PLANNING AND GOVERNANCE FOR BLENDED PEDAGOGIES AND ENGAGEMENT OF KNOWLEDGE ECONOMY FOR SOUTH AFRICA'S NATIONAL DEVELOPMENT AGENDA

By

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DECLARATION

I, Tlou Millicent Ramoroka, declare that the thesis hereby submitted to the University of Limpopo for the degree of Doctor of Administration in Development Planning and Management has not been previously submitted by me for the degree at this or any other university; that it is my own work in design and in execution, and that all material contained therein has been duly acknowledged.

Surname, Initials (title) **Date**

DEDICATION

This thesis is dedicated to the following people:

- My daughter Nare: Thank you so much for being the angel you are. Having you as my daughter gives life more meaning and thus, the courage and motivation to work even harder.
- My mother, Phuti Mathole: Your unconditional love, care and support gave me the strength and courage to complete this research. I could not have asked for a better mom. You are the best.
- My brothers, Diketso and Judas: I would not have completed this thesis without the love and support you have shown to me during this study. Your presence and contributions in my life are invaluable.

To all of you, thank you very much for being who you are, for the invaluable love, care and support. I love you all.

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ABSTRACT

The thesis drew from a combination of phenomenology, interactionism and critical theories because South Africa in itself consists of a polity with national dynamics, within the matrices of globality in which connectivity plays a determining role, especially in terms of the capacity to competitively participate in the global knowledge economy. Guided by reading collectively and critically from the economic, physical development, policy analysis, interpretative as well as collaboration planning approaches, among others, and the mono-centric, multilevel and adaptive models of governance, the thesis constructed a conceptual argument that the primate enablers for modernized infrastructure, skills and culture attached to the preconditions for blended pedagogies, are modernized planning and governance. However, the attainment of planning, governance, infrastructure and skills is in itself inadequate to inculcate the culture necessary for the integration of e-learning with conventional didactics. This observation is confirmed through international experiences that involve the developed countries that are in the very high and high Human Development Index (HDI) categories such as Australia, Poland and Korea as well as Thailand, Brazil and Algeria, respectively, where the presence of planning, governance, infrastructure and skills has not automatically precipitated a culture required for blended pedagogies. This evidence does not seek to underplay the significance of planning, governance, infrastructure and skills in the integration of e-learning with conventional didactics, but the thesis has established that the existence of modernized planning, governance, infrastructure and skills are a necessary, rather than a sufficient, condition.

From the literature review, the thesis deduces that e-culture is a virtually sufficient condition for the establishment of blended pedagogies. Hence, variables such as GDP per Capita, Gross Fixed Capital Formation, Average Annual Growth of General Government Final Consumption Expenditure, Research and Development Expenditure and Public Expenditure on Education, that demonstrate the level of human development of a country, do not necessarily reflect capacity to enable the establishment of blended pedagogies. Such conditions do not always coexist with pre-eminence of communication using Internet and/or Mobile Phones, characteristic of the “Net Generation Culture”. The

latter, as a specific form of e-culture, is heavily dependent on infrastructure and skills which are, among others things, reflected in Gross Fixed Capital Formation, Employment to Population Ratio, Labour Force Participation Rate, Labour Force with Tertiary Education, Total Electrification Rate as well as Employment to Population Ratio. The observation made above is corroborated by the experiences of developing countries such as Vietnam, Zambia and Kenya, which are in the medium and low HDI categories, wherein the absence of appropriate and adequate infrastructure, skills and e-culture together with planning and governance imperil the evolution of the national culture into that of the "Net Natives".

From an empirical perspective, consistent with the hybridization of philosophy, the thesis conveniently selected a target population that consisted of a total of 15 countries, wherein 14 of these observations provide a backdrop against which South Africa's relative readiness and appropriateness of planning, governance, infrastructure, culture and skills for blended pedagogies are determined. A combination of purposive and quota sampling procedures was adopted to select the 15 countries across the four HDI categories. The 15 countries are classified in terms of the 2015 United Nations Development Programme HDI conceptions, which produced four levels of "very high", "high", "medium" and "low". A total of 28 variables were selected for Principal Component Analysis (PCA). The thesis used secondary data sources for textual and empirical data, where the latter was largely drawn from the United Nations Development Programme Reports. The textual data were analysed qualitatively through thorough descriptions, classification and drawing of connections, the statistical data were organized into a 15 (observations) by 28 (variables) raw data matrix and analysed through the PCA. Verbal tools were used to provide thick descriptions of contexts regarding historical, social, demographic and economic backgrounds in order to situate the motive underlying the planning and governance of blending e-learning pedagogies with conventional didactics in South Africa. From a quantitative perspective, PCA was used for statistical modelling that standardized the data and produced a variety of useful statistical summaries such as Principal Components, Eigenvalues, Communalities, Correlation Matrix, Component Loadings, Component Scores and Scattergrams.

Given that the raw data consisted of 15 observations by 28 variables, a 28 by 28 variables correlation matrix was generated. Of the 378 correlations that the thesis discovered, 183 are direct and 195 are indirect. However, 276 of the 378 relationships are negligible; only 102 correlations were strong and significant enough to deserve closer examination. Principal Component Analysis extracted a total of 15 Principal Components; and, the first seven according to the thesis, accounted for the cumulative percentage of 92% in the interrelationships. Furthermore, it is evident that Principal Component 1 consists of the characteristics of Modernized, Planning, Governance, Infrastructure, Skills and Culture, which are diametrically different from the Frustrated Development, Unsustainable State Intervention and Societal Inequalities, Limiting e-infrastructure, e-skills Constraint, Muted Development Potential and the Non-existent e-culture that are associated with the rest. Given the significance and strength of the eigenvalue and component loadings on Principal Component (PC) 1, it should signify the presence of enabling environments for e-infrastructure, e-governance, e-culture and e-skills consistent with modernized planning and governance of blended pedagogies. Therefore, a country that scores negatively on PC 1 and positively on PC 2 would represent a society that is far less prepared for blended pedagogies where an unrelenting state investment for e-infrastructure, e-governance, e-skills and e-culture would translate into a replacement behaviour rather than integration of conventional didactics with digital technologies. This infers that the status of governance, infrastructure, skills and culture would remain less optimal for the adoption of blended pedagogies. For such countries, investing heavily in blended pedagogies without first creating the requisite conditions for engagement in the global knowledge economy would imply that they would have sought to exploit non-existent capacity in governance, infrastructure, skills and culture.

South Africa's component score on PC 1 is -0.58, which would in terms of the analysis mean that this country lacks the character of modernized planning, governance, infrastructure, skills and culture that are necessary for engendering blended pedagogies. Countries such as Norway, Australia, Poland, Korea, Thailand, Vietnam and Sri Lanka that have variably trotted the blended pedagogies score positively on PC 1. Besides, some of these countries have not been successful in blended pedagogies, notwithstanding their apparent enabling environments. Conversely, South Africa's component score on PC 2 is extraordinarily higher than all of the 14 countries; and, it is 2.15 points higher than the nearest score. It is important to recognize that South Africa's score on PC 2 is an extreme case and a virtual outlier that has no connection to the rest of the fourteen countries, especially those in the Medium and Low HDI. Overall, South Africa's component scores highlight the relative dearth of appropriate planning, governance, infrastructure, skills and culture, that are necessary for the adoption of blended pedagogies. Whereas the thesis finds that there is no direct correlation between the level of human development and adoption of blended pedagogies, the latter appears to be a result of convoluted processes that involve the creation of enablers for e-culture largely through planning, governance, infrastructure, skills and culture. These qualities are embedded with societal equality, equity of access to services, capital formation, employment, education as well as Internet infrastructure. The thesis therefore, concludes that South Africa's potential for human development is derailed through endless planning that has become an end in itself. Planning for its own sake, which defines South Africa's democratic history, means that modernized governance, skills and e-culture that are necessary for blended pedagogies have remained substandard.

The thesis establishes that South Africa’s national as well as Information and Communication Technology (ICT) planning demonstrates ambition and interest, which is however pursued in the absence of effective governance of implementation and adoption of appropriate educational technologies. Evidently, South Africa is yet to attain modernized planning, governance, skills and culture appropriate for the implementation of blended pedagogies, notwithstanding the infrastructure provided in some of the schools for teaching and learning. Instead, South Africa’s pedagogic digital transformation is characterized by replacement of conventional didactics with e-learning rather than integration for blended pedagogies. Therefore, this evidence suggests that, although South Africa’s educational ICT infrastructure seems to be relatively modernized, the absence of appropriate and adequate planning, governance, skills and e-culture impairs the successful implementation of blended learning. The thesis, therefore, recommends that adoption of blended pedagogies should be supported through the creation of e-culture in households, underwritten by modernized planning, governance, infrastructure and skills for competitive participation in the global knowledge economy.

ACRONYMS

HDI	: 2014 Human Development Index (HDI)
HDIRC	: HDI Rank Change (2009-2014)
AAHDIG	: Average Annual HDI Growth (1990-2014)
IAHDIV	: Inequality-adjusted HDI Value (2014)
CHI	: Coefficient of Human Inequality
IE	: Inequality in Education
IAEI	: Inequality-adjusted Education Index
II	: Income Inequality
IIGC	: Income Inequality Gini Coefficient
PEE	: Public Expenditure on Education
GDP	: Gross Domestic Products (Per Capita)
GFCF	: Gross Fixed Capital Formation
TGGFCE	: Total General Government Final Consumption Expenditure
AAGGCE	: Average Annual Growth in Government Consumption Expenditure
RDE	: Research & Development Expenditure
FFPES	: Fossil Fuels Primary Energy Supply
RSPES	: Renewable Sources Primary Energy Supply
TER	: Total Electrification Rate
RER	: Rural Electrification Rate
EPR	: Employment to Population Ratio
LFPR	: Labour Force Participation Rate
LFTE	: Labour Force with Tertiary Education
YU	: Youth Unemployment
YNSE	: Youth Not in School or Employment
IUC	: Internet Users Communication
MPSC	: Mobile Phone Subscription Communication
QE	: Quality of Education
SL	: Standard of Living
PCA	: Principle Component Analysis
PC	: Principal Component

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Introduction and Background of the Study: Planning and Governance for Blended Pedagogies

1.1. Introduction and Background

For participation in the global knowledge economy, modern national development that involves the use of Information and Communication Technology (ICT) through blended pedagogies is key (Powell & Snellman, 2004; Garrison & Vaughan, 2008; Youtie & Shapira, 2008; Deltsidou, Voltyraki, Mastrogiannis & Noula, 2010; Marginson, 2010; Farkas & Török, 2011; Garrison, 2011; Aesaert & van Braak, 2014; Button, Harrington & Belan 2014; Gu, Shao, Guo & Lim, 2015; Valtonen, Kukkonen, Kontkanen, Sormunen, Dillon & Sointu, 2015). That is, the success of blended pedagogies relies on the appropriate planning approaches, governance models, infrastructure, skills and culture necessary for national development and participation in the global knowledge economy. Overwhelming literature attest to the notion that the production of services based on intellectual capacities has thrust knowledge economy to the centre of modern development (Powell & Snellman, 2004; Garrison & Vaughan, 2008; Youtie & Shapira, 2008; Deltsidou et al., 2010; Marginson, 2010; Farkas & Török, 2011; Garrison, 2011; Aesaert & van Braak, 2014; Button et al., 2014; Gu et al., 2015; Valtonen et al., 2015). The knowledge economy relies heavily on intellectual capabilities, rather than on physical inputs, that are predicated upon human capital and natural resources in order to shape industrial mass production that is necessary for the modern global development process (Powell & Snellman, 2004; Marginson, 2010; Farkas & Török, 2011; Pruet, Ang & Farzin, 2016).

The intellectual capabilities that are needed for the knowledge economy include analytical, interactive and computing skills, among others, which take effect through the use of Information and Communication Technology (ICT). Therefore, flexible and multi-skilled human resources with high levels of digital skills and expertise, acquired through formal education, are necessary for the achievement of the goals associated with modern development. Concurrently, global knowledge economy and advancements in educational ICT bore crucial implications for teaching and learning informatics (Garrison & Vaughan, 2008; Youtie & Shapira, 2008; Deltsidou, Voltyraki, Mastrogiannis & Noula, 2010; Marginson, 2010; Garrison, 2011; Mdlongwa, 2012; Button, Harrington & Belan, 2014; Gu, Shao, Guo, & Lim, 2015; Valtonen, Kukkonen, Kontkanen, Sormunen, Dillon & Sointu, 2015), which in turn will have an effect on modern development. For all intents and purposes, ICT epitomizes educational innovation, globalisation, connectivity, global integratedness and national development (Peeraer & Van Petegem, 2015). But this strategic linkage between ICT and the knowledge economy is not automatic, it requires dedicated interventions through specific planning approaches and governance models. Thus, success and/or failure of the modern process of development often depend on the nature of planning approaches and forms of governance of blended pedagogies. The study seeks to examine the appropriateness of planning approaches, governance models, infrastructure, skills and culture for blending e-learning pedagogies with conventional didactics for societal participation in the knowledge economy in pursued of the modern process of national development.

However, the global advancements and the "inevitability" as well as "ubiquity" of ICT, and its pedagogic applications have not been unproblematic, especially given the rigidities of adherence to conventional didactics across the world, including among developed nations (Peeraer & Van Petegem, 2015; Valtonen et al., 2015; Webster & Son, 2015). Indeed, technology does not "automatically bring about particular learning outcomes" because "there is nothing inherent in technology that automatically guarantees learning" (Peeraer & Van Petegem, 2015: 48). Unsurprisingly, developed countries with the state-of-the-art ICT infrastructure have equally continued to struggle to integrate e-learning with conventional didactics, notwithstanding the positive benefits associated with digital technology. Additionally, educational ICT accessed through gadgets such as smartphones and tablets can distract learning due to the potential for gamification, "texting, social media and the internet" which reduce the degree of concentration and attention span (Beland & Murphy, 2015: 2). To this extent, infrastructure necessary for blended pedagogies is not a sufficient condition for precipitating successful implementation of e-learning in schools; instead, planning approaches and governance models for blended pedagogies are paramount determinants (Garrison & Vaughan, 2008; Deltsidou et al., 2010; Marginson, 2010; Garrison, 2011; Button et al., 2014; Peerear & Van Petegem, 2014; Valtonen et al., 2015; Webster & Son 2015). Blending e-learning pedagogies with conventional didactics for national development through participation in the global knowledge economy raises questions of the appropriateness of planning approaches, governance models, infrastructure, culture and skills.

Governments across the world, in both developing and developed countries, have significantly invested in resources and efforts for pedagogic transformation towards blending e-learning with conventional didactics for national development and participation in the global knowledge economy (Teo, 2011; Al-Mansour & Al-Shorman, 2012; Ertmer, Ottenbreit-Leftwich, Sadik, Senddurur, & Sendurur, 2012; Kirkwood & Price, 2013; Hou, Wu, Lin, Sung, Lin & Chang, 2014**;** Peeraer & Van Petegem, 2015; Webster & Son 2015). In South Korea, there has been substantial investments in ICT for teaching and learning especially between 1978 and 2001 as an attempt to “modernise and globalise the education system” for national development (Webster & Son, 2015: 84). Regardless of these efforts and investments by the Korean government and universities, the majority of trained teachers still do not use technology (Webster & Son, 2015). On its part, Vietnam sought to integrate e-learning pedagogies with conventional didactics as a tool to encourage creative learning and innovation towards national development (Peeraer & Van Petegem, 2015). Evidence from these countries suggests that ICT-related infrastructure and resources, which are assumed to provide sufficient and necessary conditions for blended pedagogies, have seldom been used for the stated purposes. Across the world, blending of e-learning with conventional didactics has generally faltered amidst momentous investments in improved access to digital technology infrastructure, culture as well as teachers’ and learners’ informatics skills. There is no conclusive evidence that blending of e-learning pedagogies with conventional didactics would be successful everywhere else because that is dependent on a variety of preconditions, including planning, governance, infrastructure, culture and skills, which are based upon national development dynamics.

South Africa has jumped onto the bandwagon of blending e-learning pedagogies with conventional didactics (Bialobrzeska & Cohen, 2005; Jacobs, 2013a & 2013b) in the hope of engendering a knowledge economy-driven national development. As early as 2004, the South African government set ambitious targets that should be achieved by 2013 as a response to the need for integration of digital technology in education

(Department of Education, 2004; National Planning Commission (NPC), 2012). The targets include, among others, that by 2013 "all schools will have access to a networked computer facility for teaching and learning, and to high quality educational resources"; and, that "all schools, teachers and learners will be confident and competent users of ICT, and ICTs will be integrated into teaching and learning at all schools" (Bialobrzeska & Cohen, 2005: 14). However, reality has not matched policy intentions, especially as some provinces have embarked on substitution rather than blending. South Africa has not as yet met its "ambitious" national development targets and the majority of schools are still without educational ICT such as networked computer facilities, quality educational resources or confident and competent users (NPC, 2012). Following the adoption of the National Development Plan 2030 in 2012, some of South Africa's provinces fervently pursued the implementation of digital technologies in education in the hope of preparing society for participation in the knowledge economy and modern process of development.

For instance, Gauteng Province took the lead on January 14, 2015 in the so-called *the Big Switch-On Pilot Project,* officially launched with the distribution of 88 000 tablets to seven schools (South Africa.Info, 2015a). This move appears to have agitated for provincial competition for championing South Africa's integration of digital technology in education, as attested to by the recent pronouncement from the Western Cape. The study seeks, therefore, to interrogate the appropriateness of South Africa's planning approaches and governance models for blended pedagogies and hopes to engage the global knowledge economy for national development, amidst the evident rush towards substitution rather than blending. It is befitting to question the readiness and appropriateness of South African planning, governance, infrastructure, culture and skills for blending, let alone substitution, of e-learning pedagogies with conventional didactics, through a historical-comparative prism that exploits selected countries at different levels of human development as measured by the United Nations Development Programme (UNDP).

1.2. Statement of the Research Problem

Globally, e-learning pedagogies are increasingly accepted as the most ideal form of promoting active, rather than passive, knowledge acquisition (Teo, 2011; Al-Mansour

& Al-Shorman, 2012; Ertmer et al., 2012; Kirkwood & Price, 2013; Hou et al., 2014; Peeraer & Van Petegem, 2015; Webster & Son 2015). As a result, e-pedagogies have gained currency and popularity across the globe (Peeraer & Van Petegem, 2015; Webster & Son 2015). A universally dominant view holds that conventional didactics alone, which relies heavily on teachers to deliver information to learners through passive learning, does not necessarily enforce active and effective knowledge acquisition (Kirkwood & Price, 2013; Hou et al., 2014; Wolff, Wagner, Poznanski, Schiller & Santen, 2015). Accordingly, it is believed that conventional didactics and electronic techniques can be used together as effective tools to “contextualize content, explain difficult concepts, and improve student learning from simply remembering to applying and analysing” (Wolff et al., 2015: 85). Even though educational transformation through the adoption of digital technology has taken the centre stage globally as a way of facilitating active knowledge acquisition, it has not been unproblematic (Peeraer & Van Petegem, 2015; Pruet et al., 2016). The most common challenge is the inability, lack of readiness and/or resistance of educational systems to blending of e-learning pedagogies with conventional didactics (Noh, Mustafa & Ahmad, 2014; Gu et al., 2015; Mohammadi, 2015; Pruet et al., 2016). This challenge is generally associated with absence of or substandard computer and information literacy among users, a dearth of ICT informatics, as well as inadequate and, sometimes, inappropriate planning approaches and governance models (Noh et al., 2014; Gu et al., 2015; Mohammadi, 2015; Pruet et al., 2016). Together with e-culture, e-skills, e-infrastructure, e-planning and e-governance are the necessary preconditions and requirements for the advancement of digital pedagogic transformation appropriate for national development and participation in the global knowledge economy (Noh et al., 2014; Gu et al., 2015; Mohammadi, 2015; Pruet et al., 2016). That is, implementation of an e-learning environment devoid of e-planning, e-governance, e-infrastructure, e-culture and e-skills would make failure an inevitable end-result. But blended pedagogies require more than mere e-planning, e-governance, e-infrastructure, e-culture or e-skills, because conventional didactics is not all ineffectual. This means that, participation in the global knowledge economy for national development requires blended, rather than replacement, pedagogies.

It is in this same context of transformation of pedagogies that the recent e-learning emphasis in a democratic South Africa and the apparent rush for substitution of conventional didactics with e-pedagogies, rather than blending, has to be rigorously examined for the readiness and appropriateness of the prevalent planning approach, governance model, infrastructure, culture and skills. The adoption and implementation of e-learning pedagogies in South Africa cannot be tenably expected to be unproblematic. E-learning investments are driven through the National Development Plan (NDP) 2030, which states that “by 2030 South Africans should have access to education and training of the highest quality, leading to significantly improved learning outcomes” (National Planning Commission (NPC), 2012: 296). Some of the requirements of this vision are that all schools must have well-functioning libraries, computer and media centres and high speed broadband which is readily available and incorporated into the design of educational systems (NPC, 2012). As a response to the aspirations of the NDP 2030, Minister of Finance, Nhlanhla Nene, proclaimed in his 2015 National Budget Speech that R29.6 billion and R1.1 billion is allocated for educational infrastructure grant and broadband connectivity, respectively (Nene, 2015). The allocated funds are meant to build and improve digital technology infrastructure and produce a future labour force that meets the requirements of the knowledge economy (Nene, 2015). Already, Gauteng and Western Cape Province are at the forefront of the digital technology race in education for national development (Makhura, 2015; Zille, 2015). The Big Switch-On Pilot Project for Gauteng Province, for example, envisions “a paperless education system which will give learners access to learning materials, workbooks and other subject matter through the use of ICT” (South Africa.Info, 2015a: n.p).

On its part, the Western Cape Province has invested in and planned to launch the so-called Smart Schools Project in July 2015 to improve the quality of teaching and learning through digital technologies (South Africa.Info, 2015b). There is evidence that the provincial contestations for a digital technology-champion in South Africa’s educational system is founded on replacement of conventional didactics with e-learning pedagogies, rather than blending (du Toit, 2015; Rand Daily Mail, 2015; South Africa.Info, 2015a, 2015b). The dearth of conclusive affirmation of the success of blended pedagogies for participation in global knowledge economy and national development in other countries should be of concern to South Africa, especially given that the leading provinces have hoped for substitution rather than integration as provided by the NDP 2030. Furthermore, effective adoption and usage of digital technologies for modern teaching and learning relies on several determinants that require adoption of specific planning approaches, governance models, infrastructure, pedagogic technological informatics for both teachers and learners, as well as for a transformation in societal culture and skills. The study sets out to investigate the preconditions of such e-transformation to determine South Africa's readiness, relative to other states in the world that have trotted out with blended pedagogies, both developed and developing. The evaluation of South Africa's relative readiness and appropriateness of planning, governance, infrastructure, culture and skills for blended pedagogies adopted a historical-comparative research design and statistical modelling among 14 countries at different levels of human development.

1.3. Research Questions

The general research question for this study is as follows: what is the probability of the readiness and appropriateness of South Africa's planning approach, governance model, infrastructure, culture and skills for blended pedagogies and participation in the global knowledge economy for national development? From this general research question, the following specific research questions are formulated to operationalize the study:

- What are the generic planning approaches?
- What are the models of governance?
- What are the tenets of conventional didactics?
- What are the principles of e-learning pedagogies?
- What are the preconditions for blending e-learning pedagogies with conventional didactics?
- What are the appropriate planning approaches, governance models, infrastructure, culture and skills, for blended pedagogies?
- What are the prospects and challenges of South Africa attaining appropriate blended pedagogies for participation in the global knowledge economy and national development, relative to other countries of various human development standing?

1.4. Aim and Objectives

The aim of the study is to investigate the probability of the readiness and appropriateness of South Africa's planning approach, governance model, infrastructure, culture and skills for blended pedagogies and participation in the global knowledge economy for national development. To operationalise this aim, the study framed the following specific working objectives:

- To analyse the generic planning approaches.
- To evaluate the models of governance.
- To identify and discuss the tenets of conventional didactics.
- To analyse the principles of e-learning pedagogies.
- To rigorously appraise the preconditions for blending e-learning pedagogies with conventional didactics.
- To discover appropriate planning approach, governance model, infrastructure, culture and skills, for blended pedagogies.
- To examine the prospects and challenges of South Africa attaining appropriate blended pedagogies for participation in the global knowledge economy and national development, relative to other countries of various human development standing.
- To recommend measures for adoption of planning approaches and governance models, as well as infrastructure, culture and skills, that are appropriate for blending e-learning pedagogies with conventional didactics.

1.5. Definition of Concepts

For the purpose of this study, a number of concepts are defined as follows:

Planning: Planning has several definitions that confirm that "it entails anticipation of the future and formulation of systematic programmes of action for the attainment of the goals set through policy formulation, identifying and coordinating long-term goals and short-term objectives" (Theron, 2008: 46). Conyers & Hills (1990: 62, cited in Tsheola, 2011: 84) asserts that planning is "a process that involves making decisions about alternative ways of allocating available resources to achieve particular goals at some stage in the future". For this study, planning is defined as a systematic process that includes making informed decisions collectively on how to achieve successful implementation of blended pedagogies for national development and participation in the global knowledge economy taking into consideration the availability of resources and infrastructures as well as required skills from beneficiaries and ensuring involvement of all relevant stakeholders. Where such a systematic process of anticipating the future is designed for appropriateness to the e-learning pedagogies, it is denoted **e-planning**.

Governance: Generally, governance has consistent definitions across different disciplines such as political sciences, public administration, economics, health and development studies, among others (van Kersbergen & van Waarden, 2004; Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Termeer, Dewulf & Lieshout, 2010). According to Rosenau (2000: 171, cited in van Kersbergen & van Waarden, 2004), governance refers to the “system of rules, as the purposive activities of any collectivity, that sustains mechanisms designed to ensure its safety, prosperity, coherence, stability and continuance”. However, Pereira & Ruysenaar (2012) define governance as the new method by which society is controlled and managed through an increased role of non-state stakeholders in policy making and implementation. For the purpose of this study, governance is defined as a system of rules that guides different stakeholders, inclusive of the state, private sector and communities, in collaborative and co-management of policy making, planning, implementation and monitoring and evaluation of the societal affairs, in all sectors. Where such a system of rules is designed for co-management of the adoption and use of digital technologies, inclusive of blended pedagogies and associated e-infrastructures, e-culture and e-skills, in order to achieve the set targets and outcomes in teaching and learning, it is commonly described as **e-governance**.

E-learning: e-learning is defined as “a dynamic and immediate learning environment through the use of the Internet to improve the quality of learning by providing learners with access to resources and services, together with distant exchange and collaboration” (Mohammadi, 2015: 359). For Mohammadyari & Singh (2015: 12), e-learning refers to “a web-based communication platform that allows learners, without limitations on place and time, to access diverse learning tools, such as discussion boards, assessments, content repositories, and document sharing systems”. E-learning covers a wide range of tools and technologies including e-mail, Internet, video streaming and virtual classrooms (Mohammadyari & Singh, 2015). For the purpose of this study, e-learning is defined as a method of knowledge acquisition using electronic devices such as computers, laptops, tablets and smartphones through connecting to a network in order to be able to access and download course material, getting queries answered and collaborating with teachers and/or learners on online platforms.

E-learning pedagogies**:** Pedagogy is about "the processes and dynamics of teaching and learning, including the purposes, relationships, environment, management and social context of learning" (Smith, 2005: 9). Generally, it refers to the study and practice of how best to teach. Thus, for this study, e-learning pedagogies refers to electronic teaching processes, methods and techniques which require the use of computers, laptops, tablets and smartphones with connection to a network in order to be able to access online course materials and other relevant materials and allow for knowledge exchange between teachers and learners through communication channels such as e-mails and social media platforms, among others.

Conventional didactics**:** According to Wolff et al. (2015: 85), "traditionally, didactic sessions are lectures that rely on the instructor delivering information to learners through passive learning, with the goal of knowledge acquisition". Therefore, conventional didactics in this study refers to traditional teaching methods which includes the use of tools such as the chalkboards, chalks and textbooks, among others which mostly focus on memorizing, remembering and reproduction skills through passive learning among learners. These conventional didactics rarely support active learning which develop learners' application, analytical and interactive skills as learners focus more on learning what the teacher is delivering to them.

Blended pedagogies**:** Blended pedagogies and/or learning refers to "the integration of traditional physical learning methods with virtual network technologies. Accordingly, blended learning employs virtual teaching activities that complement and enrich physical teaching" (Hou et al., 2014: 208). For the purpose of this study, blending is defined as the process of integrating e-learning pedagogies with conventional didactics to improve teaching and learning processes, methods and techniques in order to develop learners' application, analytical and interactive skills. Thus, blended pedagogies refers to the combination e-learning with conventional didactics which includes the traditional classroom and online activities, respectively, as a way of enhancing learner learning and successfully develop learners' application, analytical, interactive and ICT skills necessary for participation in the knowledge economy.

***Knowledge economy*: **Knowledge economy is defined as the stage of "global economic development" which emerged after the agricultural and industrial ages which were mainly based on land as well as capital and labour (Weber, 2011; Achim, 2015). Therefore, the current economic structures depends on the increasing importance of knowledge and technology as the primary means of production and economic development and growth instead of labour and/or land. For the purpose of this study, knowledge economy is defined as the economy that heavily relies on knowledge and technology as the main means of economic production and development.

1.6. Research Design and Methodology

To achieve the objectives of the study, a combination of statistical modelling, historical-comparative analysis and evaluation research design was adopted, incorporating both qualitative and quantitative approaches. Basically, the study is a desktop research study that used existing data from the databases such as the United Nations Development Programme (UNDP), Statistics South Africa, Department of Trade and Industry, South African Reserve Bank, among others. This section presents details of the research design and methodology, which includes the philosophical orientation, research design, description of the study area, kinds of data required, target population, sampling design, data collection procedures, analysis techniques as well as reliability and validity.

Combining historical-comparative analysis, statistical modelling and normative evaluation research of a social world is inherently complex; and, it becomes protracted given the social reality of a former colony in Africa, which experienced apartheid capitalism and the demonstration effect under the assumed neolibertarian democratic dispensation. As a developing country, South Africa is equally captivated by "meta-narratives of anti-colonialism and nationalism" and post-colonialism that have "tended to obscure the nuances of colonial history and the complex" engagements of domination and subordination (Ndlovu-Gatsheni, 2007: 174). Just as in most of Africa, “national development” in South Africa is now rendered an oxymoron met with suspicion, and is associated with myth, impasse or crisis, “rise and fall of development”, “post-development”, disaster of social engineering, dustbin of history, accession to Western superiority, denigration of local knowledge and innovation, and a repressive meta-narrative that makes for privilege of those defined to hold merit and oppression of those recognised as enthroning mediocrity (Mkandawire, 2011: 5). That is, the historicity of development involves complex matrices of slavery, colonialism, global capitalism, state capitalism, neoliberalism and globalisation whose impacts are organised at the local scale (Ndlovu-Gatsheni, 2007; Mkandawire, 2011), inclusive of educational systems transformation, under “homogenising thrust” and “compulsions of the market … rechristened as globalisation” where “emulation is a consequence of all human exchange” (Mkandawire, 2011: 5). Therefore, the study holds a philosophical orientation that guides the invention of a befitting normative evaluation research study, including a historical-comparative analysis and statistical modelling design, given the complexities of the contextual matrices for investigating phenomena related to a democratic South Africa within the co-evolution of globalism, knowledge economy and national development.

As Reeves, Albert, Kuper Hodges (2008: 631) state, “theories provide complex and comprehensive conceptual understandings of things that cannot be pinned down: how societies work, how organisations operate, why people interact in certain ways”. The investigation of the readiness and appropriateness of planning, governance, infrastructure, culture and skills for blended pedagogies and participation in the global knowledge economy for national development entails a complex theoretical orientation. Philosophically, therefore, the study consists of a combination of phenomenology, interactionism and critical theory (Archer, 1982; Reeves et al., 2008; Stinson, 2009). This mix is necessary because the subject under study involves planning, governance, infrastructure, culture and skills, which are all critical facets of people, institutions and states at both individual and collective scales. Educational systems produce skills at an individual level whilst simultaneously creating the possibility of cultural constructions from interactions of actors involved in creating infrastructure through processes of planning and governance for teaching and learning. That is, the participation of a society in the global knowledge economy for national development is constructed and shaped through the educational systems in this same way. Equally, oppressive regimes such as colonialism and apartheid are created through specific planning, governance, infrastructure, culture and skills, which are executed along particular pedagogies in educational school systems. Historical evidence demonstrates that the separatist and apartheid capitalism were both created and constructed through specific forms of planning and governance that established particular infrastructure, culture and skills of oppression versus domination, servant versus master and hegemon versus subaltern. In this same way, the effects of pedagogies are unavoidably enduring, with the specific didactics persisting long after they should have been transformed.

1.6.1. Research Design

The study adopted a normative evaluation research design in order to draw from the collective strengths of scholarship synthesis, content analysis, statistical modelling and historical-comparative studies. Through normative evaluation, the study determined South Africa’s appropriateness and readiness in blending e-learning pedagogies with conventional didactics. The events, actions and processes involved in planning, governance, infrastructure, culture and skills associated with transformative pedagogies for participation in the knowledge economy and national development cannot be controlled. For this reason, a combination of scholarship analysis, historical-comparative research, content analysis and statistical modelling would be appropriate for collection and analysis of relevant qualitative and quantitative data necessary to establish the probability of South Africa’s readiness and appropriateness of planning approaches, governance models, infrastructure culture and skills for blended pedagogies and participation in the global knowledge economy for national development.

Qualitative data consists of theoretical debates relating to the relationships of educational pedagogies with passive and/or active knowledge acquisition, participation in the knowledge economy and prospects of national development, as well as planning approaches, governance models, tenets of conventional didactics, principles of e-learning pedagogies, pre-conditions for establishing blended pedagogies, and prospects and challenges of blending e-learning pedagogies with conventional didactics. From an empirical perspective, data consist of frameworks and benchmarking statistics for national planning, governance, infrastructure, culture, skills and interventions designed for establishing blended pedagogies. Also, data relating to planning, governance, infrastructure, culture and skills necessary for blended pedagogies was drawn from selected countries, both developed and developing, in order to create an analytical tool for the determination of readiness and appropriateness of the same preconditions for South Africa. Furthermore, quantitative data consist of the number of schools with ICT, level of connectivity, proportions of teachers trained in e-learning pedagogies, teachers and learners who have access to digital technology inclusive of tablets, computer centres and home internet connectivity, degree of use of digital technologies for teaching and learning, extent of continued reliance on conventional didactics, proportion of subjects wherein blended pedagogies are adopted and schools with access to connected electricity supply.

The content specified was evaluated to make judgements, inferences and draw conclusions in terms of determining South Africa’s appropriateness and readiness in adopting blended pedagogies relative to that of selected countries. In this context, a historical-comparative analysis was used to conduct relational studies in the context of the evolution of globalism, knowledge economy, educational systems and national development. Such quantitative data was organized in a matrix that would be analysed using the Principal Component Analysis (PCA), together with that from selected countries in order to determine the association through principal components, loadings and component scores. In this way, it was possible to establish patterns of association between South Africa with groups of countries categorised into three groups on the basis of levels of success or lack thereof in blended pedagogies’ transformation.

1.6.2. Description of the Study Area

A democratic South Africa has signalled its interest in adopting blended pedagogies as part of the national development in its NDP 2030; and, provinces are already in a rush to assume the national champion position. The unit of analysis for the study is the country; and, South Africa was juxtaposed with 14 other nations, inclusive of those that would have already flirted with blended pedagogies. South Africa consists of a total of 9 provinces, namely, Eastern Cape, Free State, Gauteng, Kwa-Zulu Natal, Limpopo, Mpumalanga, North West, Northern Cape and Western Cape Provinces (Tibane & Vermeulen, 2014), which are at different stages of transformation towards blended pedagogies. In terms of the 2013 human development index (HDI) rankings, the following counties were conveniently selected for the study: Norway, Australia, Republic of Korea and Poland with very high HDI; Sri Lanka, Brazil and Thailand with high HDI; Botswana, Vietnam, Congo and South Africa with medium HDI; and, Kenya, Malawi, Swaziland and Nigeria with low HDI (United Nations Development Programme, 2014). South Africa has a 3 tier system of education which starts from primary to secondary/high schools then tertiary education, mostly traditional and comprehensive universities as well as universities of technology (Department of Education, 2004). It has a total number of 23 740 and 359 ordinary and special needs education schools, respectively, spread across all the nine provinces, inclusive of primary and secondary/high schools (Department of Basic Education, 2009, 2014). Importantly, though, less than one third of the total number of ordinary schools have access to computer centres.

1.6.3. Kinds of Data Required

The study required qualitative and quantitative data in the form of facts and opinions; additionally, statistical data was required in order to generate precise numerical statements that would form the basis for accurate judgements, inferences and conclusions. Textual data, especially which involves theoretical discourses and existing empirical information, relating to planning, governance, infrastructure, culture and skills which are necessary for blended pedagogies was required. Qualitative data in the form of facts and opinions was collected from documented sources such as books, journal articles, government documents, newspapers, magazines, the Internet as well as other news media. These data consist of theoretical debates, planning approaches, governance models, tenets of conventional didactics, and principles of e-learning pedagogies, the pre-conditions for establishing the e-learning environment, appropriate infrastructure, culture as well as skills for establishing the e-learning environment as well as for blended pedagogies, and the prospects and challenges of blending e-learning pedagogies with conventional didactics.

Quantitative data consist of number of schools, teachers trained in e-learning pedagogies, teachers and learners who have access to digital technology inclusive of tablets, teachers and learners with digital informatics, prevalence of conventional didactics, frequency of ICT usage, school internet connectivity, volume of usage of

ICT, computer centres and home internet connectivity and schools with access to electricity supply collected for the fifteen countries and South Africa. A raw data matrix of 15 observations (South Africa and the other 14 selected countries) by 28 relevant variables and indicators related to the description presented above (appendix A). The data required exists in the UNDP data base and the extracted variables from the report include the 2014 HDI, Coefficient of human inequality, inequality in education, Gini coefficient of income inequality, public expenditure on education, GDP per capita, research and development expenditure, primary energy supply, electrification rate, employment to population ratio, communication (internet users and mobile phone subscriptions), education quality and standard of living, among others (appendix A). The data to be collected was used to evaluate the appropriateness and readiness of blended pedagogies in South Africa through statistical modelling using the Principal Component Analysis, as explained in a later subsection.

1.6.4. Target Population

The target population of the study consisted of South Africa and 14 selected countries. This target population is appropriate for the study because South Africa has given the impression of seeking to pose as the first world nation in Africa. In this regard, it was appropriate to juxtapose South Africa against countries at different levels of HDI in order to determine, in terms of association, its readiness and appropriateness of planning, governance, infrastructure, culture and skills for blended pedagogies. That is, the study's target population consists of a total of 15 observations, inclusive of South Africa, wherein all the selected countries provide a backdrop against which readiness and appropriateness of planning, governance, infrastructure, culture and skills for blended pedagogies are determined. The selection of the 15 countries is purely on the basis of their 2015 rankings in terms of the HDI, which provides a surrogate for measuring its positioning in a knowledge economy as well as the national development performance within global capitalism and knowledge economy (table 1.1). According to the United Nations Development Programme (UNDP, 2015: 211), HDI is "a composite index measuring average achievements in three basic dimensions of human development – a long and healthy life, knowledge and decent standard of living". The HDI of the 15 selected countries, inclusive of South Africa, categorized into four levels as very high, high, medium and low, was used for a significant degree of comparability in terms of variables that are relevant to this study (table 1.1). The HDI categories are based on HDI fixed cut-off points, which are derived from the quartiles of distributions of component indicators. The cut-off points are HDI of “less than 0.550 for low human development, 0.550–0.699 for medium human development, 0.700–0.799 for high human development and 0.800 or greater for very high human development” (UNDP, 2015: 204).

Table 1.1: HDI Category and Range of Sampled Countries

HDI Category	Range	Country	2014 HDI Value
Very high	0.800 to 1.000	Norway	(0.944)
		Australia	(0.935)
		Korea (Republic of)	(0.898)
		Poland	(0.843)
High	0.700 to 0.799	Sri Lanka	(0.757)
		Brazil	(0.755)
		Thailand	(0.726)
Medium	0.550 to 0.699	Botswana	(0.698)
		South Africa	(0.666)
		Vietnam	(0.666)
		Congo	(0.591)
Low	0.000 to 0.549	Kenya	(0.548)
		Swaziland	(0.531)
		Nigeria	(0.514)
		Malawi	(0.445)

Source: UNDP, 2015

In this respect, these countries’ progress, or lack thereof, in digital transformation towards blended pedagogies provided an accurate yardstick for measuring readiness and appropriateness of South Africa’s practices by association, from both quantitative and qualitative perspectives. Furthermore, Gauteng and Western Cape Province formed an important part of the study in the sense that there exists attempts to become national champion of the digital transformation of pedagogies.

1.6.5. Sampling Design

South Africa and twenty selected countries formed part of the study. A combination of purposive and quota sampling designs was adopted to select the 15 countries across the 4 HDI categories. As already noted, the HDI was used as a surrogate measure of progress in the knowledge economy and global capitalist development. According to the UNDP (2014), countries in the world can be classified into four specific HDI categories described as very high, high, medium and low (table 1.1). The specific range of HDI values for each of these categories are above 0.790, from 0.700 to 0.790, from 0.550 to 0.690 and below 0.550, respectively (UNDP, 2014). These statistical categorization are consistent with specificities in terms of global connectivity, engagement with the knowledge economy, national status of e-planning, e-governance, e-infrastructure, e-culture and e-skills. Given that the 15 countries are selected from the four HDI categories, where South Africa is itself classified under medium HDI with the value of 0.658, there has to be a significant degree of comparability in terms of many other facets relevant to the study.

1.6.6. Data Collection Procedures

The study used secondary data sources for textual and empirical data. Thus, the most fundamental procedure used is desktop study. This entailed drawing data as described in subsection 1.6.4 above, from documentary sources such as books, journal articles, government documents, newspapers, magazines, internet as well as other news media. As already indicated, relevant data included theoretical debates and planning approaches, governance models, tenets of conventional didactics, principles of e-learning pedagogies, the pre-conditions for establishing the e-learning environment, models of planning and governance, infrastructure, skills and culture appropriate for establishing the e-learning environment and the prospects and challenges of blending e-learning pedagogies with conventional didactics as applied to enhance national development and participation in the global knowledge economy. Additionally, statistical data which consisted of a number of schools, teachers trained in e-learning pedagogies, school enrolment ratios, teachers and learners who have access to digital technology inclusive of tablets, computer centres and home Internet connectivity and schools with access to electricity supply, government expenditure in digital technologies, employment to population ratio and unemployment rate, among others, were collected from these documents. The statistical data were organized into a raw data matrix of 15 observations by 28 variables, which are discussed in subsection 1.6.4 above. A large part of this data was drawn from the United Nations Development Programme Reports.

The relevance and importance of all the 28 variables used in this study are discussed. All the variables used in the study were derived from the UNDP report (2015) and therefore, definitions from the report are adopted for the purpose of this study. The first set of variables employed in the study that seem to be obviously relevant to a statistical analysis of readiness for implementation of blended learning is the HDI, HDI Rank Change between 2009 and 2014, Average Annual HDI Growth and Inequality-adjusted HDI Value. HDI, the first variable in the set, is described as "a composite index measuring average achievement in three basic dimensions of human development; a long and healthy life, knowledge and a decent standard of living" (UNDP, 2015: 215). The variable is important in the study because the implementation of blended learning should contribute to the improvement of the HDI as learners are exposed to ICT which is necessary for engagement in the global knowledge economy. The second variable in the set of importance to the study is the HDI Rank Change between 2009 and 2014. This variable reveals the changes of the HDI in three basic dimensions of human development; a long and healthy life, knowledge and a decent standard of living, both good and bad, between 2009 and 2014 that are used to measure if the HDI is improving or not (author's own formulation). Observing the change is useful in this study to determine if the selected countries are making good progress in development or not, especially with regard to knowledge economy.

The third relevant variable in the set is the Average Annual HDI Growth which is defined as "a smoothed annualized growth of the HDI in a given period, calculated as the annual compound growth rate (UNDP, 2015: 215). The calculation of the annual HDI growth is relevant to the study because it provides a clear indication of the development within the given period of time. Lastly, the Inequality-adjusted HDI Value which is defined as "HDI value adjusted for inequalities in the three basic dimensions of human development", (UNDP, 2015: 219) is also an important variable in the study. This variable provides adjusted HDI for inequalities in a long and healthy life, knowledge and a decent standard of living thus relevant to determine the readiness of countries for the implementation of blended pedagogies for national development and participation in the global knowledge economy. Generally, HDI suggests the level of development and the different kinds of lifestyle in various countries. Depending upon the level of development, countries' successful implementation of blended pedagogies can thus be predicted through statistical analysis which reveals correlations. Thus, these variables are relevant to also establish the appropriate planning approaches, infrastructure and skills for blended pedagogies. One of the 28 important variables of this study is the Coefficient of Human Inequality which is described by the UNDP (2015: 219) as the "average inequality in three basic dimensions of human development". To some extent, a long and healthy life, knowledge and a decent standard of living and of human development implicates the levels of development reached in various countries. This variable is relevant for the determination of the successful implementation of blended pedagogies as it provides on average, evidence of inequalities in a long and healthy life, knowledge and a decent standard of living. Evidence of such inequalities are used to determine the planning approaches and governance models that could be relevant to the specific country, the identification and availability of different ICT skills, infrastructure and e-culture among teachers and learners to be implemented by means of blended learning.

Two more variables namely Inequality in Education and Inequality-adjusted Education Index are also important for understanding the status of teaching and learning in selected countries. The former refers to "inequality in distribution of years of schooling based on data from household surveys and estimated using the Atkinson inequality index", whereas the latter is described as the "HDI education index adjusted for inequality in distribution of years of schooling based on data from household surveys listed in main data sources" (UNDP, 2015: 219). These two variables are significant in the study because they provide an overview of educational inequalities across countries. These variables are used to determine such countries' readiness for and prediction of successful implementation of blended pedagogies for national development and participation in the global knowledge economy. Together, these variables assist in establishing a sufficient ground on which arguments about people's levels of educational can be made. Furthermore, with an understanding of the variables, suggestions can be made in areas of concern for countries which demonstrate high educational inequalities. The interpretation of these educational variables should provide a more systematic and logical meaning to the concept of blended learning specifically for participation in the global knowledge economy. Thus, the implementation of blended pedagogies should improve and build knowledge that is appropriate for national development and participation in the global knowledge economy.

In addition, there is another set of 3 variables which includes the Gross Domestic Product (GDP), “GDP per Capita as well as Gross Fixed Capital Formation which are important in establishing the levels of HDI among various countries by explaining the countries’ economic capabilities and productivity. Firstly, GDP is the “sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products, expressed in 2011 international dollars using purchasing power parity (PPP) rates” (UNDP, 2015: 249). Secondly, GDP per Capita is defined as the “GDP in a particular period divided by the total population for the same period” (UNDP, 2015: 249). Lastly, Gross Fixed Capital Formation means the “value of acquisitions of new or existing fixed assets by the business sector, governments and households (excluding their unincorporated enterprises) less disposals of fixed assets, expressed as a percentage of GDP. No adjustment is made for depreciation of fixed assets” (UNDP, 2015: 249). This set of variables discloses the total capital generated by the residents of countries in question as one measure to determine the HDI which is used in this study to determine the readiness for the implementation of blended learning. The assumption is that the higher the HDI the more ready the country for the implementation of blended pedagogies. Furthermore, it will be easier to determine whether the economy was growing or deteriorating, if values measuring the GDP are used. GDP in this study is also used for planning of appropriate infrastructure and skills which are key for successful implementation of blended pedagogies. However, determining the readiness to implement blended pedagogies successfully in countries would be impossible if GDP values and its growth are not evaluated against other relevant variables.

The countries’ expenditure is also of importance for the determination of their readiness to adopt blended learning. In this regard, expenditure has 3 dimensions, namely the Average Annual Growth of General Government Final Consumption Expenditure, Research and Development Expenditure and Public Expenditure on

Education. Average Annual Growth of General Government Final Consumption Expenditure is defined by the UNDP (2015: 249) as “all government current expenditures for purchases of goods and services (including compensation of employees and most expenditures on national defence and security, but excluding government military expenditures that are part of government capital formation), expressed as a percentage of GDP”. Whereas Research and Development Expenditure refers to the “current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge and the use of knowledge for new applications, expressed as a percentage of GDP. It covers basic research, applied research and experimental development” (UNDP, 2015: 249). Although the two variables are concerned with expenditure, research and development expenditure is more significant as it focuses directly on “knowledge” acquired through the use of new applications. Thus, the use of technology in education and specifically teaching and learning through newly developed applications is part of the general government’s final consumption expenditure.

Additionally, one of the measures of determining the level of HDI is through the estimation of “public expenditure on education”. This variable is explained as the “current and capital spending on education, expressed as a percentage of GDP” (UNDP, 2015: 245). The variable is of significance to the study because it reveals the countries’ total expenditure on education and thus determines their values towards knowledge acquisition and skills development. The various expenditures disclose the extent to which different countries value and invest in education in order to determine readiness as well as appropriateness for successful implementation of blended pedagogies. Collectively, the 3 variables reveal and confirm the countries’ priorities and values inclusive of education by analysing expenditures in this regard. This study assumes that countries with high expenditures have greater chances of successfully integrating e-learning with conventional didactics as most would have the necessary and appropriate infrastructure and teacher training that requires massive economical investments.

Human Development Index levels are linked to the countries’ ability to produce a labour force that is marketable, effective and efficient in what they are doing, as well as to create employment opportunities for its working population. The variable

Employment to Population Ratio is of significance in providing an understanding of the economy of various countries and more specifically the contribution of education in reducing unemployment. Employment to Population Ratio is the "percentage of the population ages 15 and older that is employed" (UNDP, 2015: 257). However, this variable carries more weight if it is interpreted with others such as Youth Unemployment Rate, Youth Not in School or Employment, Labour Force Participation Rate as well as Labour Force with Tertiary Education. The Youth Unemployment Rate measures the "percentage of the labour force population ages 15–24 that is not in paid employment or self-employed but is available for work and has taken steps to seek paid employment or self-employment". A large number of the youth can remain unemployed for as long as an equally large number of people are not active participants in the economy, assumedly as a result of lack of and/or limited education. Youth Not in School or Employment represents the "percentage of young people ages 15–24 who are not in employment or in education or training" (UNDP, 2015: 257). The percentage includes both educated and illiterate youth who are economically inactive across different countries. Labour Force Participation Rate is the "percentage of a country's working-age population that engages actively in the labour market, either by working or looking for work. It provides an indication of the relative size of the supply of labour available to engage in the production of goods and services" (UNDP, 2015: 257). Labour Force with Tertiary Education is explained as the "percentage of the labour force that has attained the tertiary level of education, that is levels 5, 5A, 5B and 6 of the International Standard Classification of Education" (UNDP, 2015: 257). These variables establish that there is a strong correlation between education and employment rates and vice versa.

Directly linked to the mentioned sets of variables, is another noteworthy set of variables which includes Inequality in Income and Income Inequality Gini Coefficient. According to the UNDP (2015: 219), Inequality in Income is explained as "income inequalities distribution based on data from household surveys estimated using the Atkinson inequality index" while Income Inequality Gini Coefficient" is a "measure of the deviation of the distribution of income among individuals or households within a country from a perfectly equal distribution. A value of 0 represents absolute equality, a value of 100 absolute inequality". The interdependence of these variables demonstrate the levels of poverty experienced in various countries due to high unemployment rates and lack of appropriate education, among others. Moreover, this set of variables offers an understanding that household income is directly linked to the successful implementation of blended learning and thus the greater inequality has adverse effects on blended pedagogies. Collectively, these variables form part of the other twenty-eight (28) which the study employed to determine readiness for the successful implementation of blended learning so as to participate in the global knowledge economy and national development. Thus, employment and labour participation in selected countries serve as some of the crucial variables for the determination of HDI levels.

One other important contributing factor towards successful integration of e-learning with conventional didactics is the selected countries' energy supply sources. In most cases, the devices that are used to fulfil the aspirations of blended learning such as computers, laptops, tablets and others, heavily rely on energy supply for charging the batteries and also for keeping some of them on and running. Therefore, for the purpose of this study, 3 variables in this regard are considered for a statistical analysis that determines the selected countries' readiness for the implementation of blended pedagogies, namely: Electrification Rate, Fossil Fuels and Renewable Energy Sources. Firstly, Electrification Rate includes all "people with access to electricity, expressed as a percentage of the total population. It includes electricity sold commercially (both on grid and off grid) and self-generated electricity but excludes unauthorized connections" both in urban and rural areas (UNDP, 2015: 253). For those people that do not rely on electricity as their main source of energy, Fossil Fuels and Renewable Energy Sources are used as alternatives. The UNDP (2015: 253) define Fossil Fuels as the "percentage of total energy supply that comes from natural resources formed from biomass in the geological past (such as coal, oil and natural gas)". Lastly, Renewable Energy Sources refer to the "percentage of total energy supply that comes from constantly replenished natural processes, including solar, wind, biomass, geothermal, hydropower and ocean resources, and some waste excluding nuclear energy, unless otherwise noted" (UNDP, 2015: 253). An evaluation of the various types and identification of the countries' main energy sources could be used to determine the sustainability of the devices that are key to blended learning. The availability, limited or lack thereof of the appropriate energy supply source is a determinant for the implementation of blended pedagogies in many countries.

Accessibility to technological devices as well as to the Internet is vital to blended learning. Thus, another pair of variables that adds value to the study consists of communication of Internet Users and Mobile Phone Subscriptions. The UNDP (2015: 265) defines Internet Users as “people with access to the worldwide network” whereas Mobile Phone Subscriptions are “number of subscriptions for the mobile phone service expressed per 100 people”. Apparently, teachers and learners who have access to the devices and the Internet seem to be more interested and willing to use technology as well as being better users of technology in education. Home computer and Internet accessibility positively contributes to the appropriate skills, knowledge and culture that are key to the successful implementation of blended learning. Additional to the above pair of variables, various countries’ satisfaction with education quality as well as standard of living is important in this study. Satisfaction with Education Quality which is associated with the “percentage of respondents answering “satisfied” to the Gallup World Poll question, “Are you satisfied or dissatisfied with the education system?” (UNDP, 2015: 269) add value in the study. The population’s satisfaction with education would suggest that the quality of education provided in the countries in question is of acceptable quality and caters for the majority’s needs. However, satisfaction with Standard of Living represents the “percentage of respondents answering “satisfied” to the Gallup World Poll question, “Are you satisfied or dissatisfied with your standard of living, all the things you can buy and do?” (UNDP, 2015: 269). This variable determined the extent to which the population in different countries are satisfied with their standard of living based on the premise that education is one of the indications of adequate living standards Therefore, based on the outcomes from various countries, it could be concluded if ever the current quality of education needs improvement or not.

Collectively, the twenty-eight presented variables are employed in this study to establish the selected countries’ readiness for the implementation of successful blended pedagogies. The level of development among countries is also of concern in determining their ability and readiness to successfully implement blended learning. The uniqueness and invaluable contributions of each of the evaluated variables makes it possible to realise the goal and objectives of the study.

1.6.7. Data Analysis Techniques

Qualitative data was analysed using techniques that involve descriptions, classifications and making connections. Verbal tools such as paraphrasing, posing questions and positive suppositions were used to provide thick descriptions of contexts regarding historical, social, demographic and economic backgrounds in order to establish the motive underlying the planning and governance of blending e-learning pedagogies with conventional didactics in South Africa. As apartheid has demonstrated, planning, governance, infrastructure, culture and skills consist of an undertone of intentions that may be inconsistent with the stated purpose of transformation. Readiness and appropriateness of South Africa's planning and governance for blended pedagogies were examined through analogous situation analysis, relational analysis and historical-comparative studies. The situations of the other twenty countries was drawn upon to determine this country's positioning and position-making in digital and blended pedagogies for its participation in a knowledge economy and for national development. Through these techniques, inferences would be drawn by association, commonalities and/or discrepancies.

From a qualitative perspective, the statistical modelling, Principal Component Analysis (PCA), was used to analyse the raw statistical data matrix as described in subsection 1.6.7 above. Principal Component Analysis is one of the known versatile multivariate analysis techniques, variously applied and extended in many different directions to provide "the linear estimator of a given rank for a random vector" (Torokhti & Friedland, 2009: 662). This analysis technique converts raw data, which is measured in different units, into standard scores which are considered as vectors (Torokhti & Friedland, 2009; Tsheola, 2010; Tsheola, 2012; Kavanoz, Yüksel & Özcan, 2015; Ninlawan, 2015; Valtonen et al., 2015; Hung, 2016). Principal Component Analysis uses the angles between these vectors to compile a correlation coefficient matrix for all the variables (Tsheola, 2010; Kavanoz et al., 2015; Ninlawan, 2015; Valtonen et al., 2015; Hung, 2016); and so in this case, the development indicators are the variables. A vector which summarizes the pattern of the variables is known as the principal component or factor which is a measure of the amount of variance in the variables accounted for by that particular principal axis (Tsheola, 2010; Tsheola, 2012; Valtonen et al., 2015; Hung, 2016). Therefore, different principal components would become indications of different levels of development or degrees of underdevelopment.

Principal Component Analysis can be used to examine interrelationships between key variables individually through regression analysis, and comprehensively for classification, clustering, prediction and neural networking (Mainardi, 2003; Lautre & Fernandez, 2004; Tsheola, 2010; Tsheola, 2012; Kavanoz et al., 2015; Ninlawan, 2015; Valtonen et al., 2015; Hung, 2016). PCA has been successfully applied in diverse multivariate analyses such as estimation of frequency data (White, Tan & Hammond, 2006; Tsheola, 2010), indexing infrastructure services, economic overhead capital (EOC) and social overhead capital (SOC) (Ghosh & De, 2005; Tsheola, 2010; Tsheola, 2012), relationships among macroeconomic and environmental conditions, water infrastructure development, and availability, demand and quality of water resources (Mainardi, 2003), measuring latent variables such as social welfare, economic development and infrastructure (Lautre & Fernandez, 2004), identification of principal factors that influence development (Andoh, Umezaki, Nakamura, Kizuki & Takano, 2006; Kavanoz et al., 2015; Ninlawan, 2015; Valtonen et al., 2015; Hung, 2016), solving a single indicator problem in forecasting electoral performance (Stambough & Thorson, 1999), and for determining the competitive power of a company (Imoto, Yabuuchi & Watada, 2008; Tsheola, 2010; Tsheola, 2012).

PCA analyses, synchronously, a large data set to reveal the underlying structure through “eigenvalue decomposition (EVD) of the variance matrix” to generate a few Principal Components (PCs) wherein “the sum of the eigenvalues is equal to the total variance (power) of the original variables” (White et al., 2006: 679). PC “represents a linearly transformed version of the input data” (White et al., 2006: 679), which in the study consists of the variables (as already discussed) captured through the 15 by 28 raw data matrix. PCA remains one powerful and reliable technique in exposing interrelationships, even with a less than perfect data set. White et al. (2006: 676) demonstrated how PCA can be used to analyse even “the problem of estimation of frequency response functions (FRFs) for a single-input single-output (SISO) system.” In this study, single inputs of variables, as described in subsection 7.7, were used among the 15 countries, inclusive of South Africa. PCs drawn reflected the power (total variance) of the interrelationships of the variables analysed to demonstrate conglomerations thereof that would be used to determine South Africa’s position in planning, governance, infrastructure, culture and skills relating to blended pedagogies among countries at different levels of HDI and transformative blended pedagogies. Standard PCA generated PCs of high power and a dimensionally reduced form of the original data, introducing parsimony to the analysis (White et al., 2006).

Standard PCA generates a global synthesis of each original matrix (Mainardi, 2003); and, when the associated covariance matrix is singular, PCA are treated as the best weighted linear estimator (Torokhti & Friedland, 2009; Tsheola, 2010; Tsheola, 2012; Kavanoz et al., 2015; Ninlawan, 2015; Valtonen et al., 2015; Hung, 2016) which embraces a balanced influence from all the groups of variables "because the inertia of the first factorial axis of every group of variables is equal to 1" and "no single group can determine the axis in the global analysis" (Lautre & Fernandez, 2004: 507). Vectors that present PCs generated by Standard PCA preserve principal features of the original data; and, "the original vector can be reconstructed from the smaller one with the least possible error" (Torokhti & Friedland, 2009: 661). PCA interpretation therefore involved reading Component Loadings (CLs) and Component (Weighted) Scores (CSs) of each observation (country) on PCs generated through Standard PCA. A cosine of the angle between the principal component and the variable is a component loading, and it is always equal to the length of the projection of the variables on the principal component (Torokhti & Friedland, 2009; Tsheola, 2010; Tsheola, 2012; Kavanoz et al., 2015; Ninlawan, 2015; Valtonen et al., 2015; Hung, 2016). The square of the component loading indicates the proportion of percentage variance in a variable associated with a specific principal component (Torokhti & Friedland, 2009; Tsheola, 2010; Tsheola, 2012). The component loading would, thus, give information on the percentage variance in the various development indicators associated with specific levels of development of degrees of underdevelopment (Torokhti & Friedland, 2009; Tsheola, 2010; Kavanoz et al., 2015; Ninlawan, 2015; Valtonen et al., 2015; Hung, 2016). Each observation or country revealed a specific length of projection onto PCs (known as CLs), providing percentage variance of its status on engagement of the knowledge economy, national development, planning, governance, infrastructure, culture and skills relating to blended pedagogies.

Eigenvalue is the sum of the squared component loadings, and it shows the total variance in all the variables associated with a specific principal component (Torokhti

& Friedland, 2009; Tsheola, 2010; Kavanoz et al., 2015; Ninlawan, 2015; Valtonen et al., 2015; Hung, 2016). Every eigenvalue has an eigenvector, which is, geometrically, the principal component or a measure of the gradient of the principal factor. The eigenvalue or eigenvector would, therefore, give a measure of the degree of representation of the different groups of development indicators by the specific levels of development or degrees of underdevelopment (principal axis) they (indicators) are associated with (Torokhti & Friedland, 2009; Tsheola, 2010; Tsheola, 2012), whereas, communality specifies the percentage variance in a development indicator accounted for by all the principal factors extracted by principal components analysis (Torokhti & Friedland, 2009; Tsheola, 2010; Tsheola, 2012; Hung, 2016). Eigenvalues indicate the total variance in all observations, associated with each PC; that is, eigenvalues measure the degree of representation of each concentration of the 28 variables as represented by the PC, with the result that communalities would show the percentage variance of each observation's transformational pedagogies, planning, governance, infrastructure, culture and skills, accounted for by each of the PCs extracted.

Finally, each observation or country would have a CS on each PC, which is crucial for the interpretation of the interrelationships and hence for determination of readiness and appropriateness of planning, governance, infrastructure, culture and skills for blended pedagogies. The component or weighted scores are the scores of each observation on individual principal factor (Torokhti & Friedland, 2009; Tsheola, 2010; Hung, 2016). These scores are necessary for mapping the spatial distributions of specific principal components (levels of development or degrees of underdevelopment) and they are also important in the interpretation of the variables over different development regions (Torokhti & Friedland, 2009; Tsheola, 2010; Hung, 2016). The scores, together with the loadings of various development indicators on the different principal factors, are useful in the identification of the development regions' relative levels of development or underdevelopment (Torokhti & Friedland, 2009; Tsheola, 2010; Tsheola, 2012; Hung, 2016). CSs were used for the classification of countries into constellations with weak or strong prospects of successful transformation towards blended pedagogies. CLs and CSs revealed the relative strength/weakness of countries' status in relation to attaining blended pedagogies successfully, given the e-planning approaches, e-governance models, e-infrastructure, e-culture and e-skills. Interpretations of Standard PCA created adequate bases for precise numerical statements to reveal whether or not South Africa’s striving towards blended pedagogies within the knowledge economy and global capitalism is weakened or strengthened or ready or not ready as well as appropriate or inappropriate. Additionally, provincial dynamics were used to provide supporting reasoning and evidence for relational analysis arguments about planning and governance.

1.6.8. Validity and Reliability

The study used planning, governance, e-leaning pedagogies and conventional didactics for conceptualization. Seemingly, these concepts have demonstrated to be valid and reliable for this study as they have been used before for a number of similar research studies. The concepts’ validity and reliability have been proven to produce dependable and applicable results (Moule et al., 2010; Garrison, 2011; Pegrum, Oakley & Faulkner, 2013; Button et al., 2014; Button et al., 2014; Peeraer & Van Petegem, 2015; Glušac et al., 2015; Gu et al., 2015; Kearney, Burden & Rai, 2015; Mohammadi, 2015; Valtonen et al., 2015; Wolff et al., 2015). Conceptually, e-learning pedagogies has been used in various research studies (Smith, 2005; Moule et al., 2010; Garrison, 2011; Pegrum, Oakley & Faulkner, 2013; Button et al., 2014; Button et al., 2014; Peeraer & Van Petegem, 2015; Glušac et al., 2015; Gu et al., 2015; Kearney, Burden & Rai, 2015; Mohammadi, 2015; Valtonen et al., 2015; Wolff et al., 2015). Conventional didactics have also been adopted for conceptualization in a number of studies (Pegrum et al., 2013; Button et al., 2014; Peeraer & Van Petegem, 2015; Glušac, Makitan, Karuović, Radosav & Milanov, 2015; Gu et al., 2015; Kearney et al., 2015; Valtonen et al., 2015; Wolff et al., 2015). Therefore, these concepts are valid and reliable for the success of this study. The research design and methodology adopted for this study are also valid and reliable. Evidence is drawn from a number of studies which employed similar instruments and techniques for data collection and analysis. For data collection, desktop study has been adopted and used as in some completed studies (Pegrum et al., 2013; Button et al., 2014; Wolff et al., 2015). Qualitative and quantitative data was analyzed using PCA, descriptions, classifications and making connections (Button et al., 2014; Kearney et al., 2015; Wolff et al., 2015); and, PCA (Tsheola, 2010; Glušac et al., 2015), respectively.

In view of the fact that the use of factor, multivariate or component analysis in this study originates from most of the above-mentioned studies, reference is therefore made to some of them. In one study, Hung (2016) used factor analysis to examine elementary and middle school teachers' readiness as “online learners” based on the Teacher Readiness for Online Learning Measure. Hung (2016) had two sets of samples, 128 and 248 teachers who participated in an online course on Internet literacy as well as ethics for teachers in practice. For the study, 18 variables were used grouped into 4 components namely: communication self-efficacy, institutional support, self-directed learning, and learning-transfer self-efficacy. One of the components that Hung (2016) elaborated was the “learning-transfer self-efficacy” which relates to teachers’ Technological Content Knowledge Skills, confidence and attitudes towards the implementation of blended pedagogies. The factor analysis featuring “principal components” and “varimax rotation”, was applied to the 18 variables in order to discover the underlying structure of the Teacher Readiness for Online Learning Measure (Hung, 2016). Generally, the choice of variables and their component loadings are appropriate in revealing the levels of technological skills that teachers possess and to determine teachers’ levels of readiness in the application of blended learning. Another study explored the self-efficacy of pre-service language teachers and their attitudes towards web pedagogical knowledge (Kavanoz et al., 2015). The data in this study was “computerized and analysed in two parts, namely descriptive statistics and inferential statistics by using Statistical Package for Social Sciences (SPSS)” (Kavanoz et al., 2015: 97). The “mean scores” and “standard deviations” of the variables for the study were calculated for descriptive statistics however, to explore the “correlations” between the pre-service teachers' self-efficacy and their attitudes regarding Web-based instruction, the participants' responses were analysed via “Pearson Correlational Analysis”. Generally, the variables of the study which were used to evaluate pre-service teachers' perceived self-efficacy and attitudes towards Web-based instruction as well as their correlation were appropriate to measure the level of readiness towards the implementation of blended learning (Kavanoz et al., 2015).

Ninlawan (2015) used PCA and specifically Multiple Regression Analysis wherein the level of confidence for the independent variables was at 95%. The aim of the study was to “investigate factors which affect teachers’ professional development in teaching innovation and educational technology in the 21st century under the Bureau of Special Education, Office of Basic Education” in Thailand (Ninlawan, 2015: 1732). The study focussed mainly on factors which developed teachers’ technological skills as well as teaching innovation and educational technology in the 21st century. To uncover the factors which developed teachers’ technological skills, variables were grouped into seven categories, namely: policies and objectives, resources and environment, process and management, results, evaluation, and follow-ups, teaching preparation and planning, implementation and development of courses. The evaluation of teaching innovation and educational technology in the 21st century involved three categories of variables which include creative and innovative skills, communication and media awareness and computer information technology and communication. The categories of the variables were used to determine teachers’ readiness towards the implementation of educational technology aimed at building their own 21st century skills for teaching and learning transformations necessary for national development. Valtonen et al. (2015) in their study which investigates the effects of technological learning experiences in pedagogically meaningful ways on pre-service teachers' intentions to use ICT for teaching and learning used factor analysis. The data was first analysed using factor analysis in order to summarize the given statements into generalised factors by using “varimax rotation” with the intention of minimizing the correlation between the factors. Valtonen et al. (2015) grouped the variables in their study and 4 factors were produced, namely: attitudes, self-efficacy, subjective norms and behavioural intentions. For the study, the factors were considered appropriate to evaluate how learning with technology affects pre-service teachers’ intentions to adopt blended pedagogies in their future teaching. Overall, all the studies employed a number of variables to measure HDI in order to determine the level of readiness of both teachers and learners necessary for the implementation of blended pedagogies.

The studies referred to above show that successful implementation of blended learning involves specific levels of ICT skills as well as culture among teachers and learners as blending is a socio-cultural process that requires appropriate planning and governance. Therefore, statistical analysis of the concept of blended pedagogies needs to encompass planning, governance, infrastructure, culture and skills variables. As already noted, for a country to be considered ready for the implementation of blended pedagogies not one or two variables are needed, but a number of variables categorised correctly to determine planning, governance, infrastructure, culture and skills components (Kavanoz et al., 2015; Ninlawan, 2015; Valtonen et al., 2015; Hung, 2016). Seemingly, a single variable would definitely cast a far too insufficient and false meaning for the countries' determination of the application of the concept of blended learning. However, the collective consideration of appropriate variables would make logical sense and be able to form an acceptable foundation for determining the countries' readiness towards the implementation of blended learning. As recommended, one of the spatially meaningful statistical techniques that can be used to weigh planning, governance, infrastructure, culture and skills variables together is principal component analysis or factor analysis (Kavanoz et al., 2015; Ninlawan, 2015; Valtonen et al., 2015; Hung, 2016). Accordingly, principal component analysis was used in this study to establish metrics by which countries with different HDIs can measure their readiness for the implementation of blended pedagogies. Thus, the concepts and research design and methodology adopted in this study guarantees dependable and applicable results.

1.7. Outline of the Thesis

This thesis consists of seven chapters which are outlined as follows:

Chapter 1: Introduction and Background of the Study: Planning and Governance for Blended Pedagogies

This chapter provides the background of the study as well as the statement of the research, research questions, aim and objectives. The core concepts used in the thesis are also defined in this chapter. Additionally, the research design and methodology, significance as well as ethical considerations of the study are discussed.

Chapter 2: Planning and Governance in Blended Pedagogies for Knowledge Economy and National Development: A Theoretical Perspective

The chapter discusses theoretical perspective on the nexus of planning and governance in blended pedagogies for participation in the knowledge economy and national development. It focusses on the planning approaches, governance models, tenets of conventional didactics, the principles of e-learning pedagogies, preconditions of blended learning as well as the prospects and challenges of blending e-learning with conventional didactics.

Chapter 3: Models, Levels, Processes and Determinants of Blended Learning

The purpose of this chapter is to provide an overview of the models, approaches and principles of blended learning. The chapter starts by conceptualizing blended learning by focussing on various knowledge domains, among other elements. An inquiry, teachers' and learners' characteristics as well as determinants of the learning environment for blended learning are discussed.

Chapter 4: Planning and Governance for Blended Pedagogies: The International Experiences

International experiences on planning and governance for blended pedagogies are discussed in this chapter. A total number of nine countries were sampled according to the four different HDI groups which do not follow any rigid order. The chapter discusses the planning approaches and governance models as well as the tenets of conventional didactics. Moreover, the principles of e-learning, the precondition for as well as the prospects and challenges of blended pedagogies from both developed and developing countries.

Chapter 5: Digital Transformation in South Africa's Educational System

This chapter specifically focusses on South Africa's experiences on blended pedagogies. It evaluates the country's national and planning approaches and governance models as well as the history of conventional didactics. The implementation of e-learning pedagogies which replaces the conventional didactics instead of blending also forms part of the discussion. Furthermore, necessary and sufficient conditions for as well as challenges and prospects of blended pedagogies in a democratic South Africa are discussed.

Chapter 6: Level of Development and Preconditions for Blended Pedagogies in South Africa

This chapter presents the results of the study with a specific focus on Principal Component Analysis (PCA). An overview of the correlation matrix, analysis of the correlation coefficients, communalities and variance accounted for in the PCA, principal components and eigenvalues as well as principal component loadings are provided. The chapter evidently reveals that there is no direct correlation between the level of development and adoption of blended pedagogies. Instead, adoption of blended pedagogies appears to be a result of a convoluted process that involves creation of enablers for e-culture largely through modernized planning, governance, infrastructure, skills and culture.

Chapter 7: Conclusions and Recommendations

The chapter presents the concluding remarks and recommendations based on the findings of the study. It concludes that there is no correlation between the successful implementation of blended pedagogies and the country's level of human development. However, evidence suggests that the failure of implementation of blended pedagogies in most countries is largely because of the absence of modernized planning, governance, skills and culture notwithstanding the presence of the state-of-the-art infrastructure. Therefore, the thesis recommends future studies on the planning approaches and governance models that would support societal digital acculturation for developing countries such as South Africa.

1.8. Significance of the Study

The need to conduct this study originates from the fact that worldwide education is considered as one of the key pillars of development. Education plays a crucial role in building an inclusive society and providing opportunities for all to realise their potential, especially in modern development related to the knowledge economy. A number of intellectual capabilities are needed for knowledge economy advancements, including analytical, interactive and computing skills, among others, and which become more effective through the use of ICT. Therefore, global knowledge economy as well as the advancements in information communication technology in education have crucial implications for pedagogy. In turn, blended pedagogies have the ability to transform the traditional acquisition of knowledge into collaborative and participatory learning which activates learners' creative and critical thinking necessary for modernity. The new teaching and learning e-techniques associated with digital technologies should however, not replace the traditional classroom didactics but supplement each other. Therefore, blending of e-learning pedagogies with conventional didactics is critical for countries which are in need of highly qualified and trained specialists with the aim of ensuring that all learners receive standard education which gives them a future opportunity to compete in the global knowledge economy.

With South Africa's education system still characterised by inequalities which in most cases adversely affects the previously disadvantaged groups, issues of planning and governance of these blended pedagogies cannot be ignored. These inequalities which are mostly related to schools' infrastructure, teachers' and learners' skills development, affect the level and quality of education, especially in townships and rural areas. In order to remedy the situation, educational infrastructure such as libraries, laboratories and computer centres, which can be achieved through proper planning and governance are needed for these disadvantaged groups. The NDP 2030 states that "high speed broadband should be readily available and incorporated into the design of schools. This will enable greater use of technology in education and enhance the classroom experience for both teachers and students" (NPC, 2012: 303). Thus, the blending of e-learning pedagogies with conventional didactics seems to be at the centre of the educational national development. This study then hoped to investigate the probability of the readiness and appropriateness of the planning, governance, infrastructure, culture and skills of these blended pedagogies in South Africa for successful integration of e-learning with conventional didactics that is necessary for national development and engagement in the knowledge economy.

1.9. Ethical Considerations

This study adhered to standard research ethics, especially as required by the Turfloop Research Ethics Committee (TREC) of the University of Limpopo. Central to the ethics are issues of integrity, consent, information sharing, as well as avoidance of harm, psychological abuse, stress or loss of self-esteem, and respect for privacy, anonymity and confidentiality, copyrights and intellectual property rights. In conducting the study, professionalism, objectivity, accuracy and justice were observed. However, this study was based on existing databases such as the UNDP, national statistical institutions and reserve banks, among others. Therefore, the potential for any physical or psychological harm to people or animals was virtually non-existent. In this regard, the study did not require approval by the TREC; however, great care was exercised to ensure that there would be no physical harm or psychological pain. Thus, no one was placed under stressful, embarrassing, anxiety-producing or unpleasant situations during the conducting of the study. Furthermore, plagiarism was avoided at all times.

Information and extracts used in the study were always accompanied by acknowledgement of scholarly ideas and authority. All attempts were made to share wisdom drawn from the research findings of the study with subjects associated with the investigation.

1.10. Conclusion

This chapter outlined the rationale and purpose of the study and further discussed the research problem. Thus, for the evaluation of South Africa’s relative readiness and appropriateness of planning, governance, infrastructure, culture and skills for blended pedagogies, a historical-comparative research design and statistical modelling were adopted among 14 countries at different levels of human development. Accordingly, the concepts (planning, governance, e-leaning pedagogies and conventional didactics) and the research design and methodology adopted in this study guarantees dependable and applicable results. With the hope to evaluate relative readiness and appropriateness of planning, governance, infrastructure, culture and skills for blended pedagogies in South Africa, certain ethics involving issues around integrity, consent, information sharing as well as avoidance of harm, psychological abuse, stress or loss of self-esteem, and respect for privacy, anonymity and confidentiality, copyrights and intellectual property rights were adhered to. The succeeding chapter discusses the theoretical perspective of the nexus of planning and governance in the implementation of blended pedagogies for participation in the knowledge economy and national development.

Chapter 2

Planning and Governance in Blended Pedagogies for Knowledge Economy and National Development: A Theoretical Perspective

2.1. Introduction

For effective engagement in the knowledge economy necessary for national development purposes, the most important sector that requires changes is education (Button et al., 2014; Glušac et al., 2015; Skryabin, Zhang, Liu & Zhang, 2015; Valtonen et al., 2015; Wolff et al., 2015). In the context of information societies, ICT in particular is perceived as one of the most important tools in changing the education sector (Button et al., 2014; Skryabin et al., 2015). Therefore, many countries have implemented educational ICT related policies and have also invested resources in the necessary infrastructure in schools with the hope of building learners' 21st century skills necessary for the knowledge economy (Button et al., 2014; Glušac et al., 2015; Valtonen et al., 2015; Wolff et al., 2015). The implementation of educational ICT is assumed to be helpful in increasing opportunities for teaching and learning as well as for reducing the gap between socioeconomic factors and educational system outcomes (Button et al., 2014; Dolenc & Aberšek, 2015; Glušac et al., 2015; Skryabin et al., 2015; Valtonen et al., 2015; Wolff et al., 2015). Furthermore, the integration of ICT in education is capable of building talented teacher communities through which best practices and success stories can be shared and thus motivating each other and also improving the quality of education (Button et al., 2014; Skryabin et al., 2015). However, the integration of ICT in education is to a large extent, determined by the planning and governance of both teachers' and learners' skills, culture and infrastructure necessary for the successful implementation of the educational ICT. In the context of this study this involves blended pedagogies, that is, the integration of e-learning with conventional didactics.

Many countries have incorporated e-learning in education, relating to various curricula; however, complexities concerning computer and information literacy among both learners and teachers have hindered the advancement of the envisaged, and hoped for, pedagogic efficacies (Button et al., 2014; Glušac et al., 2015; Valtonen et al., 2015; Wolff et al., 2015; Siddiq, Scherer & Tondeur, 2016). Notwithstanding Noh et al.'s

(2014) belief that ICT makes for good teaching and learning, even for developed countries, where infrastructure is not problematic, challenges in planning and governance have become critical to the successful implementation of blended pedagogies (Teo, 2011; Al-Mansour & Al-Shorman, 2012; Ertmer et al., 2012; Kirkwood & Price, 2013; Button et al., 2014; Dolenc & Aberšek, 2015; Valtonene et al., 2015; Webster & Son, 2015). Webster & Son (2015), for instance, show that ICT resourcing does not necessarily yield positive implementation in classrooms. Indeed, “the presence of institutional enablers is essential” to the successful blending of e-learning pedagogies with conventional didactics (Button et al., 2014: 1312). Despite such evidence, institutions have prioritised adequate access to digital technologies and resourcing ahead of the identification and execution of planning approaches and governance models regarding integration of e-learning pedagogies with conventional teaching and learning methods (Deltsidou et al., 2010; Gu et al., 2015; Oyedemi, 2015; Valtonen et al., 2015). However, the provision of adequate digital technologies and computer resourcing is only one necessary condition to ensure quality education. To achieve a level of education which will enable a country to compete in the knowledge economy requires successful implementation of blended pedagogies. Sufficient, rather than necessary determinants of the successful blending of e-learning pedagogies with conventional didactics include, at the core, planning and governance. It is against this background that this chapter theoretically discuss the appropriate planning approaches, governance models, infrastructure, skills and culture necessary for successful implementation of blended pedagogies. Thus, the next sections discuss the generic planning approaches and governance models; tenets of conventional didactics; the principles of e-learning pedagogies; pre-conditions for blending e-learning pedagogies with conventional didactics; planning approaches and governance models appropriate for establishing effective blended pedagogies as well as prospects and challenges of blending e-learning pedagogies with conventional didactics.

2.2. Generic Planning Approaches

Planning is future-oriented, and it is based on certain norms and standards that seek to reduce future uncertainties (Tsheola, 2011). Generally, planning is defined as “a goal-oriented activity that is carried out to prepare for the performance of a given task”

(Kunitz, 2015: 135). There are multiple approaches to the modern planning processes including economic planning, physical development planning, policy analysis and planning, interpretative planning and collaboration planning, among others (Dale, 2004; Mandarano, 2008; Farhoodi, Gharakhlou-N, Ghadami, & Khah, 2009; Theron, 2008, 2009; Bakhshizadeh, Hosseinpour & Pahlevanzadeh, 2011; Tsheola, 2011; Hadaya & Cassivi, 2012; Faehnle & Tyrväinen, 2013; Talpur, Napiah, Chandio. Qureshi, & Khahro, 2014; Deng, Lin, Zhao & Wanga, 2015; Drazkiewicz, Challies & Newig 2015; Elbakidzea, Dawsonb, Anderssona, Axelssona, Angelstama, Stjernquistb, Teitelbaumc, Schlyterb, & Thellbrod, 2015; Hossain, Scholz & Baumgart, 2015; Kunitz, 2015; Roy, 2015). In addition to the planning goals, planning activities and operational levels of planning activities are also used to classify planning with emphasis on the planning exercise design and stakeholders' professional positions and their roles in planning (Tsheola, 2011). However, at the centre of these planning approaches, there are two broad categories of development planning namely object-centred, substantive or technical planning and process-centred, procedural, decision-centred or institution-centred planning (Dale, 2004; Bakhshizadeh et al., 2011; Tsheola, 2011).

Object-centred planning is based on substance or subject matter whereas process-centred planning involves mechanism or process (Dale, 2004; Tsheola, 2011). Theron (2008) relates the object-centred and process-centred planning to blueprint nuts-and-bolts and social learning process heart-and-soul of planning, respectively. Economic planning and physical development planning approaches are categorised as object-centred planning whereas interpretative planning and collaboration planning approaches are considered as part of process-centred planning while policy analysis and planning locates its roots in both categories (Dale, 2004; Bakhshizadeh et al., 2011; Tsheola, 2011). Additionally, planning is guided by a number of principles inclusive of comprehensiveness (consideration of all important elements), efficiency (does not waste time, money and other resources), inclusiveness (all people and organizations affected have opportunities to be involved), informativeness and transparency (all stakeholders understand what they are involved in and related processes), integration (individual and short-term decisions support strategic long-term goals) as well as logic (each step leads to the next) (Farhoodi et al., 2009; Theron, 2008, 2009; Bakhshizadeh et al., 2011; Tsheola, 2011; Hadaya & Cassivi, 2012;

Faehnle & Tyrväinen, 2013; Talpur et al., 2014; Deng et al., 2015; Drazkiewicz et al., 2015).

2.2.1. Economic Planning

In a market economy, there are a set of forces that translate individuals' desires into the allocation of productive resources. These market forces are so complex that even the government's interventions can sometimes be risky and produce results opposite to the intended ones (Reese & Fasenfest, 2003; Kim, 2011; Folmer & Risselada, 2013; Mota, Gomes, Carvalho, & Barbosa-Povoa, 2015; Rakićević, Omerbegović-Bijelović, & Lečić-Cvetkovic, 2016). Therefore, economic planning should also be dominant at the local level where the local government is deeply involved in local business activities, mostly as suppliers of infrastructure, tax collectors and regulators of land, buildings and activities (Reese & Fasenfest, 2003; Folmer & Risselada, 2013; Mota et al., 2015). Additionally, economic planning offers a strategy for improving the necessary interactions among the government, business and communities in achieving the goals and objectives of economic development (Kim, 2011; Folmer & Risselada, 2013; Kishore & Singal, 2014; Mota et al., 2015; Rakićević et al., 2016). One of the major goals of economic planning is to ensure economic stability within communities (Folmer & Risselada, 2013; Kishore & Singal, 2014; Mota et al., 2015; Rakićević et al., 2016). More often, the goal can be realized through a number of objectives including job creation and retention, tax-base creation, development of stable and diverse economies, poverty reduction, as well as improved living conditions (Reese & Fasenfest, 2003; Kim, 2011; Folmer & Risselada, 2013; Kishore & Singal, 2014; Mota et al., 2015).

Economic planning provides a strategy for the coordination of efforts of individuals, the government, business and communities concerned with economic development. These planning processes are categorized into several stages namely: analysis of economic and community development challenges and opportunities, background and history of economic development in the area of concern, goals and objectives that correspond to the challenges and opportunities identified, and an action plan to achieve the goals and objectives as well as performance measures to evaluate goal attainment (Reese & Fasenfest, 2003; Folmer & Risselada, 2013; Mota et al., 2015; Rakićević et al., 2016). Generally, economic planning should guide, coordinate and focus actors as they pursue economic development (Reese & Fasenfest, 2003; Kim, 2011; Folmer & Risselada, 2013; Kishore & Singal, 2014; Mota et al., 2015; Rakićević et al., 2016). Ultimately, these planning processes should lead to the formulation and implementation of programmes that leads to job creation, raises levels of income, diversifies the economy, reduces poverty and improves the quality of life while protecting the environment (Reese & Fasenfest, 2003; Kim, 2011; Folmer & Risselada, 2013; Rakićević et al., 2016).

2.2.2. Physical Development Planning

Physical development planning is often used to manage one of the most valuable naturally endowed resources, the land and its surrounding environment (Albrechts, 2004; Elbakidzea et al., 2015; Fuseini & Kemp, 2015; Natarajan, 2015). Land is a very precious resource given its finite nature that provides direct livelihood sustenance to many people, supports ecosystem services that are important to the environment and humanity as well as socio-politico-cultural functions that accord identity and sense of belonging to people (Fuseini & Kemp, 2015; Natarajan, 2015). Therefore, increasing competition for space for various human activities has been the motivating factor for the practice of physical planning (Elbakidzea et al., 2015; Fuseini & Kemp, 2015). Geographically, physical development planning is used as strategy to correct the imbalance spatial and environmental planning created by the colonial investments and planning where resource rich areas received most of the infrastructural development with very little or none in the resource poor areas (Fuseini & Kemp, 2015; Natarajan, 2015). Thus, a retrospective analysis of pre-independence planning suggests that equity, which is one of the most important elements of sustainable development, was missing because there was no social and spatial equity, especially in planning. Given the importance associated with land, usually physical development planning consists of two categories, namely spatial development (inclusive of urban and rural development planning) and environmental planning (Albrechts, 2004;Talpur et al., 2014; Caparros-Midwood, Barr & Dawson, 2015; Elbakidzea et al., 2015; Fuseini & Kemp, 2015; Gonçalves & Ferreira, 2015; Natarajan, 2015). This physical planning hopes to respond to the rapid urbanisation, increased land-use competition and international and national demand for sustainable development while taking into consideration the environmental related issues.

2.2.2.1. Spatial development planning

Spatial development planning is "concerned in an integrated and qualitative way with the location, intensity, form, amount, and harmonization of land development required for numerous space-using functions" in both rural and urban areas (Albrechts, 2004: 744). This planning is the answer to problems associated with coordination and integration of sectoral policies through a space-based approach (Caparros-Midwood et al., 2015; Gonçalves & Ferreira, 2015; Natarajan, 2015). That is, a spatial development plan includes a detailed proposal on how land should be utilised taking into consideration developed policies. This planning was introduced as a response to increasing land development pressure that resulted in problems associated with density and disorganised land-uses (Albrechts, 2004; Caparros-Midwood et al., 2015; Elbakidzea et al., 2015). To achieve effective spatial development planning, three key functions are recognized, namely: management of limited resources, regulation and integration of spatial and sectoral planning as well as consultation and participation of change agents (Albrechts, 2004; Caparros-Midwood et al., 2015; Elbakidzea et al., 2015; Gonçalves & Ferreira, 2015; Natarajan, 2015). As a result of limited resources, openness about land-use planning instruments with active participation of all stakeholders is required in order to address socio-economic inequalities among societies (Caparros-Midwood et al., 2015; Gonçalves & Ferreira, 2015). However, the planning processes and implementation of the plans should comply with legally imposed rules and regulations that guide land-use in order to realise the goals informed by different stakeholders. Spatial development planning should accommodate more active stakeholders' participation in order to achieve consensus, legitimacy and synergies in land-use (Caparros-Midwood et al., 2015; Gonçalves & Ferreira, 2015; Natarajan, 2015). Thus, it is a process of creating and steering a better place-based future on shared values within the society.

In most cases, spatial development planning is a public-sector-led socio-spatial transformation process guided by a common vision, coherent actions and means of implementation in order to shape and also frame a place and what it might become (Albrechts, 2004; Caparros-Midwood et al., 2015; Gonçalves & Ferreira, 2015; Natarajan, 2015). This planning actively forces integrated patterns of different land-uses based on efficiency and socio-economic equality rather than isolated functions (Caparros-Midwood et al., 2015; Natarajan, 2015). Seemingly, an isolated functions approach overlooks the realities of land-use, thus failing to understand constantly changing socio-economic factors. The aim of spatial development planning is to ensure that undesirable land developments are discouraged however, it is not as yet able to effectively and efficiently control where and when desirable developments are needed. Although spatial plans are given formal status and serve as official implementation guidelines, other policy fields due to their budgetary and technical resources seem to take precedence when a need arises (Albrechts, 2004; Natarajan, 2015). In addition, it becomos clear that some of the planning concepts such as coherence, convenience and compactness which were long advocated by planners, cannot be achieved solely through spatial development planning (Albrechts, 2004; Caparros-Midwood et al., 2015). Therefore, the realisation of social and economic development through physical solutions becomes practically impossible.

Urban and rural planning is a technical and political process that deals with the control of the use of land and the design of the environment, including transportation networks, to guide and ensure the orderly development of settlements and communities (Talpur et al., 2014; Huynh, 2015). It has been projected that by 2030 and 2050, about 60% and 70% of the world's population respectively, will be living in urban areas as a result of rural-urban migration of which most of this growth is expected in developing countries (Talpur et al., 2014; Caparros-Midwood et al., 2015; Fuseini & Kemp, 2015; Huynh, 2015). This projected urbanization growth has been associated with "demographic dimensions of declining densities in rural areas and spatial expansion of urbanised areas" (Fuseini & Kemp, 2015: 309). Therefore, issues of compactness, sustainable transport, density, mixed land-use and diversity, among others should cut across the modern urban and rural planning processes. In most cases, the decision to prepare an urban or rural development plan is usually taken by an organization which verifies the need for a development plan in its area of jurisdiction (Farhoodi et al., 2009; Badawy, Abdel-Salam, & Ayad, 2015; Hossain et al., 2015; Huynh, 2015; Wang & Wang, 2015). These decision making organizations include municipalities, city councils, government departments and provincial offices, among others. However, urban and rural development planning are characterized by a number of processes which include the initial decision and work reference, report preparation, evaluation of the report, plan sanction and municipalities, preparation of a detailed plan and supervision of plan implementation (Farhoodi et al., 2009; Badawy et al., 2015; Hossain et al., 2015). Furthermore, the separation of land-uses denoted zoning is the basis of the majority of the planning legislation (Hossain et al., 2015).

Both urban and rural planning hope to realise a number of goals including health, public safety, circulation and movement, provision of services and infrastructure, economic development as well as environmental protection (Farhoodi et al., 2009; Bakhshizadeh et al., 2011; Levy, 2011; Talpur et al., 2014; Badawy et al., 2015; Huynh, 2015; Wang & Wang, 2015; Panagopoulos, Duque & Dan, 2016). Urban and rural health in planning should ensure that patterns of land-use prohibit densities of development that overload water and sewer facilities as well as electricity (Levy, 2011; Farhoodi et al., 2009; Talpur et al., 2014; Hossain et al., 2015). Additionally, proper identification of locations for different land-uses such as residential, industrial and commercial, among others, should promote efficiency, effectiveness and sustainability within urban and rural areas (Farhoodi et al., 2009; Bakhshizadeh et al., 2011; Levy, 2011; Talpur et al., 2014; Badawy et al., 2015; Huynh, 2015; Wang & Wang, 2015; Panagopoulos et al., 2016). Closely related to urban and rural health is public safety which manifests itself in a number of ways including sufficient road width to accommodate high numbers of vehicles and pedestrians, access to emergency services and the design of buildings, patterns and spaces that promotes the security of community members and that of their properties (Levy, 2011; Bakhshizadeh et al., 2011; Hossain et al., 2015; Wang & Wang, 2015). Circulation and movement is concerned with the development of a system of streets and parking facilities which promotes order and efficiency as well as rapid flow of vehicular and pedestrian traffic (Farhoodi et al., 2009; Talpur et al., 2014; Hossain et al., 2015). Moreover, this system also needs to take into consideration planning for adequate public transportation and road infrastructure within and around urban and rural areas that connects the two areas.

One of the most important components of urban and rural planning processes is the provision of public services and infrastructure (Farhoodi et al., 2009; Talpur et al., 2014; Wang & Wang, 2015). Land-use patterns affect the feasibility and costs of providing such as water, sewage, education, health and electricity, among others. Furthermore, planning also prescribes the locations of infrastructures such as parks, schools, hospitals, police stations, shopping facilities and others in both urban and rural areas (Levy, 2011; Talpur et al., 2014; Badawy et al., 2015; Wang & Wang, 2015). Therefore, planned physical and socio-economic infrastructure is key for the development and accessibility of economic growth and the prosperity of communities concerned. Economic development and the maintenance of existing economic activities are also of importance to urban and rural planning. A pattern of land-use that offers commercial and industrial activities is encouraged in planning as it provides some of the community members with job opportunities (Farhoodi et al., 2009; Bakhshizadeh et al., 2011; Levy, 2011; Talpur et al., 2014; Wang & Wang, 2015). Thus, modern planning processes should encourage job provision and access to all sites offering economic activities. However, caution must be exercised with regard to environmental protection during the planning processes. Environmental protection involves the restrictions of building in wetlands, steep slopes and all other ecologically valuable lands (Hossain et al., 2015; Wang & Wang, 2015; Panagopoulos et al., 2016). The restrictions further include preservation of open space, control of discharges into natural water sources as well as the prohibition of commercial and industrial activities that degrade natural resources (Levy, 2011; Wang & Wang, 2015; Panagopoulos et al., 2016 Panagopoulos et al., 2016). Even though urban and rural development consultant engineers and architects are involved in the planning processes as a special participation sector, they are not seriously involved in the decision-making process and the same applies to public opinion (Farhoodi et al., 2009).

2.2.2.2. Environmental planning

The environment is increasingly becoming at risk from a number of multiple human actions. These include uncontrolled expansion of urban development, agricultural production and industrial pollution, natural hazards, environmental health issues, natural resource use and management, sustainable community design as well as applications for decision-making based on the functions and processes of natural systems and ecosystem services (Korhonen, 2007; Heink & Kowarik, 2010; He, Lu, Mol, & Beckers, 2012; Drazkiewicz et al., 2015; Portman, Natapov & Fisher-Gewirtzman, 2015). These human activities adversely affect the ability of the natural system to sustain itself and also to provide life support for human life and activities (Korhonen, 2007; Mandarano, 2008; Heink & Kowarik, 2010; Portman et al., 2015). The consequences of these human activities include losses in biodiversity, depletion of the ozone and more recently, climate change, among a number of other environmental ills (Korhonen, 2007; Portman et al., 2015). Therefore, as a response to the consequences of human activities, environmental planning is crucial. Environmental planning is a process that identifies, assesses and develops solutions to environmental issues and challenges with the goal of improving the environmental quality as well as people's health and welfare in an area of concern (Korhonen, 2007; Heink & Kowarik, 2010; de Groot, Alkemade, Braat, Hein & Willemen, 2010; He et al., 2012; Drazkiewicz et al., 2015). However, communities' values, traditions and cultures differ and therefore, environmental planning approaches should also be tailor-made specifically for each community. Additionally, environmental planning is often assumed to have the ability to enhance sustainable as well as effective and improved environmental quality through stakeholders' participation (Mandarano, 2008; de Groot et al., 2010; Heink & Kowarik, 2010; He et al., 2012; Drazkiewicz et al., 2015; Portman et al., 2015). Thus, environmental planning increasingly values various stakeholders' participation for quality decisions and enhancement of compliance and implementation. However, in some cases stakeholders' participation in environmental planning can result in inferior decisions, noncompliance and poor implementation as compared to non-participatory decision making processes (Heink & Kowarik, 2010; He et al., 2012; Drazkiewicz et al., 2015).

Environmental planning is guided by a number of principles inclusive of identification of an appropriate planning team, environmental development vision, definition of a community's needs using environmental assessment surveys, identification of possible solutions and development of the plan (Mandarano, 2008; Korhonen, 2007; de Groot et al., 2010; He et al., 2012; Drazkiewicz et al., 2015). During the identification of the appropriate planning team, different stakeholders across the community should be involved including both the public and private sectors. The planning team is established in order to hold meetings to identify and discuss all environmental issues affecting the community (Mandarano, 2008; Heink & Kowarik, 2010; Portman et al., 2015). The identified planning teams have the responsibility to represent the interests of the entire community in promoting environmental health, safety and protection (de Groot et al., 2010; He et al., 2012; Portman et al., 2015). Additionally, the involvement of a variety of stakeholders in planning processes creates and builds a strong sense of ownership of the environment and its related issues within the community. The development of an environmental vision is very important during the planning stage.

An environmental development vision is a long-term goal which represents the culture and values of a community with regard to the future use and protection of the environment (Korhonen, 2007; Mandarano, 2008; de Groot et al., 2010; Heink & Kowarik, 2010; Drazkiewicz et al., 2015). The vision describes a picture of what the community wants to see happening in the future taking into consideration sustainability issues. The planning team should facilitate the visioning stage and allow all interested community members to participate during the process (Heink & Kowarik, 2010; He et al., 2012; Portman et al., 2015). The main purpose of the vision is to ensure that there is focus and direction with regard to development and the need to protect the environment in areas of concern.

After the development of the vision, the definition of the community's needs using environmental assessment surveys should follow. The aim of conducting these surveys is to ensure that all community members have an opportunity to provide inputs, identify their needs, support required, knowledge and their understanding of environmental issues directly and indirectly affecting them (Korhonen, 2007; de Groot et al., 2010; Heink & Kowarik, 2010; Drazkiewicz et al., 2015; Portman et al., 2015). The community’s needs are identified, prioritised and aligned to the environmental vision to ensure consistency and compliance. After the community has identified, prioritized and discussed the environmental issues, it is time to come up with solutions. It is very important to identify, discuss and agree on possible solutions towards achieving a community's needs (Mandarano, 2008; Heink & Kowarik, 2010; He et al., 2012; Portman et al., 2015). After gathering all the necessary information, the development of an environmental plan follows. This plan is developed to assist the community members to lay out the road map towards the goals, needs and priorities that they have identified with regard to environmental use and protection (Korhonen, 2007; Mandarano, 2008; de Groot et al., 2010; Heink & Kowarik, 2010; He et al., 2012; Drazkiewicz et al., 2015). A written plan will assist in the identification of areas of concern and the role players involved, the support needed as well as an estimation of costs and time.

Notwithstanding the benefits associated with environmental planning, there are a number of challenges which may also be faced. The ecological restructuring due to economic growth which in turn responds to population growth will soon be impossible as environmental limits will be reached (Korhonen, 2007; Mandarano, 2008; de Groot et al., 2010; Heink & Kowarik, 2010; He et al., 2012; Drazkiewicz et al., 2015). The levels and growth rates of non-renewable resource extraction and consumption, pollution and environmental inequalities, pose challenges associated with lack of sustainable development (Korhonen, 2007; Mandarano, 2008; de Groot et al., 2010; Heink & Kowarik, 2010; He et al., 2012; Drazkiewicz et al., 2015). Therefore, a significant change in consumption and production patterns is necessary for sustainable development. The other challenge is the disjuncture of environmental and social dimensions of sustainability. Increasingly, environmental and social agendas meet at different levels whereas sometimes their interests run parallel putting more stress on the environment (Korhonen, 2007; Mandarano, 2008; de Groot et al., 2010; Heink & Kowarik, 2010; He et al., 2012; Drazkiewicz et al., 2015).

2.2.3. Policy Analysis and Planning

Policy planning and analysis occurs within contexts which are affected by competing political and economic considerations, different agendas as well as by multiple actors and stakeholders who represent a variety of interests (Geva-May & Maslove, 2006; Carroll & Sapinski, 2010; Badawy et al., 2015; Demartini, Gaviglio, & Bertoni, 2015; Kivits & Charles, 2015).This planning is a problem solving process which is rational, balanced, objective and analytical in which decisions are made in sequential phases from problem identification to ending with activities to solve it (Geva-May & Maslove, 2006; Carroll & Sapinski, 2010; Badawy et al., 2015). The Policy planning and analysis approach carefully considers all the relevant information in order to ensure that they achieve their intended goals (Badawy et al., 2015; Demartini et al., 2015; Kivits & Charles, 2015).There are five models which inform policy planning and analysis processes, namely: incrementalism, mixed-scanning, policy as arguments, policy as social experiment and policy as interactive planning models (Carroll & Sapinski, 2010; Demartini et al., 2015). Incrementalism regards a good policy as the one that all participants agree on rather than what is best to solve the problem (Carroll & Sapinski, 2010; Kivits & Charles, 2015). Additionally, this model suggests that major policy changes should occur in a series of small steps in order to be able to incorporate new approaches without fundamental changes to the policies (Geva-May & Maslove, 2006; Demartini et al., 2015; Kivits & Charles, 2015). Therefore, the policy planning and analysis process is one of disjointed incrementalism or muddling through. In contrast, a mixed-scanning model takes a broad view of possible options and looks further into those which require a more in-depth examination.

The policy as arguments model describes policy planning and analysis processes as reasoned arguments that are developed through debates between the state and community stakeholders (Geva-May & Maslove, 2006; Carroll & Sapinski, 2010; Demartini et al., 2015). During the planning processes, ideas are communicated which reflect certain political stances and social reality (Badawy et al., 2015; Demartini et al., 2015; Kivits & Charles, 2015). In the policy as social experiment model, social change is seen as a process of trial and error which involves successive hypotheses tested against reality in an experimental manner. Whereas the policy as interactive learning model is critisises the development policy as being top-down and not being generated by communities in which policies are implemented (Geva-May & Maslove, 2006; Carroll & Sapinski, 2010; Demartini et al., 2015). The model emphasizes the need to take into account opinions of individuals, agencies and social groups that have a stake in how the plans evolves (Carroll & Sapinski, 2010; Badawy et al., 2015; Kivits & Charles, 2015). Furthermore, this promotes interaction and sharing of ideas between policy makers and those who are directly affected by the outcomes of the planning processes (Geva-May & Maslove, 2006; Carroll & Sapinski, 2010; Badawy et al., 2015; Demartini et al., 2015).

2.2.4. Community Development Planning

Internationally, development planning has slowly moved from centralised top-down forms of planning to decentralise bottom-up strategies (Mason & Beard, 2008; van Niekerk, 2014; Fox-Rogers & Murphy, 2015; Hibbard, 2015; Putra & Rudito, 2015). One of the popular bottom-up approaches is community development planning which promotes community-based resource management programmes as well as participatory approaches to project planning, implementation and evaluation (Mason & Beard, 2008; van Niekerk, 2014; Putra & Rudito, 2015). Community development planning is defined as a process that involves communities in decision making related to their own development, directed by government or business with adaptive methods which aim at improving fundamental elements of the society (Fox-Rogers & Murphy, 2015; Hibbard, 2015; Putra & Rudito, 2015). The planning is geographically focused with an attempt to comprehensively address the needs and uplift the standard of living of people living in these communities through citizen participation in planning processes and implementation of community-change efforts (van Niekerk, 2014; Fox-Rogers & Murphy, 2015; Hibbard, 2015). This planning allows local stakeholders to take collective action which usually results in meaningful development outcomes for improvements related to household welfare, protection of scarce natural resources, management of public infrastructure and services as well as the reduction of social exclusion and inequality (Mason & Beard, 2008; Fox-Rogers & Murphy, 2015; Putra & Rudito, 2015). Most importantly, community development planning processes empower stakeholders and encourage democratic decision making. Thus, the shift within planning takes into consideration the experiences and contextual knowledge of communities as they are key in conceptualizing development, identifying priorities and helping to design local strategies (Mason & Beard, 2008; van Niekerk, 2014; Hibbard, 2015; Putra & Rudito, 2015).

Community development planning is guided by two sets of principles, namely, ethical and practical principles that ensure that the benefits of these participatory processes are realised by various stakeholders (Mason & Beard, 2008; van Niekerk, 2014; Fox-Rogers & Murphy, 2015; Hibbard, 2015; Putra & Rudito, 2015). The ethical principles include human orientation, participation, empowerment, ownership, sustainability and release whereas practical principles are learning, compassion, adaptiveness and simplicity (Mason & Beard, 2008; van Niekerk, 2014; Fox-Rogers & Murphy, 2015; Hibbard, 2015; Putra & Rudito, 2015). Despite the positive claims of participatory approaches such as community development planning, there is evidence that the approaches have failed to deliver progressive and social transformative outcomes as promised (Mason & Beard, 2008; van Niekerk, 2014; Fox-Rogers & Murphy, 2015; Hibbard, 2015). Instead, more contrary evidence reveals that community development planning's long-term affective participation in development issues does little in improving the conditions of most stakeholders or as a strategy for socio-economic change (van Niekerk, 2014; Hibbard, 2015). Initially, the first reason behind this failure was the lack of individual incentives for their contribution in the provision of public infrastructure and services that accrues to the group in which they are members (Fox-Rogers & Murphy, 2015; Hibbard, 2015). The second problem lay in the management of public infrastructure and services. Apparently, one person's use of the infrastructure and services reduces the total amount of the resources available to others. Lack of a system to control individual use of public infrastructure and services allows people to overuse and even destroy community resources for personal gains (Fox-Rogers & Murphy, 2015; Hibbard, 2015).

2.2.5. Interactive Planning

Interactive planning is based on the belief that the future of an organization is determined by what it does between now and the future estimated time (Bakhshizadeh et al., 2011; Asmu'i, & Fitriati, 2014; Fabry, Blaha, Vanherpe, Braesch, Tabourot & Feral, 2014; Santoso, 2015; Yan, Poirson & Bennis, 2015). This type of planning concentrates on designing a desirable present and determining ways of achieving it as accurately as possible in preparation for future goal attainment (Bakhshizadeh et al., 2011; Asmu'i, & Fitriati, 2014; Santoso, 2015). The future is then continuously created by closing the gap between where it is now and where it would like to be (Bakhshizadeh et al., 2011). Interactive planning consists of two phases namely, idealization and realization which both consist of 6 interrelated stages (formulating the mess, ends planning, means planning, resource planning, design and implementation as well as design of controls). The first two stages are categorized as the idealization phase whereas the last four fall under the realization phase (Bakhshizadeh et al., 2011; Asmu'i, & Fitriati, 2014; Fabry et al., 2014; Yan et al., 2015). During the idealization phase, formulating the mess, popularly known as situational analysis, and ends planning are conducted (Bakhshizadeh et al., 2011). A mess is a system of problems with a set of interacting threats and opportunities which every organization faces (Bakhshizadeh et al., 2011; Asmu'i, & Fitriati, 2014; Santoso, 2015).

Therefore, the formulation of a mess involves preparation of a system and obstruction analysis, reference projections as well as a reference scenario. A systems analysis provides a detailed description of the way that the system operates whereas an obstruction analysis identifies the characteristics and properties that obstruct the organization's progress (Bakhshizadeh et al., 2011; Asmu'i, & Fitriati, 2014; Fabry et al., 2014; Santoso, 2015; Yan et al., 2015). With regard to reference projections, predictions are made of aspects to determine the organization's future with the assumption that there will be no change in current plans, policies, and legislation, among others. As part of formulating the mess, a reference scenario is also important. Provided that the assumptions made were true, a description of the ways and reasons why an organization would destroy itself is of importance (Asmu'i, & Fitriati, 2014; Santoso, 2015; Yan et al., 2015). The last stage of idealization is called ends planning, which determines the vision of the organization and the projection of challenges that might be encountered in the process of realizing the goal (Bakhshizadeh et al., 2011; Fabry et al., 2014). Thus, this stage is directed at removing or reducing challenges collectively and interactively.

The realization phase consists of 4 stages namely: means planning, resource planning, design of implementation and design of controls (Bakhshizadeh et al., 2011; Asmu'i, & Fitriati, 2014; Fabry et al., 2014; Santoso, 2015; Yan et al., 2015). Means planning is concerned with interventions to eliminate the challenges identified in the ends planning stage. During this stage, the selection and invention of the course of action, projects and policies that should be implemented in pursuit of the organizations' idealized redesign (Bakhshizadeh et al., 2011; Yan et al., 2015). In order to implement the designed means plan, resource planning becomes very important. Resource planning is concerned with all that is needed in order to implement what is planned: materials, services, personnel, information and knowledge, money and time, among others (Bakhshizadeh et al., 2011; Asmu'i, & Fitriati, 2014; Santoso, 2015). After all the necessary resources have been estimated and planned for, the design of implementation stage follows. In this stage, responsibilities are allocated to all the personnel clearly indicating what is expected from them, time frames of the all the activities and all necessary locations are outlined (Bakhshizadeh et al., 2011; Fabry et al., 2014; Santoso, 2015; Yan et al., 2015). After this stage, the design of controls stage follows which aims to monitor all the activities and schedule in order to avoid failure. Additionally, monitoring during this stage determines if ever the expected results are realized and if not, develops corrective action. The six stages of interactive planning can be carried out in any order depending on the situation at hand. The stages are strongly interdependent and can be undertaken simultaneously and interactively (Bakhshizadeh et al., 2011; Asmu'i, & Fitriati, 2014; Fabry et al., 2014; Santoso, 2015).

2.2.6. Collaboration Planning

Collaboration planning also known as participatory planning is a process which involves the participation of the communities concerned, such as the state, residents, private sector and non-governmental organizations, among others, in decision making with regard to the planning of public services and infrastructure or any other activity (Faehnle & Tyrväinen, 2013; Deng et al., 2015; Kunitz, 2015). Hadaya & Cassivi (2012) assert that collaborative planning is a process that orients plans of different stakeholders towards each other in order to enable joint decision making among them. Generally, the activity is based on a communicative and discussion-based approach that requires inputs from all stakeholders during the planning processes. This type of planning approach is governed by four principles, namely: knowledge integration, meaningful involvement, functioning governance and sustainable use of the area of concern (Hadaya & Cassivi, 2012; Faehnle & Tyrväinen, 2013; Deng et al., 2015; Kunitz, 2015; Palmgren-Neuvonen & Korkeamäki, 2015). Firstly, the principle of knowledge integration hopes to improve the value base of planning through the combination of the community's personal culture-dependent experiences with professional and scientific facts. For collaboration planning, building a thorough knowledge and value base depends on the use of experiential, professional and scientific facts (Faehnle & Tyrväinen, 2013; Deng et al., 2015; Palmgren-Neuvonen & Korkeamäki, 2015). This knowledge is usually built into the processes of learning, re-framing and understanding of the information shared among stakeholders (Faehnle & Tyrväinen, 2013; Deng et al., 2015) in order to establish their common culture. That is, different stakeholders' participation is used to gather efficient and effective knowledge as well as values that will be integrated for modern planning purposes. However, the knowledge should cover diverse themes that are essential for the case in question, should represent the voices of various groups of the affected population and be demographically representative (Faehnle & Tyrväinen, 2013; Kunitz, 2015; Deng et al., 2015; Palmgren-Neuvonen & Korkeamäki, 2015). According to Faehnle & Tyrväinen (2013: 335), "experiential information obtained from participants improves the knowledge and value base actually used in planning and thus enables more profound treatment of competing interests and finally more well-grounded planning solutions".

Secondly, in addition to knowledge integration, the principle of meaningful participation is of importance to the planning processes. Collaboration planning ensures that the participation of various stakeholders does not waste public resources nor those of other participants (Mandarano, 2008; Hadaya & Cassivi, 2012; Faehnle & Tyrväinen, 2013; Deng et al., 2015; Kunitz, 2015; Palmgren-Neuvonen & Korkeamäki, 2015; Roy, 2015). Simultaneously, this planning should give stakeholders opportunities to learn about planning issues and diverse interests, governance systems as well as collaboration itself (Faehnle & Tyrväinen, 2013; Deng et al., 2015; Elbakidze et al., 2015). To be able to participate and contribute meaningfully, a successful participatory planning process informs actively informed stakeholders about important issues such as their opportunities and benefits at the right time (Mandarano, 2008; Faehnle & Tyrväinen, 2013; Deng et al., 2015; Palmgren-Neuvonen & Korkeamäki, 2015). Thus, the background information made available to different stakeholders at each stage of the planning process provides a common understanding of the situation and the freedom of actions within it (Hadaya & Cassivi, 2012; Faehnle & Tyrväinen, 2013; Deng et al., 2015; Palmgren-Neuvonen & Korkeamäki, 2015; Roy, 2015). Additionally, choosing the most appropriate participation methods becomes easy as the objectives of the planning process are clearly explained to relevant stakeholders. Apparently, the involvement of these different stakeholders in planning and decision making seems to promise better outcomes associated with sustainability, avoids wasting resources and supports the accountability of administration (Hadaya & Cassivi, 2012; Faehnle & Tyrväinen, 2013; Roy, 2015). The different stakeholders are usually invited to participate through methods such as public meetings, questionnaires, web-forums and field trips, among others (Hadaya & Cassivi, 2012; Faehnle & Tyrväinen, 2013; Deng et al., 2015) which should allow the planning processes to be educative for the participants. Explicitly, a variation of skills and abilities of stakeholders should allow those with limited opportunities to gain knowledge through their participation in the planning processes (Hadaya & Cassivi, 2012; Faehnle & Tyrväinen, 2013; Palmgren-Neuvonen & Korkeamäki, 2015).

Thirdly, participatory planning should be justified and managed appropriately as it is part of the governance system as a whole (Hadaya & Cassivi, 2012; Faehnle & Tyrväinen, 2013; Deng et al., 2015). Therefore, modern planning should be coordinated across various governance units within and between communities. Accordingly, horizontal collaboration among different stakeholders is needed in order to address the sustainable use of scarce resources, proper functioning and to realise synergy potentials among participants (Faehnle & Tyrväinen, 2013). Moreover, collaboration planning promotes learning that integrates knowledge of various stakeholders for re-framing the settings of governance in which issues of problem identification and solving take place (Hadaya & Cassivi, 2012; Faehnle & Tyrväinen, 2013; Deng et al., 2015; Roy, 2015). Lastly, whereas the first three principles already discussed focus more on the quality of collaboration planning as a process, the fourth one pays attention to the main output, the plan and its implementation. Seemingly, a successful planning process should develop a plan that addresses the identified problem in practice and leads to implementation as per stakeholders' contributions (Hadaya & Cassivi, 2012; Faehnle & Tyrväinen, 2013; Deng et al., 2015; Roy, 2015). Furthermore, in addressing interests of different stakeholders through collaborative planning processes, sustainable development should be enhanced and maintained. As part of self-reflection, monitoring and evaluation, both coordination of the implementation of the plans and any unexpected developments should be taken into consideration. These monitoring and evaluation processes should focus on realising the goals and benefits of the plan and provide accountability to stakeholders when needed.

Although it is criticised for its mismatch with reality, collaborative planning is attached to a number of benefits. Apparently, collaborative planning encourages stakeholders' participation in modern matters that affect them (Mandarano, 2008; Roy, 2015; Palmgren-Neuvonen & Korkeamäki, 2015). As a result, this type of planning approach does not make assumptions about stakeholders' interests, motivations and intentions, but rather pragmatically examines how actions and contributions of participants directly define and develop plans (Hadaya & Cassivi, 2012; Faehnle & Tyrväinen, 2013; Deng et al., 2015; Kunitz, 2015). The plans represent a rational selection of the processes through which stakeholders' goals will be achieved. That is, activities are planned around a dominant goal which integrate stakeholders' interests while at the same time their contributions to the process are also informed by what they will inherit from the processes (Kunitz, 2015; Roy, 2015). A cause-effect relationship between plans and actions is therefore assumed. Though planning may be reviewed a number of times before the implementation phase, the plans might not fulfil the needs of all stakeholders (Hadaya & Cassivi, 2012; Deng et al., 2015). Collaboration planning can also be used as a governance mechanism to build trust and mutual understanding among stakeholders. However, it not always guaranteed that this will be achieved among participants (Mandarano, 2008; Hadaya & Cassivi, 2012). Notwithstanding mechanisms put in place to minimize opportunistic behaviour, some stakeholders still find a way to fulfil their personal interests not related to the plans (Deng et al., 2015; Roy, 2015). Given the identified challenges, collaboration planning does not necessarily guarantee the achievement of national development goals. This planning can however be adopted in economic, physical, policy analysis and community development planning approaches. The typologies of planning approaches are numerous and variably suited to substitution, insertion and blended pedagogies for participation in global knowledge economy for national development.

2.3. Models of Governance

Governance within and beyond the state has focused on non-hierarchical coordination modes and the involvement of non-state stakeholders in the formulation and implementation of public policies and plans for development (van Kersbergen & van Waarden, 2004; Börzel & Risse, 2010; Termeer et al., 2010; Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Stojanovska, Miovska, Jovanovska & Stojanovski, 2014). The participation of both state and non-state stakeholders is supposed to improve both the quality of public policies and the effectiveness of their implementation in development (Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Stojanovska et al., 2014). Governance is the various institutionalized modes of social coordination to produce and implement collectively binding rules for the provision of public goods and services (Börzel & Risse, 2010). Governance reflects increasing decentralization of power and control to non-state actors who now participate in more complex structures and processes rather than in a system characterized by hierarchical command and control or market-based anarchy (Termeer et al., 2010; Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Stojanovska et al., 2014). Generally, there are three models of governance that deal with institutional processes and rules for authority decision making, informed by different stakeholders, specifications and norms namely: the monocentric, multilevel and adaptive models (van Kersbergen & van Waarden, 2004; Termeer et al., 2010; Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012).

2.3.1. Monocentric Governance

Monocentric governance is referred to as a model in which the state is at the centre of political power and authority and that has control over society, economy and resources (van Kersbergen & van Waarden, 2004; Kok & Veldkamp, 2011; Termeer et al., 2010; Pereira & Ruysenaar, 2012; Stojanovska et al., 2014). This governance model is based on the top-down development strategy; as a result, the state identifies challenges and areas of need in order to decide on policy goals and other response mechanisms necessary for the implementation of development policies and plans (Termeer et al., 2010). Apparently, a monocentric governance model is characterized as a system which is made up of a limited number of jurisdictions of hierarchical government levels whose task never overlaps (van Kersbergen & van Waarden, 2004; Kok & Veldkamp, 2011; Termeer et al., 2010; Pereira & Ruysenaar, 2012; Stojanovska et al., 2014). More often, most states have a three level system which consists of the national, provincial and local levels wherein the power allocated to the lower levels is restricted and limited by the higher level government (van Kersbergen & van Waarden, 2004; Kok & Veldkamp, 2011; Termeer et al., 2010; Pereira & Ruysenaar, 2012). For this model, the scale of the government matters for governance capacity and representation of the society. Monocentric governance is also referred to as the government perspective, hierarchical governance, command and control systems of governance or the classical modernist approach of governance (Termeer et al., 2010; Pereira & Ruysenaar, 2012).

2.3.2. Multilevel Governance

While the monocentric governance model puts political power and authority of national development on the state, the multilevel governance model asserts that policy and administration starts internationally, then infiltrating down to and between different policy and administrative levels (national, regional/provincial and local). According to Termeer et al. (2010: n.p.), multilevel governance is “a process of continuous interactions among governments and private entities, operating at, and between, several administrative levels and ultimately aiming at the realisation of collective goals”. The multilevel governance model places emphasis on the threefold displacement of state power and control as follows: upwards to international actors and organizations; downwards to provinces, municipalities and communities; and, outwards to civil society and non-state actors (Termeer et al., 2010; Pereira & Ruysenaar, 2012; Stojanovska et al., 2014). This model denotes that the dispersion of governance to different spheres is efficient, effective and superior to monocentric governance (van Kersbergen & van Waarden, 2004; Termeer et al., 2010; Kok &

Veldkamp, 2011; Pereira & Ruysenaar, 2012; Stojanovska et al., 2014). It is usually impossible to find fixed matches between levels on administration, ecological and development scales; therefore, the operation of governance at multiple scales captures and accommodates variations (van Kersbergen & van Waarden, 2004; Termeer et al., 2010; Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Stojanovska et al., 2014). Additionally, the multilevel model activates cross-level interactions and has the potential to collectively resolve with complex multiscale problems (van Kersbergen & van Waarden, 2004; Termeer et al., 2010; Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Stojanovska et al., 2014).

2.3.3. Adaptive Governance

In addition to the two above-mentioned approaches, there is adaptive governance model. Pahl-Wostl et al. (2007: 4, cited in Termeer et al., 2010) defines adaptive governance as “a systematic process for improving management policies and practices by learning from the outcomes of management strategies that have already been implemented”. The adaptive governance model is an integrated, multidisciplinary approach that is designed to confront complex and uncertain natural resources issues (Termeer et al., 2010; Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Stojanovska et al., 2014). The model acknowledges that managed resources can change due to human activities, intervention and consumption and as a result surprises and new uncertainties may also emerge (Termeer et al., 2010; Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012). Therefore, the adaptive governance model assumes that the world characterised by continuous and unexpected changes mostly with unpredictable consequences (Termeer et al., 2010; Pereira & Ruysenaar, 2012). The model accepts challenges of uncertainty by preparing for continuous and unexpected changes through adaptive capacity to deal with the consequences related to the implementation of development plans (Termeer et al., 2010; Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Stojanovska et al., 2014). Contrary to monocentric and multilevel governance models, scale is not limited to spatial and jurisdictional scales only but includes institutional, management, network and knowledge scales (Termeer et al., 2010; Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Stojanovska et al., 2014). Apparently, blended pedagogies and participation in the global knowledge economy require such unlimited flexibility for national development.

2.4. Tenets of Conventional Didactics

Conventional didactics involve the traditional routes of learning through which learners are rendered passive whilst teachers profess all knowledge making it teacher-centred. The reality though is that learners acquire knowledge in different ways which include seeing and hearing, reflecting and acting, reasoning logically and intuitively and drawing pictures, among others, which are influenced by a variety of teaching methods (Pegrum et al., 2013; Button et al., 2014; Peeraer & Van Petegem, 2015; Glušac et al., 2015; Gu et al., 2015; Kearney et al., 2015; Valtonen et al., 2015; Wolff et al., 2015; Salminen, Gustafsson, Vilén, Fuster, Istomina & Papastavrou, 2016). The extent to which learners acquire knowledge is largely influenced by the compatibility of their learning styles and teachers' didactic methods (Pegrum et al., 2013; Button et al., 2014; Peeraer & Van Petegem, 2015; Glušac et al., 2015; Gu et al., 2015; Kearney et al., 2015; Valtonen et al., 2015; Wolff et al., 2015). However, conventional didactics are seen to offer the level and standard of education that deny learners the opportunity to compete in the knowledge economy arena (Pruet et al., 2014). Additionally, lack of integration of digital technology in teaching and learning compromises the ICT skills development of both teachers and learners which are now paramount in global capitalist development (Pegrum et al., 2013; Peeraer & Van Petegem, 2015; Glušac et al., 2015; Gu et al., 2015; Wolff et al., 2015; Salminen et al., 2016). The intellectual capabilities needed for a knowledge economy, including analytical, interactive and computing skills, among others, cannot be acquired through conventional didactics (Pegrum et al., 2013; Button et al., 2014; Peeraer & Van Petegem, 2015; Glušac et al., 2015; Gu et al., 2015; Kearney et al., 2015; Valtonen et al., 2015; Wolff et al., 2015). Apparently, conventional didactics results in learners' boredom and inattentiveness in class, poor performance in assessments, and even dropping out of school (Subramanian, Timberlake, Mittakernti, Lara & Brandt, 2012; Littlewood, Shilling, Stemland, Wright & Kirk, 2013; Gu et al., 2015; Wolff et al., 2015). However, this claim should not suggest a complete replacement of conventional didactics and a drift to the digital pedagogies extremes. Technology on its own may not be the perfect panacea for all challenges faced in education and knowledge construction, particularly in under-resourced areas.

In recent years, the pursuit of effective teaching and learning has been largely captivated by the didactics of passive versus active learning (Subramanian et al., 2012; Littlewood et al., 2013; Gu et al., 2015; Wolff et al., 2015; Salminen et al., 2016). The traditional teachers' delivery of information to learners has been criticised for reinforcing passive learning and suboptimal knowledge acquisition (Subramanian et al., 2012; Littlewood et al., 2013; Gu et al., 2015; Wolff et al., 2015). Research has conclusively demonstrated that learners "do not retain a significant portion of what is taught during lectures" from conventional didactic-ridden sessions of passive learning (Wolff et al., 2015: 85). Additionally, it has been argued that learners who use e-learning are more likely to achieve higher grades than those who rely solely on the face-to-face didactic model alone (Button et al., 2014; Gu et al., 2015; Hanus & Fox, 2015; Salminen et al., 2016). Cognitive formulations involve extremes of arguments such as insinuations that computers are essentially incompatible with teaching, on the one end, whilst at the other end some studies affirm that ICT improves knowledge acquisition (Schmidt et al., 2014: 286 cited in Webster and Son 2015: 85). According to Suh (2004: 1040 cited in Webster & Son, 2015: 85), the question of how to integrate digital technology in teaching and learning for national development is one of the "major challenges facing educational policy in the information age". Using conventional didactics or e-learning alone would not equip learners with the required knowledge and skills; however, the blending of the two approaches holds the potential for effective and active knowledge acquisition, preparedness for participation in the knowledge economy and promotion of national development (Button et al., 2014; Peerear & Van Petegem, 2014; Pruet et al., 2014; Ahonen & Kinnunen, 2015; Valtonen et al., 2015; Salminen et al., 2016). Hence, a complete replacement of conventional didactics and a remiss drift to the envisioned pureness of digital pedagogies is not suggested as the face-to-face model remains necessary for personal development.

2.5. Principles of e-Learning Pedagogies

Given the strife for transformational pedagogy from passive to active learning, ICT has become "inevitable" and "ubiquitous" across the world. There have been insinuations that e-learning pedagogies provide for "deeper learning" than the traditional face-to-face classroom contact model (Pegrum et al., 2013; Button et al., 2014; Dolenc & Aberšek, 2015; Peeraer & Van Petegem, 2015; Glušac et al., 2015; Gu et al., 2015; Kearney et al., 2015; Valtonen et al., 2015; Wolff et al., 2015; Siddiq et al., 2016). However, there is support (cognitive convergence) for the idea that e-learning should not necessarily replace the conventional didactics (Button et al., 2014; Dolenc & Aberšek, 2015; Wolff et al., 2015), even among those digital technology fanatics. As a result, there has been a shift towards blended learning, which integrates conventional didactics with the online teaching and e-learning model (Garrison & Vaughan, 2008; Button et al., 2014; Dolenc & Aberšek, 2015; Wolff et al., 2015). An exclusively online learning environment is possible, but there are serious limitations that arise due to the nature of knowledge. Whereas it could be easy to transfer codified knowledge, the tacit version would be lost in the process because it is vested with the teachers and it therefore requires face-to-face contact to be experienced by the receiver (Storper & Venables, 2004; Smedlund, 2006; Bramwell, & Wolfe, 2008; Hong, 2008; Rosenthal, & Strange, 2008; Youtie, & Shapira, 2008; Marginson, 2010; Dolenc & Aberšek, 2015; Wolff et al., 2015; Siddiq et al., 2016). For this reason, it is preferable to adopt blended learning to incorporate various techniques and approaches, to exclusive reliance on one or the other model (Subramanian et al., 2012; Littlewood et al., 2013; Hanus & Fox, 2015; Wolff et al., 2015).

The e-learning pedagogies are guided by a number of principles to ensure their success and appropriate contribution to national development through education and participation in the knowledge economy. The principles include matching and integration of digital technologies with the existing curriculum, facilitation of learners' engagement and participation, encouragement of collaborative learning, provision of innovative approaches, coherence, consistency and transparency as well as application (Teo, 2011; Al-Mansour & Al-Shorman, 2012; Ertmer et al., 2012; Kirkwood & Price, 2013; Pegrum et al., 2013; Button et al., 2014; Dolenc & Aberšek, 2015; Peeraer & Van Petegem, 2015; Glušac et al., 2015; Gu et al., 2015; Kearney et al., 2015; Valtonen et al., 2015; Wolff et al., 2015; Webster & Son 2015; Siddiq et al., 2016). Whereas not a panacea to all knowledge acquisition, there is value in establishing e-learning pedagogies for participation in the knowledge economy and promotion of national development. Thus, e-learning pedagogies must have clear objectives which align to the content covered, be appropriate to both teachers' and learners' didactic and knowledge acquisition activities and complement the assessments (Button et al., 2014; Dolenc & Aberšek, 2015; Peeraer & Van Petegem, 2015; Webster & Son 2015; Siddiq et al., 2016).

Additionally, e-pedagogies must encourage learners' engagement and participation in order to enhance control of their knowledge acquisition (Gu et al., 2015; Kearney et al., 2015; Valtonen et al., 2015; Siddiq et al., 2016). The e-learning teaching approaches must be innovative and fit for purpose to give both teachers and learners an opportunity to improve their levels of creativeness, imaginativeness and analytical skills (Al-Mansour & Al-Shorman, 2012; Dolenc & Aberšek, 2015; Glušac et al., 2015; Gu et al., 2015; Siddiq et al., 2016). The e-learning pedagogies must be internally coherent and consistent in the way that the objectives, content, student activity and assessment match each other in regard to design, openness and accountability (Dolenc & Aberšek, 2015; Glušac et al., 2015; Gu et al., 2015). Whereas e-learning approaches and methods should be easy and fun to use for both teachers and learners, their application to knowledge acquisition cannot be left to chance, it requires specific planning, governance, infrastructure, culture and skills. This study used statistical modelling for a relational analysis to determine the readiness and appropriateness of South Africa's planning, governance, infrastructure, culture and skills relative to other countries of different human development standing in the world.

2.6. Preconditions for Blending e-Learning Pedagogies with Conventional Didactics

The blending of e-learning pedagogies with conventional didactics is not unproblematic (Valtonen, Dillon, Hacklin & Väisänen, 2010; Valtonen, Pöntinen, Kukkonen, Dillon, Väisänen & Hacklin, 2011; Valtonen, Hacklin, Kontkanen, Hartikainen-Ahia, Kärkkäinen & Kukkonen, 2013; Noh et al., 2014; Glušac et al., 2015; Valtonen et al., 2015; Siddiq et al., 2016) because the preconditions are imposing and rigidly determinant of successful transformation. In the present world, the majority of educational systems are characterised by rigidities of adherence to conventional didactics (Peeraer & Van Petegem, 2015; Valtonen et al., 2015; Webster & Son, 2015). Hence, even developed countries that are endowed with the state-of-the-art ICT infrastructure have equally continued to struggle to blend e-learning pedagogies with conventional didactics (Peeraer & Van Petegem, 2015; Valtonen et al., 2015; Webster & Son, 2015). However, the user commitment theory and continuous adoption of technology states that "usefulness, ease of use, personalization and learning cost" are the main variables that affect the implementation of blended pedagogies (Domingo & Garganté, 2016: 21). Additionally, accepting technology for teaching and learning is also crucial to the success of blended pedagogies (Davies, 1989; Wang, Guo & Jou, 2015; Valtonen et al., 2015).

Accordingly, the Technology Acceptance Model's (TAM) usefulness and perceived ease of use are the fundamental determinants of the approval and implementation of blended pedagogies (Davies, 1989; Wang et al., 2015; Valtonen et al., 2015). This model was initially designed to predict user acceptance of ICT and its usage in an organizational context including learning institutions, by focusing on the explanations of intention for using specific technologies or services (Davies, 1989; Wang et al., 2015). Up-to-date, TAM has proven to be a valid, robust and powerful model for predicting user usefulness and acceptance of technology (Davies, 1989, Mohammadi, 2015; Valtonen et al., 2015; Wang et al., 2015; Domingo & Garganté, 2016; Siddiq et al., 2016). That is, infrastructure is not necessarily a sufficient condition for precipitating successful blending of e-learning pedagogies with conventional didactics. Instead, the collective of preconditions, inclusive of planning, governance, infrastructure, culture and skills, is critical for successful blending of e-learning pedagogies with conventional didactics (Noh et al., 2014; Pruet et al., 2014; Gu et al., 2015; Mohammadi, 2015; Domingo & Garganté, 2016; Siddiq et al., 2016) as well as productive engagement of the knowledge economy and global capitalism.

2.6.1. Infrastructure for Blended Pedagogies

Increasingly, the requirement to incorporate digital technology in teaching and learning has become ubiquitous and consequently with a race to install an advanced computer and information communication technology infrastructure (Garrison, 2011; Button et al., 2014; Gu et al., 2015; Lee & Kim, 2015; Oyedemi, 2015; Webster & Son, 2015; Wolff et al., 2015). The fashionable use of digital technology to facilitate teaching and learning is commonly denoted e-learning (Garrison, 2011; Button et al., 2014), which entails several preconditions (Valtonen et al., 2015; Webster & Son, 2015), some of which consist of necessary requirements whilst other are sufficient conditions. Without installing the necessary infrastructure, the use of e-learning would be improbable or unsuccessful. If there are no computers, if computer systems and applications are unreliable, computer screens freeze, online connections are frequently dropped and there are long download time spans (Button et al., 2014) and thus, e-learning becomes unfeasible. Beyond the use of desktop and laptop computers mostly for administration purposes in schools, teaching and learning through mobile devices such as smartphones and tablets has seem to have increased (Gikas & Grant, 2013; Pruet et al., 2014; Glušac et al., 2015; Domingo & Garganté, 2016).

However, tablets are the most preferred mobile devices due to their competence related to portability and easy operation for teaching and learning (Teo, 2011; Al-Mansour & Al-Shorman, 2012; Ertmer et al., 2012; Kirkwood & Price, 2013; Button et al., 2014; Lee & Kim, 2015; Valtonene et al., 2015; Webster & Son 2015). Generally, the tablets' specifications are a 7 inch touch screen, with a storage capacity of 16GB, a front camera and compatible with Android (Al-Mansour & Al-Shorman, 2012; Ertmer et al., 2012; Kirkwood & Price, 2013; Button et al., 2014; Pruet et al., 2014; Lee & Kim, 2015; Valtonene et al., 2015; Domingo & Garganté, 2016). The tablets are then installed with the national digital teaching and learning contents that are aligned with the curriculum (Pruet et al., 2014; Domingo & Garganté, 2016). Tablets which allow users to interact directly with software applications using a stylus and/or touch interfaces on screens instead of keyboards are mostly used for personal and business uses and in education (Pruet et al., 2014; Domingo & Garganté, 2016). These mobile devices allow teachers and learners to employ digital technology to access educational materials anywhere and anytime and promote both personalised and collaborative learning away from the classrooms (Pruet et al., 2014). Thus, mobile devices are highly regarded for providing flexible and self-paced learning in a digital environment, described by Mifsud (2014) as "anywhere, anytime", "on the move" and in "multiple contexts".

Clearly, the use of computers, laptops and mobile devices for effective teaching and learning largely depends on Internet connectivity. The evolution of the Internet from a model known as the "Web 1.0 (distributive)" to "Web 2.0 (collaborative)" has allowed its use to be expanded especially in pedagogy (Rolando, Salvador & Luz, 2013; Pruet et al., 2014; Garbin, Garcia, do Amaral, da Silva & de Abreu, 2015; Lee & Kim, 2015; Domingo & Garganté, 2016). Web 1.0 is characterized by "a division of roles between producers and final information users (consumers) by the centralized production of content, static websites and mainly by a one-way distribution of knowledge by downloading" (Oreilly, 2007 cited in Rolando et al., 2013: 47). Compared to Web 1.0, Oreilly (2007) states that Web 2.0 was created for definition of a new kind of experience in terms of Internet use, which changes the role of the Web as a platform, in which online tools with a “greater interactivity potential” create a network effect through participation and collaboration among users. Therefore, Web 2.0 offers the possibility of authorship, information sharing and collective knowledge building by means of which users can continually reconstruct data from multiple sources, whilst providing their own information and services, allowing these to be remixed, edited and used by others (Rolando et al., 2013; Pruet et al., 2014; Garbin et al., 2015; Lee & Kim, 2015; Oz, Demirezen & Pourfeiz, 2015; Domingo & Garganté, 2016).

The globalization of the Internet and advancements in technology have facilitated the development of new digital tools which have the potential to be adopted for educational purposes (Rolando et al., 2013; Pruet et al., 2014; Lee & Kim, 2015; Oz et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Park, Yu & Jo, 2016; Salminen et al., 2016). These tools which are available on the Internet have different names such as “Web 2.0 technologies”, “social web”, “internet tools”, “social media”, “Web 2.0 tools” and “digital technologies”, among others (Rolando et al., 2013; Pruet et al., 2014; Oz et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Salminen et al., 2016). These common Web 2.0 technologies include “blogs”, “wikis”, “social bookmarking”, “media sharing spaces”, “RSS feeds”, “collaborative editing tools”, “microblogging” and “social networking sites” (Rolando et al., 2013; Pruet et al., 2014; Lee & Kim, 2015; Oz et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Salminen et al., 2016). However, traditional Internet tools including emails, chats and search websites to-date remain widely used, providing a mix of possible actions on the Web (Garbin et al., 2015; Hung, 2016; Park et al., 2016). Thus, teachers and learners have access to a number of Internet tools to perform various educational tasks such as conducting research using search websites (Google, Ask, Bing); communicating via synchronous and asynchronous tools (Gmail, MSN, Skype); file sharing (YouTube, Flickr); writing and publishing online diaries (Wordpress, Blogger, Twitter) and social networking (Facebook, MySpace, Second Life) (Rolando et al., 2013; Pruet et al., 2014; Oz et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Salminen et al., 2016).

Additionally, the used mobile devices give the disadvantaged areas an opportunity to use digital technologies in education without necessarily incurring costs on infrastructure related to computer labs, furniture and security, among others. These devices are also compatible with Wi-Fi connection which cuts costs on Internet connection to encourage the online learning environment (Pruet et al., 2014; Domingo & Garganté, 2016). This online learning environment encourages teachers and learners, as it were, to engage in collaborative learning, to motivate each other and "to know each other outside of the classroom" (Button et al., 2014: 1313). Thus, these low cost devices are produced to provide and cater for the needy, create an ever-present learning environment with anytime access to digital technology resources, and promote collaborative learning between teachers and learners. Pre-conditions related to computer infrastructure and access to it, such as reliability of the computer systems, working computer applications, non-freezing computer screens, reliable online and electricity connections and reduced download time, are important but not determining factors to the successful implementation of digital technology in education. Rather, teachers' and learners' levels of competence and their unique culture in digital technology informatics and the appropriateness of the adopted planning approaches and governance models of the e-infrastructure and related systems necessary for the blending of e-learning pedagogies with conventional didactics are both necessary and sufficient.

2.6.2. Culture Necessary for Adoption of Blended Pedagogies

The implementation of e-learning requires an understanding of the different contexts of both teachers and learners. Culture is related to values, knowledge, experience, language and symbols, attitudes and notion of time necessary for the implementation of blended pedagogies (Warschauer & Ames, 2010; Mdlongwa, 2012; Viriyapong & Hartfield, 2013; Aesaert & Van Braak, 2014; Pruet et al., 2014; Aesaert, Van Nijlen, Vanderlinde, Tondeur, Devlieger, & van Braak, 2015; Hung, 2016; Siddiq et al., 2016) as measures for the level of e-culture that is important in e-pedagogies. Evidence reveals that the main failure of the usage of digital technologies in education is mostly related to the ignorance of the e-culture of both teachers and learners (Warschauer & Ames, 2010; Viriyapong & Hartfield, 2013; Aesaert & Van Braak, 2014; Pruet et al., 2014; Aesaert et al., 2015; Siddiq et al., 2016). Apparently, the focus is on delivery of the new technology without considering people's needs, e-culture and how they will use the technology (Warschauer & Ames, 2010; Aesaert & Van Braak, 2014). In the field of education, it may be, if not most likely, that teachers and learners in developed countries or urban areas use digital technology differently from those in developing countries or rural areas. (Aesaert & Van Braak, 2014; Pruet et al., 2014; Aesaert et al., 2015). Thus, values, knowledge, experience, language and symbols, attitudes and notion of time in the use of digital technology are important factors that can be used to determine the level of e-culture necessary for the implementation and success of the implementation of ICT in education (Warschauer & Ames, 2010; Viriyapong & Hartfield, 2013; Aesaert & Van Braak, 2014; Pruet et al., 2014; Aesaert et al., 2015; Erdogdu & Erdogdu, 2015; Glušac et al., 2015; Hung, 2016; Siddiq et al., 2016).

Values in terms of teaching and learning styles are crucial to the success of educational ICT for national development. Seemingly, teachers and learners who are in favour of auditory, visual and highly competitive teaching and learning styles are more likely to use digital technologies in their pedagogy than those who are not (Vanderlinde & van Braak, 2010; Aesaert & Van Braak, 2014; Pruet et al., 2014; Glušac et al., 2015; Siddiq et al., 2016). Access to and the use of ICT determines the level of knowledge and experience that the teachers and learners hold for the successful application e-learning. Accordingly, teachers and learners who had the privilege to access and use ICT before are more likely to succeed in the implementation of educational digital technology due to the knowledge and experience they already possess (Vanderlinde & van Braak, 2010; Warschauer & Ames, 2010; Viriyapong & Hartfield, 2013; Pruet et al., 2014; Aesaert & Van Braak, 2014; Erdogdu & Erdogdu, 2015; Glušac et al., 2015; Hung, 2016; Siddiq et al., 2016). Language and symbols used in the digital world are also of importance to the success of educational ICT. Even though the e-language and e-symbols compromise learners' ability to correctly spell words, it makes learning easy as they are more familiar with the codes used (Erdogdu & Erdogdu, 2015; Glušac et al., 2015).

Teachers' and learners' attitudes towards ICT is another important factor by which to predict the successful implementation of digital technology in education (Pruet et al., 2014; Erdogdu & Erdogdu, 2015; Hung, 2016; Siddiq et al., 2016). Apparently, teachers and learners who "perceive computers and the Internet as useful; who are less anxious to use computers and the Internet; and who have more confidence about independent control with Internet use" demonstrate high levels of acceptance of e-learning (Aesaert & Van Braak, 2014: 329). With regard to the notion of time in the use of digital technology, seemingly, most teachers and learners dedicate the majority of their time to personal communication to establish and maintain relationships, find information on various issues, mostly for entertainment and recreational purposes, rather than on teaching and learning (Glušac et al., 2015; Erdogdu & Erdogdu, 2015; Hung, 2016; Siddiq et al., 2016). The time allocated for lessons and their preparations is then misused as a result of both teachers and learners' cyberloafing. For these reasons, there is a need to establish teachers' and learners' levels of e-values, e-knowledge, e-experiences, e-language and e-symbols, e-attitudes and e-notion of time before the implementation of digital technologies before revealing the significant potential for educational purposes.

2.6.2.1. Factors contributing to e-culture in pedagogy

Besides teachers' and learners' values, knowledge, experience, language and symbols, attitudes as well as behaviour necessary for transformational pedagogy, behaviour also plays a crucial role. Davies' Theory of Planned Behaviour (TPB) states that teachers' and learners' actions with regard to the adoption and use of ICT for knowledge transfer and acquisition are determined by their behavioural intentions (Teo, 2011; Aesaert et al., 2015; Valtonen et al., 2015; Wilson, Scalise & Gochyyev, 2015; Domingo & Garganté, 2016; Hung, 2016; Siddiq et al., 2016). These behavioural intentions are determined by three elements, namely: attitudes, subjective norms and perceived behavioural control (Teo, 2011; Valtonen et al., 2015). Teachers and learners' evaluation of certain behaviours either positively or negatively valued, is referred to as attitudes (Teo, 2011; Aesaert et al., 2015; Valtonen et al., 2015; Wilson et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Siddiq et al., 2016). On one hand, subjective norms refer to the social aspect that relates to the behaviour and also focuses on how it is viewed by significant people, such as teachers and learners (Teo, 2011; Wilson et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Siddiq et al., 2016). While on the other hand, perceived behavioural control has to do with the resources and possibilities to support the behaviour and self-efficacy which is more on teachers' and learners' evaluation of their abilities and skills necessary to conduct the behaviour (Teo, 2011; Valtonen et al., 2015). According to Teo (2011), TPB is a valid model for explaining the behavioural intentions of teachers and learners to blend e-learning with conventional didactics.

Regardless of teachers' and learners' values, knowledge, experience, language and symbols, attitudes as well as behaviour there are five external factors that have effects on their e-culture and are necessary for blended pedagogies. The factors include socio-economic characteristics, ICT oriented home situations, general educational, classroom and school level factors (Durndell & Haag, 2002; Meelissen, 2008; Strudler & Hearrington, 2008; Vekiri, & Chronaki, 2008; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009; Tsai & Tsai, 2010; Vanderlinde & van Braak, 2010; Zhong, 2011; Verhoeven, Heerwegh & De Wit, 2012; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015; Hung, 2016) which are discussed as follows:

2.6.2.1.1. Socio-economic factors

The socio-economic characteristics that have the ability to influence the e-culture of both teachers and learners are sex, age and economic status (Durndell & Haag, 2002; Meelissen, 2008; Vekiri, & Chronaki, 2008; Tsai & Tsai, 2010; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015; Hung, 2016). Although there is no conclusive evidence about the relationship between sex and e-culture, it is perceived that females have more relationship and communication focused ICT abilities compared to males who possess more technical skills (Durndell & Haag, 2002; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015). With regard to age, the older teachers and learners get, the more they tend to have less interest in technology (Tsai & Tsai, 2010; Meelissen, 2008; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Hung, 2016). Apparently, teachers and learners with high economic status seem to hold a strong e-culture compared to those who come from poor backgrounds (Durndell & Haag, 2002; Meelissen, 2008; Vekiri, & Chronaki, 2008; Tsai & Tsai, 2010; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015). This evidence suggests that accessibility to technological gadgets and the Internet as a result of affordability has effects on people's e-culture. Thus, the socio-economic characteristics of teachers and learners can either support or hinder the adoption of educational ICT.

2.6.2.1.2. Family Information and Communication Technology support

Another factor is the ICT oriented home situation with measures such as family ICT support, attitudes and availability of computers and the Internet (Tsai & Tsai, 2010; Zhong, 2011; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015). Firstly, family ICT support entails the degree at which family members control and guide each other in the use of ICT by imposing rules, having talks about computer and Internet usage and doing some activities together (Tsai & Tsai, 2010; Zhong, 2011; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015; Hung, 2016). Secondly, family ICT attitudes relate to the degree in which family members believe that their ICT usage will economically, socially and educationally benefit them by developing their skills and competencies (Tsai & Tsai, 2010; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Hung, 2016). In this case, teachers and learners who perceive their family members as supportive and encouraging with regard to ICT usage and related skills development, consider themselves to be better at adopting computers and Internet in their pedagogy. Lastly, the availability of computers and Internet at home refers to opportunities that family members have to develop their ICT skills and competencies by having access to the necessary infrastructure in the comfort of their homes (Vekiri, & Chronaki, 2008; Tsai & Tsai, 2010; Zhong, 2011; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015). Thus, family computer ownership influences teachers' and learners' e-culture as it gives them an opportunity to relate to and be confident to use certain applications and programmes.

2.6.2.1.3. General educational factors

In addition to the discussed characteristics of e-culture, there are general educational, classroom and school level factors which also have an influence on teachers' and learners' e-culture (Vekiri, & Chronaki, 2008; Vansteenkiste et al., 2009; Verhoeven et al., 2012; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015). The general educational factors focus on teaching and learning motivation, style and analytical intelligence (Vansteenkiste et al., 2009; Verhoeven et al., 2012; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015). Teaching and learning motivation encourages autonomous rather than controlled knowledge transfer and acquisition. In this case, teaching and learning that is motivated by pressure and related factors in transformation of pedagogy explains the lack of e-culture amongst participants (Vekiri, & Chronaki, 2008; Vansteenkiste et al., 2009; Verhoeven et al., 2012; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Hung, 2016). The teaching and learning style is also of importance in building a strong and stable e-culture. A more meaning-directed teaching and learning style encourages an effective e-culture towards achieving the desired transformation in pedagogy (Vansteenkiste et al., 2009; Verhoeven et al., 2012; Aesaert et al., 2015). Another general education factor is the analytical intelligence, a measure of aptitude, which is believed to have effects on both teachers' and learners' e-culture (Vansteenkiste et al., 2009; Verhoeven et al., 2012; Hung, 2016). Apparently, teachers and learners who are able to apply their analytical intelligence in blended pedagogies have demonstrated a positive e-culture.

2.6.2.1.4. Classroom factors

Classroom factors with a number of characteristics also affect the e-culture of teachers and learners. These include ICT experiences, logistic appropriateness, competencies and professional development (Vanderlinde & van Braak, 2010; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015; Hung, 2016). Generally, the characteristics refer to teachers' and learners' personal ICT profiles and classroom conditions created to encourage the use of educational technology (Vanderlinde & van Braak, 2010; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015). In order to develop the level of e-culture required for success of the blended pedagogies, the frequency of using ICT for teaching and learning in the classrooms must be improved (Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014). Appropriate logistics with regard to the educational ICT are important in ensuring that both teachers and learners feel satisfied with the technological resources (Vanderlinde & van Braak, 2010; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015).

The logistics revolve around ICT accessibility and availability of required software and hardware necessary for blended pedagogies. ICT competencies are limited to self-perceived technical, organizational and pedagogical-didactical ability to use technology in the classrooms (Vanderlinde & van Braak, 2010; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015; Hung, 2016). Seemingly, high teachers' e-culture is positively related to learners' cognitive and emotional achievements as well as the development of values towards educational ICT. Additionally, teachers' confidence in delivering lessons using technology and assisting learners to achieve their educational goals is positively linked to the development of learners' e-culture (Vanderlinde & van Braak, 2010; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015). That is, teachers who perceive ICT as useful and important in education encourages the development of learners' e-culture so that they are able to excel in using the technology for knowledge acquisition. ICT professional development refers to the degree to which teachers and learners make efforts to keep informed about technology advancements and simultaneously engage in ICT-related professional development (Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Hung, 2016). Apparently, a dearth of professional development, especially among teachers, is one of the challenges prevent the development of the appropriate e-culture in education.

2.6.2.1.5. School level factors

School level factors involve organizational factors that are related to teaching and learning such as the ICT support, coordination and vision and policy (Strudler & Hearrington, 2008; Zhong, 2011; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015). ICT support focuses on quality technical and educational support that teachers and learners must receive in the implementation of blended pedagogies to achieve a robust e-culture (Strudler & Hearrington, 2008; Zhong, 2011; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015). ICT coordination plays four supportive roles; that of planner, technician, budgeter and educationalist in ensuring that the processes of the implementation of the blended pedagogies in schools unfold accordingly (Zhong, 2011; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Hung, 2016). Apparently, the support from the ICT coordinator add value to the successful blending of pedagogies as challenges on the ground are realized and resolved as they emerge. A school's vision and ICT policy should consider prioritizing the educational ICT goals as an essential component of blended pedagogies (Strudler & Hearrington, 2008; Zhong, 2011; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015; Hung, 2016). Notwithstanding the school's vision and ICT policy, it is the teachers' and learners' e-culture to a large extent that still determines the appropriate application of the blended pedagogies. Teachers and learners who have positive e-cultures have better chances of successfully integrating e-learning with conventional didactics.

However, institutional dynamics also affect the total level of e-culture in schools, something which cannot be addressed at the individual level. The international application of the McNay's Taxonomy in studies concerned with organizational culture provides examples of institutional types judged on their culture towards the core business of their institutions (McNay, 1995; McNaught & Vogel, 2006; Czerniewicz & Brown, 2009). McNay's Taxonomy provides four organisational cultural types namely: collegium, bureaucracy, corporation and enterprise (McNay, 1995; McNaught & Vogel, 2006; Czerniewicz & Brown, 2009). This taxonomy has subsequently been extended and modified by McNaught & Vogel (2006) in order to categorise the culture towards the implementation of e-learning within educational institutions. McNay (1995) and McNaught & Vogel (2006) state that the collegium organizational culture is characterised by a "loose institutional policy definition", informal networks and decision arenas, and innovation at the level of the individual or department in the implementation of e-learning and/or blended learning. That is, this type of culture within an institution allows for the lack of tight policies that clearly guide, control and manage e-learning activities. However, willing individuals and/or departments randomly make decisions to adopt technology in their teaching and learning without an appropriate analysis of the required planning, governance, infrastructure, culture and skills. The bureaucratic organizational cultural type is also characterised by "loose policy but strong regulation". It is dominated by committees or administrative consultations with regard to the implementation of e-learning (McNay, 1995; McNaught & Vogel, 2006; Czerniewicz & Brown, 2009). In most cases, the decisions made during these "highly regulatory" committees or administrative consultations around e-learning are not conducive to the required changes as they are determined by the ‘‘political authority" at that moment (McNay, 1995; Czerniewicz & Brown, 2009).

The corporate organizational cultural type is defined by "tight policy definition, tight implementation and a culture of strong top down directives, implemented by institutional senior management" (McNay, 1995: 108). The corporate culture suggests that the implementation of e-learning is governed by strict policy and implementation processes which are managed specifically by the senior management of the institution in question. Therefore, appropriate implementation of e-learning and the development of an effective culture lies with the senior management of the institution. The enterprise type has a "well-defined policy framework" which is informed by "learners as clients" who are considered as the dominant criterion for decision making (McNay, 1995; McNaught & Vogel, 2006; Czerniewicz & Brown, 2009). For this type of organizational culture, leadership in e-learning is decentralised to learners in order to ensure that the institution meet their needs and therefore, considering the market as a strong focus. As McNay (1995) and McNaught & Vogel (2006) emphasized, no institution can precisely be grouped under one type and as a result of continuous developments, institutions have the flexibility to change classification over time. Generally, appropriate e-culture should be well developed at the school level through appropriate policies and involvement of the relevant stakeholders inclusive of teachers and learners for planning and governance of e-learning. The inclusion of teachers and learners will ensure that e-learning is not considered as one of the initiatives that are merely imposed on them, especially during the implementation phase.

Seemingly, factors which include socio-economic characteristics, ICT oriented home situations, general educational, classroom and school level factors affect the level of e-culture among both teachers and learners. These findings reveal that during times in which educational policies are focusing on ICT integration and developing ICT frameworks and curricula, teachers' and learners' perceptions and their judgment of their computer and Internet competences are still developing outside of the school setting, rather than inside the classroom. According to Zhong (2011), the home which is an out of school setting in which some teachers and learners use ICT, works as a more powerful predictor of e-culture than the classroom itself. In order to deal with the absence of e-culture in the formal education, learners should be taught to reflect on their own ICT attitudes and teachers be assisted to choose and develop ICT activities that are appropriate in terms of difficulty and ease as part of pedagogical aspects that ICT professional development should focus on. However, using self-efficacy as a measure for the level of e-culture, can result in validity problems as the results are based on teachers' and learners' own judgment, experience and expectations of their successful performance of computer and Internet related tasks. Perhaps the expectation that defining appropriate e-culture should be left to teachers and learners only is misleading as well. The educational institutions should also ensure that their level of e-culture strongly supports and motivates both teachers and learners during the adoption and implementation of e-learning and/or blended learning.

2.6.3. Required Skills For Blending E-learning Pedagogies with Conventional Didactics

In the last decade, the knowledge economy seems to depend more on information technology (Powell & Snellman, 2004; Garrison & Vaughan, 2008; Youtie & Shapira, 2008; Deltsidou et al., 2010; Marginson, 2010; Farkas & Török, 2011; Garrison, 2011; Aesaert & van Braak, 2014; Button et al., 2014; Aesaert et al., 2015; Gu et al., 2015; Valtonen et al., 2015; Siddiq et al., 2016). For the twenty-first century skills and information society, it is important to be digitally competent for active participation in the knowledge economy (Aesaert et al., 2015; Gu et al., 2015; Valtonen et al., 2015; Wilson et al., 2015; Siddiq et al., 2016). As a result, the digital competencies are driven by the international and national ICT educational policies in an attempt to formalise e-learning curricula (Marginson, 2010; Farkas & Török, 2011; Garrison, 2011; Aesaert & van Braak, 2014; Button et al., 2014; Aesaert et al., 2015; Gu et al., 2015). That is, people must be in possession of a set of ICT skills and competencies acquired through education in order to be able to participate in the knowledge economy for national development. In response to these technological transformations, the blending of e-learning pedagogies with conventional didactics have become key in pedagogy (Teo, 2011; Al-Mansour & Al-Shorman, 2012; Ertmer et al., 2012; Kirkwood & Price, 2013; Hou et al., 2014**;** Peeraer & Van Petegem, 2015; Webster & Son 2015; Wilson et al., 2015). However, e-learning requires, at the minimum, specific levels of computer and information literacy, pedagogic technological informatics as well as self-efficacy, which are discussed in the succeeding sub-sections:

2.6.3.1. Computer literacy

According to Martin (2006), the concept of computer literacy has gone through a three-stage evolution of mastery, application and reflection. Firstly, the mastery stage, which took place until the mid-1980s, perceived computer literacy as knowledge of how the computers work, known as "computer science" and the skills on how to master and program them (Carleer, 1984; Martin, 2006; Aesaert, van Nijlen, Vanderlinde, Tondeur, Devlieger & van Braak; 2015; Wilson et al., 2015). Computer literacy at this stage referred to “an understanding of the concepts, terminology and operations that relate to general computer use" (Computer Literacy USA, 2012 cited in Button et al., 2014: 1311). Basically, the fundamental focus of computer literacy was on understanding of the components of the machine, its history, and principal application as well as acquiring hands-on skills in programming language (Carleer, 1984; Wilson et al., 2015). In this stage, computer literacy was more on learning about information technology rather than learning with or through computers (Carleer, 1984; Martin, 2006; Aesaert et al., 2015; Wilson et al., 2015). Secondly, between the mid-180s and late 1990s, operating systems and software applications became more popular, user friendly and products of mass usage, forcing computer literacy to shift into a more application oriented stage (Martin, 2006; Aesaert et al., 2015; Wilson et al., 2015). Instead of focusing on specialist knowledge, attention shifted to practical basic competences for the application of common software in education, work, leisure and home, among other environments (Martin, 2006; Aesaert et al., 2015). Technical-procedural skills incorporated in both the mastery and application stages were required at this level for applications ranging from file management and text processing to authoring tools and programming (Martin, 2006; Aesaert et al., 2015; Wilson et al., 2015).

Lastly and now dominant, the reflective stage, which shifted from basic skills and use of applications to a more evaluative and critical use of computers and the Internet (Eshet, 2002; Voogt, 2008; Aesaert et al., 2015; Wilson et al., 2015). Apparently, the acquisition of basic knowledge in relation to the operations of a computer and skills in the application of a few programmes is insufficient to cope with the changes of the ever evolving contemporary society (Voogt, 2008; Aesaert et al., 2015). For example, retrieving data from the Internet not only requires knowledge of search engines but also the ability to differentiate between relevant and irrelevant data (Eshet, 2002; Aesaert et al., 2015; Wilson et al., 2015). Therefore, the current computer literacy is concerned with "problem solving, information processing, critical thinking, creative and innovative ICT use rather than mastering of basic ICT skills (Aesaert et al., 2015: 56). Computer literacy for the 21st century is defined as the interactive use of general cognitive and technical capabilities in order to successfully complete cognitive and generic activities, such as the ability to use technology and communication tools to identify, access, manage, integrate, evaluate and create information for participation in the knowledge economy (Martin, 2006; Markauskaite, 2007; Aesaert et al., 2015;

Wilson et al., 2015). Therefore, the technical and application orientated skills developed during the mastery and application stages respectively, need to be mastered in order to be able to achieve more critical and high-order computer and Internet competencies. Computer literacy involves a high-order learning process and orientated competence used in complex, authentic and unpredictable situations underpinned by technical and application ICT knowledge and skills (Aesaert et al., 2015; Wilson et al., 2015).

For learners, the reflective stage categorises computer literacy necessary for blended pedagogies by using a 6 levels framework developed by the Australian Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA) (MCEETYA, 2005; Wislon et al., 2015). According to the framework, learners at level one are expected to use computers and software to perform basic tasks as per instruction (MCEETYA, 2005; Aesaert et al., 2015; Wilson et al., 2015; Siddiq et al., 2016). Learners at this stage recognize the most commonly used ICT concepts and functions as per curriculum presented through blended pedagogies. At level 2, learners are able to locate simple and explicit information from a prescribed electronic source by adding content and making simple changes to existing information as per instruction (MCEETYA, 2005; Markauskaite, 2007; Aesaert et al., 2015; Wilson et al., 2015). Learners can further recognize and identify basic ICT technology security, health and safety usage issues and practices. The generation of simple search questions and selection of the best information source that fulfil a specific purpose are the ICT skills that learners should have at stage three. Learners retrieve and use this information for knowledge acquisition and completion of specific assessment tasks (MCEETYA, 2005; Aesaert et al., 2015; Wilson et al., 2015).

At level 4, learners are able to search for relevant information from electronic sources for knowledge acquisition which they can reorder to meet a specific and/or individual goal. Learners are also fully aware of the intentions of the blended pedagogies and thus, can recognise situations when they do not use the educational ICT for intended purposes (MCEETYA, 2005; Martin, 2006; Aesaert et al., 2015; Wilson et al., 2015). When learners are at level 5, evaluation of the credibility and selection of the most relevant information from electronic sources is key. Their use of software to reorganize and present information graphically in line with the objectives of the lessons, demonstrate evidence of planning and technical competence in their work (MCEETYA, 2005; Martin, 2006; Markauskaite, 2007; Wilson et al., 2015). During level 6, learners who are exposed to blended pedagogies present information in a manner that show technical proficiency, careful planning and review by using software to organize, synthesize and represent data in an integrated and complete manner. The information they design is in line with the expectation of the curriculum with a well-developed communicative effect of their work (MCEETYA, 2005; Martin, 2006; Markauskaite, 2007; Aesaert et al., 2015; Wilson et al., 2015). This six level framework explains the development of learners' ICT skills comprising data identification, collection, categorization, reordering, analysis, evaluation and synthesis as part of their knowledge acquisition through blended pedagogies.

2.6.3.2. Information literacy

According to Bundy (2005, cited in Button et al., 2014: 1311), information literacy means the ability to recognize the need for information, to determine the extent of the need, to access it efficiently, to critically evaluate it and its sources, and to collect or generate, classify, store, manipulate, redraft and incorporate it into existing knowledge systems or bases. Successful implementation of e-learning is, therefore, dependent upon the levels of computer and information literacy among teachers and learners (Button et al., 2014; Noh et al., 2014; Webster & Son, 2015; Siddiq et al., 2016). To be equipped with lifelong learning skills, teachers and learners need to be supported with ongoing education and informatics as current education methodologies and teaching strategies increasingly incorporate e-learning (Button et al., 2014; Aesaert et al., 2015; Gu et al., 2015; Wilson et al., 2015). E-learning brings about an ease of dissemination and circulation of educational information between teachers and learners (Bakhshizadeh et al., 2011). In most cases, the most tangible advantage of e-learning is its provision of information literacy for teachers and learners with little or no costs (Bakhshizadeh et al., 2011).

The establishment of the e-learning environment requires among other things computer and information literacy related to Internet skills and their combined use to retrieve information, largely conditional upon acquisition of costly personal computers and training (Elder & Koehn, 2009; Bond, 2010; Deltsidou et al., 2010; Aesaert & van Braak, 2014; Button et al., 2014; Aesaert et al., 2015; Gu et al., 2015; Wilson et al., 2015; Siddiq et al., 2016). Information literacy relating to the skills of managing large volumes of data when conducting Internet database searches is as important as literacy for the basic use of computers for information retrieval from the Internet (Elder & Koehn, 2009; Bond, 2010; Deltsidou et al., 2010; Aesaert & van Braak, 2014; Button et al., 2014; Aesaert et al., 2015; Gu et al., 2015; Siddiq et al., 2016). Therefore, the integration of e-learning with conventional didactics is believed to support learners with their own constructive thinking, allows them to transcend their cognitive limitations through operations that they might not have been capable of before. Moreover, a degree of independent learning and expansion of horizons beyond the standard curriculum are encouraged, as well as an interactive capability of using the e-learning resources to motivate and engage weaker learners and allow them to learn at an appropriate pace (Bakhshizadeh et al., 2011; Wilson et al., 2015).

2.6.3.3. Pedagogic technological informatics

Theoretically, Technological Pedagogical Content Knowledge (TPACK) assumes that in order to transform classroom environments specifically from teacher-centred into collaborative and interactive spaces that is, more learner-centred, it is crucial for teachers to successfully integrate technological, pedagogical and content knowledge (Mishra & Koehler, 2006; Aesaert & van Braak, 2014; Button et al., 2014; Noh et al., 2014; Aesaert et al., 2015; Boschman, McKenney, & Voogt, 2015; Kavanoz et al., 2015; Peeraer & Van Petegem, 2015; Gu et al., 2015; Park, Schallert, Sanders, Williams, Seo, Yu, Vogler, Song & Williamson, 2015; Valtonen et al., 2015; Wilson et al., 2015). Thus, TPACK consists of a number of knowledge domains comprising content knowledge, pedagogical knowledge, pedagogical content knowledge, and technological pedagogical knowledge. These knowledge domains develop entangled relationships that combine teachers' conventional methods, technology use, and understanding of the subject matter (Mishra & Koehler, 2006; Aesaert & van Braak, 2014; Button et al., 2014; Noh et al., 2014; Aesaert et al., 2015; Boschman et al., 2015; Kavanoz et al., 2015; Peeraer & Van Petegem, 2015; Gu et al., 2015; Park et al., 2015; Valtonen et al., 2015). Hence, content affects pedagogical goals, methods and the technologies to be used in blended pedagogies. Equally, technology use has several limitations and requirements that in turn affect both the content and its transfer methods of the learners' pedagogic technological informatics (Mishra & Koehler, 2006; Aesaert & van Braak, 2014; Button et al., 2014; Boschman et al., 2015; Kavanoz et al., 2015). Therefore, TPACK suggests that teachers who resist and fail to integrate conventional didactics with e-learning, still require training to develop their fundamental knowledge and skills necessary for the successful integration of technology in classrooms (Mishra & Koehler, 2006; Aesaert & van Braak, 2014; Button et al., 2014; Noh et al., 2014; Aesaert et al., 2015; Boschman et al., 2015; Kavanoz et al., 2015; Peeraer & Van Petegem, 2015; Gu et al., 2015; Park et al., 2015; Valtonen et al., 2015; Wilson et al., 2015).

Pedagogic technological informatics involve the skills necessary for teachers to integrate teaching, computer and information sciences in their management and communication of data, information and knowledge in facilitation of learning (authors' own formulation drawn from Button et al., 2014). Thus, computer and information technology competences among teachers are critical for the establishment of the e-learning environment (Mishra & Koehler, 2006; Aesaert & van Braak, 2014; Button et al., 2014; Noh et al., 2014; Aesaert et al., 2015; Boschman et al., 2015; Peeraer & Van Petegem, 2015; Gu et al., 2015; Valtonen et al., 2015; Wilson et al., 2015). For these reasons, e-learning entails costly interventions relating to financial, training and technical support for both teachers and learners (Moule, Ward & Lockyer, 2010; Nguyen, Zierler & Nguyen, 2011; Gu et al., 2015). Both computer and information literacy, which cannot be acquired by osmosis, are fundamental to technology informatics in teaching and learning (Bond, 2010; Button et al., 2014; Noh et al., 2014; Webster & Son, 2015). That is, teachers and learners alike require financial, technical and training support in order to acquire and improve their technology informatics, necessary for successful implementation of e-learning. Teachers and learners should be able to manage digital technology and information as well as being provided with the "opportunities for progressive development of ICT competence" (Button et al., 2014: 1320). More often than not, institutions prioritize acquisition and installation of computer hardware and software above teachers' and learners' technological training and its incorporation in teaching and learning (Valtonen et al., 2010; Valtonen et al., 2011; Valtonen et al., 2013; Oyedemi, 2015; Valtonen et al., 2015; Webster & Son, 2015; Wilson et al., 2015).

The application of pedagogic technological informatics is directly linked to the additional roles that teachers play in the integration of e-learning with conventional didactics. The additional teachers' roles which are brought about by e-learning include pedagogical, social, managerial and technical skills (Mishra & Koehler, 2006; Aesaert & van Braak, 2014; Button et al., 2014; Noh et al., 2014; Aesaert et al., 2015; Boschman et al., 2015; Peeraer & Van Petegem, 2015; Gu et al., 2015; Park et al., 2015; Valtonen et al., 2015; Wilson et al., 2015). Because these roles are implemented within an electronic set-up, for the purpose of this research they will be referred to as "e-pedagogical", "e-social", "e-managerial" and "e-technical" skills. E-pedagogic skills involve encouraging learners to think about elements that are critical to the topic in question in order to ensure that their online postings and engagements reflect practice, whereas e-social skills focus on integrating informal conversations with content discussions to successfully create learners' commitment and enjoyment of technology (Aesaert et al., 2015; Boschman et al., 2015; Peeraer & Van Petegem, 2015; Gu et al., 2015; Park et al., 2015; Valtonen et al., 2015; Wilson et al., 2015).

The e-learning environments must be managed appropriately by the teacher who coordinates the unit. The teacher should intervene to maintain discussion momentum and keep contact with the learners when a need arises (Aesaert & van Braak, 2014; Button et al., 2014; Noh et al., 2014; Aesaert et al., 2015; Boschman et al., 2015; Peeraer & Van Petegem, 2015; Gu et al., 2015; Park et al., 2015; Valtonen et al., 2015; Wilson et al., 2015). The e-management role is concerned with management tasks which involve planning, organizing and managing the communication of a course offered through e-learning. E-technical skills also known as instructional designer skills, are required for designing the online curriculum, delivery methods and assessments using interactive technologies (Mishra & Koehler, 2006; Aesaert & van Braak, 2014; Button et al., 2014; Noh et al., 2014; Aesaert et al., 2015; Boschman et al., 2015; Peeraer & Van Petegem, 2015; Gu et al., 2015; Park et al., 2015; Valtonen et al., 2015; Wilson et al., 2015). Besides, e-learning informatics are in a continuous state of flux, implying that teachers and learners are challenged to keep up with the advancements for timeous and appropriate engagement of the knowledge economy and national development.

2.6.3.4. Self-efficacy

Collectively, computer and information literacy for the application of e-learning involves issues of the user's "capacity" or "self-efficacy" rather than mere access for both the teachers and learners (Vekiri, & Chronaki, 2008; Moos & Azevedo, 2009; Tsai, Chuang, Liang & Tsai, 2011; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015; Kavanoz, Yüksel & Özcan, 2015; Wilson et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Siddiq et al., 2016). ICT self-efficacy originates from the concept of self-efficacy which was derived from Bandura's Social Cognitive Theory. The theory is mostly used in psychology, education, as well as communication, and it holds that parts of individuals' knowledge acquisition is directly related to observation of others within the context of social interactions, experiences and outside media influences (Bandura, 1986; Aesaert & van Braak, 2014; Kavanoz et al., 2015; Wilson et al., 2015; Siddiq et al., 2016). When people observe others performing a certain behaviour and realize its consequences, the observers tend to remember the sequence of events and apply the information to guide their own subsequent behaviours (Bandura, 1986; Aesaert & van Braak, 2014). Additionally, the observations have the ability to prompt the viewers to engage in behaviour that they have already learnt, therefore, the survival of humanity to some extent, depends on the replication of actions of other individuals. That perpetuates the application of existing behaviours of the viewers (Bandura, 1986). In this context, Bandura (1986: 391) defines self-efficacy as ''people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances''. That is, self-efficacy is "a person's belief in his/her capability to perform a certain task" (Aesaert & van Braak, 2014: 327).

Perhaps, the low levels of applications of ICT in education, amidst excessive technological resourcing, is a function of the negligible "capacity" and "self-efficacy" among teachers. Drawing from Bandura's (1977) and Ford's (1992) conceptions of "self-efficacy" as "a person's ability to be successful in organizing and executing actions towards a specific goal" and "capacity" as beliefs about personal empowerment, respectively (both cited in Webster & Son, 2015: 85), computer and information literacy should involve teachers' and learners' ability to successfully use the e-learning environment for knowledge acquisition through analysis, application and evaluation. Apparently, ICT self-efficacy is directly related to teachers' and learners' computer and Internet use and their performance in completing the expected tasks. Specifically, teachers and learners with high computer and Internet self-efficacy tend to have better information searching skills and strategies necessary for lesson preparations and knowledge acquisition, respectively (Vekiri, & Chronaki, 2008; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015; Kavanoz et al., 2015; Wilson et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Siddiq et al., 2016). Therefore, the relationship between ICT self-efficacy and the actual ICT skills and competencies to some extent, imposes motivation and attitudinal changes towards the use of computers and Internet in teaching and learning. Teachers and learners with high computer and Internet self-efficacy have a better chance to frequently use the technology effectively for the intended purposes as they are less anxious about the pedagogic transformations (Aesaert & van Braak, 2014; Aesaert et al., 2015; Kavanoz et al., 2015; Domingo & Garganté, 2016; Siddiq et al., 2016). Additionally, the belief in one's capabilities to be able to use a computer and the Internet for teaching and learning has strong effects on their intentions to use the technology – they feel at ease and develop a realization of its usefulness (Aesaert & van Braak, 2014; Aesaert et al., 2015; Kavanoz et al., 2015; Wilson et al., 2015; Hung, 2016).

Part of ICT self-efficacy of teachers and learners is their ICT experience, use and attitudes (Moos & Azevedo, 2009; Tsai et al., 2011; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015; Kavanoz et al., 2015; Wilson et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Siddiq et al., 2016). ICT experiences refers to the period that the teachers and learners have already been using computers and Internet. However, the findings between ICT self-efficacy and experiences revealed mixed emotions: a positive relationship and a partial or no significant effect of experiences on self-efficacy (Moos & Azevedo, 2009; Tsai et al., 2011; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015; Kavanoz et al., 2015; Wilson et al., 2015; Hung, 2016). ICT use relates to teachers' and learners' usage of specific ICT applications and software (Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015; Kavanoz et al., 2015). Accordingly, teachers and learners who use ICT applications such as text processor, spreadsheets, presentation software and e-mails possess a positive computer and Internet self-efficacy (Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015; Kavanoz et al., 2015; Domingo & Garganté, 2016). ICT attitude relates to the way in which teachers and learners accept the use of computer and Internet in pedagogy.

That is, teachers and learners who perceive computers and Internet as useful, who are less anxious to use them and who are more confident about independent control of technology express high levels of ICT self-efficacy (Moos & Azevedo, 2009; Tsai et al., 2011; Aesaert & van Braak, 2014; Peeraer & Van Petegem, 2014; Aesaert et al., 2015; Kavanoz et al., 2015; Wilson et al., 2015; Hung, 2016). Whereas Noh et al. (2014: 144) argue that "Computers and computing technology are … indicative of good teaching and student learning", digital technology has revolutionized social networking, but the same has not been true with the onset of educational ICT (Peeraer & Van Petegem, 2014). Hence, computer and information technology literacy is often stipulated as one of the necessary preconditions for the implementation of an online learning environment and for lifelong learning (Moos & Azevedo, 2009; Tsai et al., 2011; Button et al., 2014; Aesaert et al., 2015; Gu et al., 2015; Kavanoz et al., 2015; Wilson et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Siddiq et al., 2016).

According to Rogers' Diffusion of Innovations Theory, there are five proposed phases which lead to successful integration of technology in education, namely: knowledge, persuasion, decision, implementation and confirmation, respectively (Rogers, 2003; Hart & Laher, 2015). Rogers (2003) asserts that the knowledge phase is concerned about the knowledge of teachers and learners about what the technology does and how to use it to their benefit. Teachers and learners therefore, must be introduced to the technology in order to familiarise themselves with its operations, all that it requires from them and the changes it will bring to the education system. During the persuasion phase, positive or negative perceptions and attitudes develop among teachers and learners affected by how useful they perceive educational ICT. These perceptions and attitudes are in relation to the assumed advantage of ICT over previous and current innovations, its complexity and compatibility with existing practices, the tangibility and observability of the transformations of the technology, and the possibility of allowing for experimentation before its actual implementation in education (Rogers, 2003; Hart & Laher, 2015). For perceptions and attitudes of teachers and learners to be positive and in support of the ICT, Rogers (2003) also acknowledges the need for the technology to conform to and be compatible with their social and cultural norms. Once the knowledge and persuasion phases are completed, the decision phase will then follow, with a positive choice which should ultimately result in implementation and confirmation of the technology in education (Rogers, 2003; Hart & Laher, 2015). That is, implementation of e-learning environment devoid of e-planning, e-governance, e-infrastructure, e-culture and e-skills would make failure an inevitable end-result. However, blending e-learning pedagogies with conventional didactics for engagement in the knowledge economy for the national development agenda entails appropriate forms of planning, governance, infrastructure, culture and skills.

2.7. Appropriateness of Planning Approaches, Governance Models, Infrastructure, Culture and Skills, for Blended Pedagogies

The establishment of the e-learning environment depends primarily on the adoption of suitable e-planning approaches, e-governance models and the necessary e-infrastructure, e-culture and e-skills. Thus, e-planning, e-governance, e-infrastructure, e-culture and e-skills collectively are necessary and sufficient conditions for successful educational transformation towards using blended pedagogies. The integration of e-learning with conventional didactics requires specific planning approaches and governance models, as well as particular forms of infrastructure, culture and skills, in order that the e-learning pedagogies may be blended with, rather than replace, conventional didactics. Ideally, planning for blended pedagogies must involve decision making, policy formulation for the realization of set goals, programmes of action and stakeholder participation with the aim of current and future sustainability (Dale, 2004; Theron, 2008; Tsheola, 2011). Thus, the norms and standards of blended pedagogies should be established on the grounds of the 2 broad categories of development planning, namely object-centred and process-centred planning with more emphasis on stakeholder participation. Apart from other stakeholders' participation, planning for blended pedagogies requires the participation of direct beneficiaries, including teachers and learners. Planning for blended pedagogies must take into consideration the context of teaching and learning, digital technology and associated infrastructures, teaching and learning designs and ICT skills, among other factors (Peeraer and Van Petegem, 2015; Glušac et al., 2015; Gu et al., 2015; Kearney et al., 2015; Wolff et al., 2015). Accordingly, blended pedagogies require a holistic planning approach, rather than e-planning alone, which supports partnerships, people-centeredness as well as attendant physical, economic and social aspects (Theron, 2008; Tsheola, 2011;

Peeraer & Van Petegem, 2015). Besides planning approaches, models of governance are crucial preconditions for blended pedagogies.

Governance literature identifies three broad models, which are: monocentric, multilevel, and, adaptive (Pereira & Ruysenaar, 2012). Whereas monocentric governance “places the state at the heart of political power and authority”, the multilevel version “recognises the three-way displacement of governmental power across scales”, whilst adaptiveness hopes to “handle the inherent complexity and unpredictability of socio-ecological systems” (Pereira & Ruysenaar, 2012: 41-42). Most often, governance of blended pedagogies deals with the system of rules and institutional processes for authoritative decision making, informed by different stakeholders, specifications and norms (van Kersbergen & van Waarden, 2004; Kok & Veldkamp, 2011). The ability to govern depends on political and/or policy capacity which drives decision making and administrative ability to execute those decisions (Pereira & Ruysenaar, 2012). Thus, the success of blended pedagogies relies on the choice of governance model, inclusive of policy development and administration, as well as their capacity to address inequalities across all levels (Termeer et al., 2010). As part of the identification and selection of such an appropriate governance model, development interventions should be questioned, prioritised and made relevant to a specific group of people who are in need; and, the assessment should be based on the background of the target group, availability or lack of resources and, most importantly, the management and control styles to be adopted (Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Termeer et al., 2010).

Therefore, this study asserts that an adaptive governance model holds the potential to be suitable for blended pedagogies because it provides for continuous and unexpected changes, with unpredictable consequences as well as co-management with a number of stakeholders (Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Termeer et al., 2010; Peeraer & Van Petegem, 2015). That is, adaptive governance for blended pedagogies would cater for the involvement of different stakeholders, including direct beneficiaries who have authority over the specified development interventions, as well as a suitable degree of acceptance and preparedness for challenges related to uncertainty in the future (van Kersbergen & van Waarden, 2004; Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Termeer et al., 2010). It may be possible that such a governance model could adequately address the uncertainties related to the global knowledge economy and national capitalist development.

Blended pedagogies require infrastructure such as computers, reliable computer systems and applications, non-freezing computer screens, seldom dropping online connections, short download time spans and reliable electricity connections (Button et al., 2014; Valtonene et al., 2015; Glušac et al., 2015; Webster & Son 2015). Besides the use of desktop and laptop computers, teaching and learning through mobile devices such as smartphones and tablets has currently increased (Gikas & Grant, 2013; Pruet et al., 2014; Glušac et al., 2015; Domingo & Garganté, 2016). Tablets are currently the most preferred mobile devices due to their accessibility related to portability and easy operation for teaching and learning (Teo, 2011; Al-Mansour & Al-Shorman, 2012; Ertmer et al., 2012; Kirkwood & Price, 2013; Button et al., 2014; Valtonene et al., 2015; Glušac et al., 2015; Webster & Son 2015). Tablets installed with the national digital teaching and learning contents aligned with the curriculum allow users to interact directly with software applications to employ digital technology to access educational materials anywhere and anytime and promote both personalised and collaborative learning away from the classrooms (Pruet et al., 2014; Glušac et al., 2015; Webster & Son 2015; Domingo & Garganté, 2016). The implementation of blended pedagogies requires an understanding of the different contexts of both teachers and learners which shape their values, knowledge, experience, language and symbols, attitudes and notion of time (Warschauer & Ames, 2010; Mdlongwa, 2012; Viriyapong & Hartfield, 2013; Aesaert & Van Braak, 2014; Pruet et al., 2014; Aesaert, Van Nijlen, Vanderlinde, Tondeur, Devlieger, & van Braak, 2015) and which determine the appropriate culture for educational ICT.

Therefore, blended pedagogies require teachers and learners who value and appreciate, possess appropriate knowledge, have experience and are familiar with technological language and symbols, and their attitudes and use of time are all in support of educational ICT (Warschauer & Ames, 2010; Mdlongwa, 2012; Viriyapong & Hartfield, 2013; Aesaert & Van Braak, 2014; Pruet et al., 2014; Aesaert et al., 2015). In terms of skills, blended pedagogies require, at the minimum, specific levels of computer and information literacy, pedagogic technological informatics as well as self-efficacy among teachers and learners (Marginson, 2010; Farkas & Török, 2011;

Garrison, 2011; Aesaert & van Braak, 2014; Button et al., 2014; Aesaert et al., 2015; Gu et al., 2015). Planning approaches, governance models, infrastructure, culture and skills appropriate for blended pedagogies are at the core of the country's participation in the knowledge economy and national development.

2.8. Prospects and Challenges of Blending e-Learning Pedagogies with Conventional Didactics

As Valtonen et al. (2015: 49) contends, the value of ICT for teaching and learning "is widely recognised" especially for reasons supplementary to the knowledge economy and national development. E-learning is indeed associated with the "so called twenty-first century skills" on a global scale (Ahonen & Kinnunen, 2015; Valtonen et al., 2015; Salminen et al., 2016, Siddiq et al., 2016). Global knowledge economy which is currently key for modern development requires pedagogic advancements (Button et al., 2014; Peerear & Van Petegem, 2014; Pruet et al., 2014; Valtonen et al., 2015). The aim is to ensure that all learners receive high quality education which gives them future opportunities to compete in the knowledge economy arena regardless of differences in socio-economic status (Pruet et al., 2014). Given this background, this section is divided into two (2) sub-sections as follows:

2.8.1. Prospects of Blended Pedagogies

Evidently, poor performance by learners derails development, especially in remote areas, where there are challenges related to lack of learning materials and a shortage of qualified teachers (Button et al., 2014; Pandey & Tiwari, 2014; Peerear & Van Petegem, 2014; Pruet et al., 2014; Ahonen & Kinnunen, 2015; Valtonen et al., 2015). Therefore, it is ideal that previously disadvantaged areas in the developing world are allowed better opportunities to use digital technology in pedagogy. It is also very important to train learners through blended pedagogies in order to encourage critical thinking and active learning which allow them to have control over their knowledge acquisition, learning ability, outcomes and achievements necessary for participation in the global knowledge economy and the national development (Bakhshizadeh et al., 2011; Button et al., 2014; Pandey & Tiwari, 2014; Peerear & Van Petegem, 2014; Pruet et al., 2014; Ahonen & Kinnunen, 2015; Valtonen et al., 2015; Domingo & Garganté, 2016; Hung, 2016). Therefore, integration of e-learning with conventional didactics is believed to support students with their own constructive thinking and allows them to surpass their cognitive limitations through processes and procedures that they might not have been able to experience (Peerear & Van Petegem, 2014; Pruet et al., 2014; Valtonen et al., 2015; Domingo & Garganté, 2016; Hung, 2016). The degree of independent learning and expansion of horizons beyond the standard curriculum is encouraged through the interactive capability of the blended pedagogy resources.

Technology and teachers share pedagogical functions wherein the latter design the instructional uses of the former in order to facilitate student learning (Park et al., 2015; Domingo & Garganté, 2016). Therefore, blended pedagogies provide new ways of teaching and learning that provide an opportunity to explore a variety of knowledge transfer and acquisition methods (Bakhshizadeh et al., 2011; Button et al., 2014; Pandey & Tiwari, 2014; Peerear & Van Petegem, 2014; Pruet et al., 2014; Ahonen & Kinnunen, 2015; Park et al., 2015; Valtonen et al., 2015; Domingo & Garganté, 2016). Hence, e-learning promotes authentic educational environments that allows learners to make connections between what they are taught and practice (Bakhshizadeh et al., 2011; Button et al., 2014; Pandey & Tiwari, 2014; Peerear & Van Petegem, 2014; Pruet et al., 2014; Ahonen & Kinnunen, 2015; Valtonen et al., 2015; Domingo & Garganté, 2016). Learners who take interest in blended pedagogies are more engaged in their own knowledge acquisition and experience an increased assessment accomplishment leading to improved performance which is a result of self-directed learning (Bakhshizadeh et al., 2011; Button et al., 2014; Pandey & Tiwari, 2014; Peerear & Van Petegem, 2014; Pruet et al., 2014; Ahonen & Kinnunen, 2015; Park et al., 2015; Valtonen et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Salminen et al., 2016). Self-directed learning ensures that learners take the initiative and responsibility for the establishment of personal learning goals and needs, identification of resources for learning, selection and implementation of learning strategies, development of self-discipline and monitoring of personal performance (Pruet et al., 2014; Valtonen et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Salminen et al., 2016).

The integration of e-learning with conventional didactics encourages autonomous and collaborative learning forcing learners to take control of their own knowledge acquisition goals (Domingo & Garganté, 2016; Hung, 2016; Salminen et al., 2016).

Autonomous learning also develops learners' leadership skills as most tend to be supportive coaches for fellow classmates who struggle in certain educational areas. The also actively participate during the design of curriculum and methods while collaborative learning encourages interactivity, connectivity group work and communication among teachers and learners (Bakhshizadeh et al., 2011; Button et al., 2014; Pandey & Tiwari, 2014; Peerear & Van Petegem, 2014; Pruet et al., 2014; Ahonen & Kinnunen, 2015; Valtonen et al., 2015; Domingo & Garganté, 2016). Accordingly, learner-led online discussions allows learners to elaborate more on their contributions, easily engage in topics aligned with their interests, and resolve conflicts better than when they are in face-to-face class discussion groups led by the teacher (Park et al., 2015; Valtonen et al., 2015; Domingo & Garganté, 2016; Salminen et al., 2016). On average, learners who take courses that are either completely or partially online tend to perform better than those taking traditional face-to-face courses. However, courses that integrate e-learning with conventional didactics seem to be the best of all delivery methods.

Generally, the most tangible advantage of e-learning is its provision of ICT training and skills for teachers and learners with little or no costs (Bakhshizadeh et al., 2011). Blending of e-learning pedagogies with conventional didactics has the ability to decrease the digital gap between different countries; also between rural and urban schools. Blending of pedagogies also promote skills and knowledge acquisition effectively (Pegrum et al., 2013; Button et al., 2014; Pandey & Tiwari, 2014; Peeraer & Van Petegem, 2015; Gu et al., 2015; Kearney et al., 2015; Valtonen et al., 2015; Domingo & Garganté, 2016). Additionally, it is important to allude to the various positive effects in teaching and learning associated with the implementation of ICT. It is assumed that the adoption of mobile ICT and the online learning environment, especially that relating to emails and digital discussion fora, allow learners to “access their teachers rapidly”, to receive timely responses and to be flexible as well as being self-paced in studying (Kelly, Lyng, McGrath & Cannon, G. 2009; Button et al., 2014; Pandey & Tiwari, 2014; Gu et al., 2015). The m-learning is, in particular, highly regarded for providing a flexible and self-paced learning in a digital environment described by Mifsud (2014) as “anywhere, anytime”, “on the move” and “multiple contexts”. There are positive aspects of conventional didactics such as the face-to-face role model image that can be drawn and the human face in learning. Additionally, there exist prospects of integration for active and effective knowledge acquisition.

2.8.2. Challenges of Blending E-learning with Conventional Didactics

Digitisation of education can result in uncontrollable gamification and dehumanisation of knowledge acquisition in a deleterious manner. Whereas the online learning environment encourages teachers and learners, as it were, to engage in collaborative learning, to motivate each other and “to know each other outside of the classroom” (Button et al., 2014: 1313), there are pitfalls as some uses involve excessive social discussions, undue gamification and less of academic activities. Notwithstanding Noh et al.’s (2014) belief that ICT makes for good teaching and learning, these challenges for the developed countries, where infrastructure is not problematic, teachers’ capacity to use “pedagogically sound delivery models” and learners’ skills in digital technologies have become critical to the successful implementation of e-learning (Teo, 2011; Al-Mansour & Al-Shorman, 2012; Ertmer et al., 2012; Kirkwood & Price, 2013; Button et al., 2014; Pandey & Tiwari, 2014; Valtonene et al., 2015; Webster & Son, 2015; Salminen et al., 2016). The latter complexity is more than crucial for developing countries where infrastructure may not be adequate, therefore demanding excessive time and energy from both teachers and learners.

The inadvisable, excessive and uncontrolled use of ICT by teachers and learners gives rise to challenges related to cyberloafing (Valtonen et al., 2010; Valtonen et al., 2011; Valtonen et al., 2013; Oyedemi, 2015; Park et al., 2015; Valtonen et al., 2015; Webster & Son, 2015; Yilmaz, Yilmaz, Ozturk, Sezer & Karademir, 2015). The time allocated for lessons and their preparations is then misused as a result of both teachers’ and learners’ cyberloafing. This phenomenon is more visible in ICT related courses that are delivered in computer labs wherein during preparations of and the presentation of lessons some teachers and learners, respectively do not use the technology for the intended purposes rather for "sending and/or receiving e-mails, surfing the Internet for news and sports, downloading music and videos, chatting, playing online games reading blogs, visiting social networks and updating personal websites", among others (Oyedemi, 2015; Valtonen et al., 2015; Yilmaz et al., 2015). Such behaviours of using the technologies for purposes other than educational activities named cyberloafing, has a variety of consequences to both teachers and learners (Valtonen et al., 2010;

Valtonen et al., 2011; Valtonen et al., 2013; Oyedemi, 2015; Park et al., 2015; Valtonen et al., 2015). Apparently, teachers' and learners' attentions are drawn away from the lesson and its related intentions which could result in difficulties in the integration of e-learning with conventional didactics and also impede the latter's educational performance.

The majority of institutions have prioritized adequate access to digital technologies and resourcing ahead of the training requirements for teachers and learners regarding the integration of e-learning informatics in the teaching and learning activities (Deltsidou et al., 2010; Gu et al., 2015; Oyedemi, 2015; Park et al., 2015; Valtonen et al., 2015; Salminen et al., 2016). More often than not, institutions prioritise acquisition and installation of computer hardware and software above teachers’ and learners’ technological training and incorporation in education (Valtonen et al., 2010; Valtonen et al., 2011; Valtonen et al., 2013; Oyedemi, 2015; Valtonen et al., 2015; Webster & Son, 2015). The provision of adequate digital technologies and computer resourcing is only a necessary condition to ensure successful implementation of e-learning. As Webster & Son (2015: 84) observed, teachers have not employed educational technology “regularly and consistently” in their teaching, notwithstanding “considerable effort and expenditure” by government and universities to promote its use. Besides, e-learning informatics are in a continuous state of flux, implying that teachers and learners are challenged to keep up with the developments. For these reasons, e-learning entails costly interventions relating to financial, training and technical support for both teachers and learners (Moule, Ward & Lockyer, 2010; Nguyen et al., 2011; Gu et al., 2015).

More importantly, it has been demonstrated that when challenged to use ICT, both teachers and learners experience increased levels of anxiety precipitated by the lack of relevant skills (Elder & Koehn, 2009; Bond, 2010; Deltsidou et al., 2010; Button et al., 2014; Pandey & Tiwari, 2014; Noh et al., 2014; Salminen et al., 2016). Such anxiety with the use of ICT creates a negative impact on teaching and learning activities, unambiguously demonstrating the significance of self-confidence and self-belief associated with the competence in technology informatics. To a large extent, this negative impact entails a significant level of technical support (Elder & Koehn, 2009; Bond, 2010; Deltsidou et al., 2010; Button et al., 2014 Pandey & Tiwari, 2014;

Salminen et al., 2016), which is not always possible. Besides, the justification for the incorporation of e-learning is to create flexibility in the teaching and learning activities. To ensure effectiveness in teaching and learning, technology informatics should be tacitly held by the e-learning users themselves. Additionally, there is time cost, because blending means that whilst traditional face-to-face interaction model is maintained, teachers should find time to “develop E-learning resources” rendering the online learning environment time intensive (Button et al., 2014: 1320). Crews, Miller & Brown (2009), Chapman (2010), Moule et al. (2010), Nguyen et al. (2011) and Webster & Son (2015) demonstrate that the amount of time involved in developing and facilitating e-learning is multifaceted because teachers are, besides interacting with the learners on the online learning environment, required to learn the new technologies and to prepare new lectures that incorporate ICT. It is estimated that one hour of preparation of online content requires almost 80 hours of production, whereas developing one hour of online educator-led teaching requires over 40 production hours (Chapman, 2010). Beyond being time intensive, e-learning entails high financial costs too (Crews et al., 2009; Chapman, 2010; Moule et al., 2010; Nguyen et al., 2011; Gu et al., 2015). Also, it was estimated that teachers’ interactions with learners on the online learning environment could take twice as much as the face-to-face facilitation, thereby enforcing low levels of motivation for adoption (Crews et al., 2009; Chapman, 2010, Moule et al., 2010; Nguyen et al., 2011).

Given that teachers too are captivated by the logic of the “goodness” of e-learning for effective teaching and learning, the adoption of educational technologies is often accompanied by the lack of requisite skills and, therefore, attendant poor quality of online courses, occasioned by the lack of consideration and incentivization of the time intensive course development as overtime (Crews et al., 2009; Chapman, 2010, Moule et al., 2010; Nguyen et al., 2011; Noh et al., 2014; Salminen et al., 2016). For the latter reason, developing and facilitating online learning is construed by most teachers as additional unpaid work as it does not supersede the face-to-face interactions model. Most teachers tend to be less keen to invest the amount of time, cost and energy into developing online courses; and, relevant institutions that provide the digital technology infrastructure are not blameless in this regard as they do not seem to acknowledge that e-learning is time intensive (Webster & Son, 2015). However, incorporating techniques such as “gamification”, “pause procedures”, “team-based” activities, “case-based scenarios", "role-play and commitment-generating exercises" (Subramanian et al., 2012; Littlewood et al., 2013; Hanus & Fox, 2015; Wolff et al., 2015) into traditional designed-didactic sessions may also entail additional time, energy and resources, which the institutions and teachers may not be willing to invest (Button et al., 2014; Pandey & Tiwari, 2014; Gu et al., 2015). But blended pedagogies, with a judicious mix of conventional didactics and digital technologies, offer realistic prospects of successful participation in the knowledge economy and promotion of national development. A question to ask is: what prospects and challenges does South Africa have and/or face, relative to other countries at various human development standings?

2.9. Conclusion

Sustainable participation in the knowledge economy for national development starts with the integration of ICT in teaching and learning. Thus, the integration of conventional didactics with e-learning pedagogies should be given priority in the modernization of the education system processes. At the core of the processes, are the appropriate planning approaches and governance models which should be adopted for educational ICT. Additionally, the preconditions such as infrastructure, culture and skills are also key for the integration of conventional didactics with e-learning. The prospects and challenges of blended pedagogies cannot be left to chance as they are necessary to inform the planning, governance, infrastructure, skills and culture which are appropriate for these blended pedagogies. In an attempt to prepare countries for their participation in the knowledge economy, it is important that they do not replace conventional didactics with e-learning but adopt blended learning. The next chapter discusses the models, approaches and principles of blended learning which are appropriate for various countries' participation in the global knowledge economy and their national development.

Chapter 3

Models, Levels, Processes and Determinants of Blended Learning

3.1. Introduction

During the "Neoliberal Political Economy" production patterns shifted from "industrial" to "knowledge" production which is understood to be the “Internet economy” or “digital economy” (Susar, 2014; Guerrero, Granados & González, 2014; Achim, 2015). A number of factors had an effect on the changing nature of the economy which include, among others, "progress in ICT levels", "fast developing new technologies", "global competition", "liberalization of markets", as well as "raising the quality of life" (Achim, 2015: 1201). Therefore, the current economic structures depend on the increasing importance of knowledge as the primary means of production and economic development and growth instead of labour and/or land. The knowledge economy is regarded as the stage of "global economic development" which emerged after the agricultural and industrial ages which were mainly based on land as well as capital and labour, respectively (Weber, 2011; Achim, 2015). Consequently, "in such an economic context, knowledge itself becomes the economic value and source, which inevitably creates a change in the principles of production and the division of labour” (Susar, 2014: 2295) hence creating correlations between pedagogy and the economy. In the recent international curriculum reform, the identification of the 21st century skills, knowledge and qualities are developed and promoted through education. In other words, these skills and attributes point out the desired form of subjectivity of individuals towards teaching and learning (Weber, 2011; Guerrero et al., 2014).

For this reason, the skills underlined and targeted in the curriculum are significant in designating the idealized image of self, which is indeed a significant clue for understanding the inscription of power in constituting the form and content of the pedagogical approach (Weber, 2011; Susar, 2014). In pedagogy, new roles and meanings are developed in response to the changing nature of the labour force in order to ensure the attainment of specific skills such as "learning to learn, strategy production, creativity, teamwork, spirit of entrepreneurship, technological culture, information technology communication skills, adaptability, and flexibility" (Susar, 2014: 2295). Therefore, educators through pedagogy, learners through education, individuals should acquire the necessary qualities and skills including innovative and critical thinking skills, self-responsibility and dedication to learning, and eventually self-realization, to assist them to realize and appreciate knowledge accumulation. Additionally, there is also a need to establish "individual and authentic ways" of using knowledge in a productive, effective and efficient, as well as genuine way (Guerrero et al., 2014; Susar, 2014; Achim, 2015). Empowerment through the pedagogic approach as well as learner-centred education methods, is the current objective of the new pedagogical arrangements. Education plays a very important role in the knowledge economy, thus, technological innovation depends on continuously updated knowledge that requires life-long learning (Achim, 2015). Internationally, knowledge specifically generated through “ITC, education and innovation” is a central capacity builder for national development and participation in the global knowledge economy (Weber, 2011; Guerrero et al., 2014; Achim, 2015).

In recent decades digital technologies and social media have captured societal imagination across the world, and so becoming “prevalent in the day-to-day life” of learners characterized as the “Net Generation”, “Y-generation” or “the digital natives” (Abe & Jordan, 2013; Domingo & Garganté, 2016; Salminen et al., 2016). Simultaneously, interest in the potential for using digital technologies and social media in education precipitated the notion of e-learning (Tower, Latimer & Hewitt, 2014; Domingo & Garganté, 2016; Salminen et al., 2016). However, the e-learning environment is facilitated by teachers who, unlike the “Net Generation”, were not born to be socialized into digital technologies, social media, computers and the Internet (Domingo & Garganté, 2016; Salminen et al., 2016). Teachers are however under tremendous pressure to integrate digital technologies and social media in their instructional designs because the learners have positive perceptions of their impacts, usefulness, enjoyment and excitement of these tools, to which they are socialized as part of normal life (Abe & Jordan, 2013; Green, Wyllie & Jackson, 2014; Peck, 2014; Salminen et al., 2016). Learners have already spent vast amounts of time and energy in the digital technologies, the Internet and social media spaces (Domingo & Garganté, 2016; Salminen et al., 2016). Oz et al. (2015) show statistically that there are positive correlations between computer and ICT literacy and attitudes towards adoption and use of digital technology and the Internet in the learning environment. Also, computer and ICT literacy is a significant determinant of attitudes towards technology-based and computer-assisted learning (Oz et al., 2015; Domingo & Garganté, 2016; Salminen et al., 2016).

Literature on e-learning is unanimous on the notion that the significance of teachers' "ability and willingness" to integrate pedagogical, technological and content knowledge does not cease with the ascendancy of digital education (Boschman et al., 2015; Kavanoz et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). Internet is now widely used in education (Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016); in fact, the "21st century classrooms call for teachers to integrate technology into their instructional practices" (Kavanoz et al., 2015: 94). Instead, the search for techniques to enforce effective teaching and learning has in many ways been underlined by the strife for active, rather than passive, learning (Subramanian et al., 2012; Littlewood et al., 2013; Boschman et al., 2015; Kavanoz et al., 2015; Orr & Kukner, 2015; Webster & Son, 2015; Wolff et al.,, 2015; Hung, 2016; Park et al., 2016; Salminen et al., 2016). Concurrently, the global knowledge economy as well as the advancements in information and communication technology (ICT) have crucial implications for teaching and learning informatics (Garrison & Vaughan, 2008; Youtie & Shapira, 2008; Deltsidou et al., 2010; Marginson, 2010; Garrison, 2011; Button et al., 2014; Gu et al., 2015; Kavanoz et al., 2015; Valtonen et al., 2015).

For effective participation in the knowledge economy necessary for national development, it is necessary for countries to adopt blended learning. However, most countries tend to replace conventional didactics with e-learning rather than integrating the two. It is against this background that this chapter discusses the models, approaches and principles of blended learning in order to clarify its misconceptions in many countries. The chapter consists of six sections including this introduction and the conclusion. The second section conceptualizes blended learning and provides a clear discussion on the importance of the integration of knowledge domains as well as online and offline learning environments; its models, typologies, levels, constructs and a taxonomy. The third section discusses the levels and processes of inquiry offered by blended learning. The fourth section focusses on the characteristics required from both teachers and learners for successful blended learning. In this section, the skills, attitudes and self-efficacy as well as teachers' roles and responsibilities in blended learning are outlined. The fifth section delineates the determinants of a blended learning environment with a focus on teaching creatively and teaching for creativity, teachers-as-learners as well as infrastructure and teachers' and learners' ICT literacy.

3.2. Conceptualizing Blended Learning

In recent years, the pursuit of effective teaching and learning has been largely captivated by the didactics of passive versus active learning (Subramanian et al., 2012; Littlewood et al., 2013; Gu et al., 2015; Kavanoz et al., 2015; Wolff et al., 2015; Hung, 2016; Salminen et al., 2016). The traditional teachers' delivery of information to learners was criticized for reinforcing passive learning and suboptimal knowledge acquisition (Subramanian et al., 2012; Littlewood et al., 2013; Gu et al., 2015; Kavanoz et al., 2015; Wolff et al., 2015; Hung, 2016; Salminen et al., 2016). Literature confirms that online learning is more advantageous than the traditional face-to-face offerings; however, the integration of the two provides for the best instructional methods (Salminen et al., 2016). The challenge, though, appears to have been the dearth of knowledge and understanding of the proper usage of technology in teaching and learning as well as the levels of integration (Domingo and Garganté 2016; Salminen et al. 2016). Research has conclusively demonstrated that learners "do not retain a significant portion of what is taught during lectures" from traditional didactic-ridden sessions of passive learning (Wolff et al., 2015: 85). Conversely, active learning shifts attention to the learners' learning, away from the teachers' didactic delivery, in order to solicit their active participation in the process of achieving improved retention and deeper understanding of content (Subramanian et al., 2012; Littlewood et al., 2013; Gu et al., 2015; Kavanoz et al., 2015; Wolff et al., 2015; Hung, 2016; Siddiq et al., 2016). Hence, a variety of teaching techniques have been recommended, guided by the aspiration for fostering increased learner engagement and inculcation of "self-directed learning" through effective delivery of core knowledge, contextualization and simplification of difficult concepts (Wolff et al., 2015: 85).

As Park et al. (2016: 1) put it, "Blended learning (BL) is recognized as one of the major trends in higher education today". But blended learning, far from the conventional perspective as a "mere combination" of classroom and online activities, is in effect a way of optimizing "learner learning and success" through transformation of the traditional pedagogies for both on-site and distance modes of education delivery

(Garrison & Vaughan, 2013; Kavanoz et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016; Salminen et al., 2016). There is a universal acceptance that learning engagement could be intensified through mixed modalities in blended learning courses (Garrison & Vaughan, 2013; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). Teachers and learners serve a critical role in ensuring that knowledge transfer and acquisition activities are "adapted for blended modalities" (Dahlstrom, Walker & Dziuban, 2013 cited in Park et al., 2016: 1). However, successful implementation of blended modalities is heavily dependent upon institutional support to teachers and learners through the creation and valuation of the learning management system as digital environments (Boschman et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016).

In reality, a negligible number of institutions across the world have adopted "a unified approach" to blended and transformational learning, using the learning management system as an enterprise system (Orr & Kukner, 2015; Hung, 2016; Park, et al., 2016). Blended learning is more than a mere act of teachers transferring course content into the learning management system and using basic features such as posting syllabuses and uploading lecturer notes (Graham, Woodfield & Harrison, 2013; Park & Jo, 2014; Porter, Graham, Spring & Welch, 2014; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). Adoption of blended learning is deeply involved; and, to this extent, it requires clarity of understanding of the instructional interventions adopted, sometimes at an institutional scale, as well as the approaches and support mechanisms for leveraging the various features of the learning management system for blended learning (Porter et al., 2014; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). It is also important to understand the integration of knowledge domains as well as online and offline learning environments, blended learning models, typologies, levels, constructs and the taxonomy which are discussed in the sub-sections that follows.

3.2.1. The Integration of Various Knowledge Domains for Blended Learning

Teachers are expected to have an in-depth understanding of blended learning because they are, among other things, expected to "create technology-rich lesson modules" by designing specific instructional activities for their classroom for each theme (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Park et al., 2016). There is a specific way in which teachers' "knowledge of technology, pedagogy and content interact … during instructional decision-making" (Boschman et al., 2015: 251), which they should first understand in order to create a high quality teaching and learning environment for blended learning (Kavanoz et al., 2015; Orr & Kukner 2015; Hung, 2016; Park et al., 2016). For instance, there is a distinct body of knowledge, denoted Technological Pedagogical Content Knowledge (TPACK), which "is a form of situated knowledge about the affordances of technology on teaching specific subject matter in a certain context" (Boschman et al., 2015: 251). Drawing from pertinent literature, Kavanoz et al. (2015: 95) describes TPACK as a theoretical framework that:

> "Refers to the intertwined relationships that combine teachers's technology use, instructional methods, and understanding of the subject matter …. (wherein) content affects the pedagogical goals, methods and the technologies to be used …. (whilst) Reciprocally, the technology used exerts several limitations and requirements that in turn might affect both the content and the way it is transferred to the learner".

Importantly, the TPACK involves teachers' "understanding of the difficulties learners encounter when they have to learn a particular subject matter domain" (Boschman et al., 2015: 251). This form of situated knowledge derives from integration of at least three knowledge domains, which are: technological knowledge, pedagogical knowledge and content knowledge (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Park et al., 2016; Siddiq et al., 2016). Exclusion of any one of the three domains would limit integration to either Pedagogical Content Knowledge, Technological Content Knowledge or Technological Pedagogical Knowledge rather than Technological Pedagogical Content Knowledge (Boschman et al., 2015; Orr & Kukner, 2015; Park et al., 2016). None of these incomplete integrated forms would, alone, be adequate for creating a high quality teaching and learning environment (Boschman et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Park et al., 2016; Siddiq et al., 2016). Blended learning is thus complex and involved with sophisticated integration of various domains and forms of knowledge (Boschman et al., 2015; Kavanoz et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). Hence, blended learning should integrate various forms of knowledge as well their integratedness as follows: technological knowledge, pedagogical knowledge, content knowledge, pedagogical content knowledge, technological content knowledge, technological pedagogical knowledge and technological pedagogical content knowledge (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Park et al., 2016). In practice, the pedagogical content knowledge provides the fulcrum of the TPACK, because “each content area is unique on its own, and (it) requires instruction peculiar” to its specification (Kavanoz et al., 2015: 95). Thus, teaching content and pedagogy cannot be treated as “two distinctive entities” because pedagogical content knowledge is “the particular form” that embodies “aspects of content most germane to its teachability”, which represents integration of content with “general pedagogical knowledge in a particular context” and one of the general area constructs of teachers’ knowledge required for supplementation of “subject matter knowledge, general pedagogical knowledge, and knowledge of context” (Kavanoz et al., 2015: 95).

A study conducted by Boschman et al. (2015) used design talk as it occurs in the "collaborative design of technology-rich curriculum activities" and its relationship to teachers' integrated knowledge of technology, pedagogy and content. The study focused on the integration of teachers' knowledge domains. The findings revealed that teachers spend most of their time on Pedagogic Content Knowledge and Technological Pedagogic Content Knowledge whereas domains such as Technological Knowledge, Pedagogical Knowledge and Content Knowledge are seldom applied (Boshman et al., 2015). With regard to Technological Pedagogic Knowledge, the focus of teachers is on the appropriateness of technology and its use for teaching and learning processes, whereas Pedagogic Content Knowledge reflects the application in teaching and learning literacy during early stages (Boshman et al., 2015). These findings suggest that teachers' collaborative design decisions are based on integrated knowledge domains rather than on their understanding of how these knowledge domains link (Boshman et al., 2015). Seemingly, teachers from this study did not have an understanding of the integration of different knowledge domains which are appropriate for each of the planned level of inquiry for learners at various study levels.

Successful implementation of blended learning requires knowledge about teaching and learning, socio-emotional development of learners, literacy concepts such as phonological awareness, book-reading and vocabulary development, application of general instructional strategies for developing literacy, technology such as computer and email operations, transformation of specific subject matter literacy, stimulation of cooperative learning, and the appropriateness of uses of the affordances of TPACK to specific literacy content and contexts (Boschman et al., 2015; Kavanoz et al., 2015). In blended learning, teachers are therefore involved in more than just sharing of information because they have to ensure that they create a conversational and collaborative learning environment wherein “design decisions are made in collaborative inquiry” and “technology-rich activities” are designed for learner learning whilst taking into account “external priorities, practical concerns and existing beliefs” (Boschman et al., 2015; Kavanoz et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). For this reason, generic instructional design activities would not be appropriate for all pedagogical, technological and knowledge contents and contexts. Hence, teachers are required to creatively establish an online and offline blended teaching and learning environment that engages learners’ learning for group creativity, innovation, adaptability and flexibility.

Often, blended learning is conflated with the adoption of e-pedagogies for replacement of the conventional face-to-face didactics, thereby creating misconceptions that access to digital resources, including e-books, would automatically deliver active and deeper engagements in learning activities. This, however, is not the case. A variety of constructs, including creativity mindsets, innovation, flexibility and adaptability, are examined in the e-learning and blended modalities literature to determine their roles in enhancing learners’ knowledge acquisition experiences. It has been established that the teachers’ ICT self-efficacy and beliefs in TPACK as well as Web-based communicative instructional designs are the strongest predictors of the potential for successful blended learning and establishment of an environment conducive for creativity mindsets, innovation, adaptability and flexibility (Kavanoz et al., 2015; Ninlawan, 2015; Hung, 2016; Park et al., 2016) and not the use of e-pedagogies alone. According to Kavanoz et al. (2015: 95), TPACK represents the integratedness of knowledge, which is required of teachers “for effective integration of technology into pedagogically appropriate teaching and learning activities”, founded on the premise that classroom environments could be transformed into “collaborative and interactive spaces” for creativity, innovation, adaptability and flexibility by effectively combining technological, pedagogical and content knowledge. This observation is consistent with the call for blended learning (see, for example, Boschman et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Salminen et al., 2016).

3.2.2. Integrating e-learning with Conventional Didactics: Online Versus Offline Learning Environments

Valtonen et al. (2015) observe that ICT is a broad concept and that it includes applications such as laptop computers, Smartphones, social media, emails and Internet online environment. Governments across the world, in both developing and developed countries, have made significant resources and effort investments in education technology (Teo, 2011; Al-Mansour & Al-Shorman, 2012; Ertmer et al., 2012; Kirkwood & Price, 2013; Peeraer & Van Petegem, 2014; Ninlawan, 2015; Webster & Son, 2015; Hung, 2016; Park et al., 2016). Increasingly, the requirement to incorporate digital technology in teaching and learning has become ubiquitous with the attendant race to install advanced computer and information communication technology infrastructure (Garrison, 2011; Button et al., 2014; Gu et al., 2015; Oyedemi, 2015; Webster & Son, 2015; Wolff et al., 2015; Hung, 2016; Park et al., 2016; Siddiq et al., 2016). The fashionable use of digital technology to facilitate teaching and learning is commonly denoted e-learning (Garrison, 2011; Button et al., 2014; Boschman et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016), which entails several preconditions (Valtonen et al., 2015; Webster & Son 2015), some of which consist of necessary requirements whilst other are sufficient conditions. Without installing the necessary physical environment infrastructure, the integration of e-learning with conventional didactics would be improbable because it requires computers, reliable computer systems and applications, non-freezing computer screens, live online connections and short download time spans for it to be pragmatically successful (Button et al., 2014; Orr & Kukner, 2015; Park et al., 2016).

As Kavanoz et al. (2015: 94) observe, computer, "technological, instructional and pedagogical advances" as well as developments in multimedia and network resources have substantially shaped teaching and learning processes, creating the potential for innovative strategies. With the utilization of ICT, the learners' ways of communication entails changes in the educational settings and, therefore, in the mediation of teaching and learning (Zhang, de Pablos, Wang, Wang, Sun & She 2014; Kavanoz et al., 2015; Ninlawan, 2015; Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Salminen et al., 2016; Siddiq et al., 2016). Educational ICT includes the so-called mobile learning (m-learning) in which the enhancement of the pedagogy occurs through "handled devices" like Smartphones, Tablets and game-consoles (Pegrum, et al., 2013; Kearney et al., 2015; Domingo and Garganté, 2016; Hung, 2016; Salminen et al., 2016). Hence, "Mobile technology, such as the Tablet and the Smartphone, has become popular worldwide with a broad range of users in classrooms", paralleled by the "remarkable growth of Internet applications specifically developed for those devices" (Domingo & Garganté, 2016: 21). Moreover, the use of mobile technology reflected in these applications seems to be in support of "portability", "interactivity", "context sensitivity", "connectivity", "individuality" and "social media", which allow the creation and exchange of user generated content (Zhang et al., 2015). Therefore, mobile technology affords learners with activity based approaches which stimulate "authentic, action and experiential learning" (Kearney et al., 2015).

It is assumed that the adoption of mobile ICT and the online learning environment, especially that relating to emails and digital discussion fora, allow learners to "access their teachers rapidly", to receive timely responses and to be flexible as well as being self-paced in studying (Kelly et al., 2009; Button et al., 2014; Boschman et al., 2015; Gu et al., 2015; Orr & Kukner, 2015; Park et al., 2016; Salminen et al., 2016). M-learning is, in particular, highly regarded for providing flexible and self-paced learning in a digital environment and described variously by Mifsud (2014) and Domingo & Garganté (2016) as "anywhere, anytime", "on the move" and "multiple contexts". It is believed that together with media, m-learning provides for a good pedagogical transformation tool (Zhang, Wang, de Pablos, Tang & Yan, 2015; Domingo & Garganté, 2016; Salminen et al., 2016; Siddiq et al., 2016). Hence, there is increasing acceptance that social media could offer the most "inexpensive methods of communication, collaboration and connection in real time" for educational teaching and learning environments (Salminen et al., 2016: 354), especially because collaboration is one of the core constructs of blended learning (Peck, 2014). Social media, in particular, is seen to be providing the possibility of continuous discussions and thought provocation, notwithstanding the geographic distance and time separating learners and teachers (Abe & Jordan, 2013; Green et al., 2014; Salminen et al., 2016).

Due to its versatility, across age and gender divides, social media is accommodative of diverse values, ideas, ethics, cultures and learning styles, thereby creating the opportunity for its use in the learning environments by both learners and teachers (Andreou, Papastavrou & Merkouris, 2014; Salminen et al., 2016). However, teachers require training in the use of digital technologies and social media in the teaching and learning environment (Oz et al., 2015; Salminen et al., 2016).

The online learning environment provides new ways of knowledge transfer and acquisition that offer an opportunity to explore a variety of knowledge transfer and acquisition methods (Zhang et al., 2015; Domingo & Garganté, 2016; Salminen et al., 2016; Siddiq et al., 2016). These online environments appear to encourage authentic educational settings that allow learners to make connections between what they are taught in classrooms and practice (Boschman et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). Learners who take interest in e-learning tend to be more engaged in their own knowledge acquisition and as a result they experience improvements in assessment accomplishment leading to enhanced educational performance (Domingo & Garganté, 2016; Salminen et al., 2016). The integration of e-learning with conventional didactics encourages "autonomous and collaborative learning" forcing learners to take control of their own knowledge acquisition goals (Domingo & Garganté, 2016). Autonomous learning also develops learners' leadership skills as most tend to be supportive coaches for fellow classmates who struggle in certain educational areas. These autonomous learners also actively participate during the design of curriculum and methods (Boschman et al., 2015; Orr & Kukner, 2015; Zhang et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Salminen et al., 2016; Siddiq et al., 2016). Furthermore, "collaborative learning" facilitated by the online environment encourages "interactivity, connectivity group work and communication" among teachers and learners (Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Salminen et al., 2016; Siddiq et al., 2016).

The irony of the global advancements, including the "inevitability" and "ubiquity" of ICT, is that its pedagogic applications in education for teaching and learning have not been unproblematic, especially given the rigidities of adherence to the traditional face-to-face didactics (Peeraer & Van Petegem, 2014; Valtonen et al., 2015; Webster & Son, 2015; Hung, 2016; Salminen et al., 2016). Indeed, technology does not "automatically bring about particular learning outcomes” because “there is nothing inherent in technology that automatically guarantees learning” (Peeraer & Van Petegem, 2014: n.p.). Recent literature on ICT in education advocates for blended learning, which in simple terms means integration of offline didactics with online pedagogies, for “a high quality teaching and learning environment” (Park et al., 2016: 2) and collaborative design activities with which teachers would “develop technological pedagogical content knowledge” and “reach deeper levels of inquiry” (Boschman et al., 2015: 250). However, blended learning, just like collaborative curriculum design, and its linkages to the teachers’ “knowledge about technology, pedagogy and content” is poorly understood, notwithstanding the conceptual clarity and simplicity of the term itself (Boschman et al., 2015; Orr & Kukner, 2015; Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Salminen et al., 2016). The misconception that the use of digital technologies in education is easy and “relatively free from effort” on the part of teachers has to be dismissed (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Salminen et al., 2016). Indeed, it could be deduced that a creativity mindset is a function of the level and depth of inquiry and integratedness of technological, pedagogical and content knowledge in the blended online and offline learning environment.

In a study conducted by Domingo & Garganté (2016) findings confirmed that the most common practical impacts of online learning environments are facilitating access to information, providing new ways to teach and learn and increasing learners' engagement in their own knowledge acquisition. The findings also revealed that the most common and frequently used type of applications are "Content Learning applications" which are mostly used independently by learners. Apparently, the applications provide instant assessment and feedback and they are usable at a large range of educational levels. The majority of the applications are "Learning Skills applications" and "Informational Management applications" which change the roles of members involved in the processes (Domingo & Garganté, 2016). According to Domingo & Garganté (2016: 27), "the teacher becomes a learning guide who helps students to adopt and connect reality to the learning content, and students become the constructors of their own knowledge". However, blended learning cannot be seen as a single and homogeneous approach, but rather as a set of conventional didactics and tools together with technological devices and methods that facilitates creativity, innovation, flexibility and adaptability. For this reason, it is important not only to pay attention to the online learning environments, but also to the offline learning environments in order to collectively realize the benefits of blended pedagogies.

3.2.3. Blended Learning Models, Typologies, Levels, Constructs and Taxonomy

Notwithstanding its ubiquity and inevitability, e-learning has not been successfully implemented with strategic plans for blended learning, which refers to “a combination of face-to-face and online learning instruction” for their complementarity in enhancing the effectiveness of teaching and the learners’ learning experiences (Graham et al., 2013; Park & Jo, 2014; Porter et al., 2014; Boschman et al., 2015; Kavanoz et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). But there are “diverse instructional models and best practices of blended learning”, drawing from various degrees of combinations of face-to-face modalities with digital mediated technologies (Park et al., 2016: 2). The hope of having a single one-size-fits-all instructional model of blended learning is unrealistic. Thus, Garrison & Kanuka (2004 cited in Park et al., 2016: 2) observe that the apparent clarity and simplicity of the concept of blended learning could be misleading because “its implementation is complex and rather challenging since virtually limitless designs are possible depending on how much or how little online instruction is inherent in blended learning”. Determination of this balance is specific to each instructional design; and, each teacher adopts a unique hybrid of blended modalities, which is dependent upon a variety of determinants and constructs, including the ICT literacy levels. A high premium on teachers’ ICT literacy is necessary for the complex integration of pedagogical, technological and content knowledge to meet specific learners’ needs, in-the-moment interests, pursuits and socio-emotional contexts of teaching and learning. Instructional design for blended learning is itself complex as it includes “models, strategies, best practices, implementation, and environment and course structure” (Halverson, Graham, Spring, Drysdale & Henrie, 2014; Boschman et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). Thus, the instructional design remain unresolved without a single universally accepted norm, even for the same subject or discipline.

Conceptions and typologies of blended learning involve “a broad spectrum both in the delivery modalities between offline and online and the pedagogies between instructor-led and student-centred approaches” (Park et al., 2016: 2). Park et al. (2016) represent the spectrum diagrammatically to isolate four possible combinations and types of blended learning, thus: a “mostly face-to-face class with substantial online activities”; a “mostly online class with learner offline group meeting”; a “mostly face-to-face class with online resources”; and, a “mostly online class with optional face-to-face meeting”. To achieve effective blended learning in diverse contexts, teachers need to be aware of the different phases and typologies of blended learning. Based on the same framework, Graham et al. (2013) identified the following three adoption levels of online instruction: “blended learning adoption spectrum with awareness and exploration (level 1), adoption and early implementation (level 2), and mature implementation and growth (level 3)”. These adoption levels do not occur through osmosis, they require planned behaviour between teachers as well as learners. More importantly, three e-learning modes of engagement in blended learning are identified by Francis & Raftery (2005 cited in Park et al., 2016: 2) as: “baseline course administration and learner support”; “blended learning leading to significant enhancements to learning and teaching process”; and, “all of two modes to the level of personalized instruction through diverse online courses and modules”. These adoption phase-based typologies are drawn on the basis of *Diffusion of Innovation Theory* (Rogers, 2010 cited in Park et al., 2016). Institutions and teachers alike, have to be aware of the phases of transition from lower to upper levels of blended learning so that a “high quality teaching and learning environment” may be secured through specific *strategy*, *structure* and *support* (Graham et al., 2013; Boschman et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016).

Blended learning is not a straightforward process; instead, it involves a spectrum of typologies based on a series of interrelated constructs, including levels and dimensions of blending as well as pedagogical approaches and taxonomies. For instance, pedagogical approaches are more than a mere “combination of instructional methods online and offline” because they include “a combination of learning theories such as problem-based approaches based on constructive ideology vs. traditional lectures derived from a direct instruction method based on behaviourist principles” (Bishop & Verleger, 2013 cited in Park et al., 2016: 2). As “a new pedagogical method”, the flipped classroom "employs asynchronous video lectures and problem-solving practices as learners' homework with active and diverse group-based activities in the classroom" (Park et al., 2016: 2). Besides instructional designs, which have already been identified in this chapter, blended learning is complex (Halverson, Graham, Spring, Drysdale & Henrie, 2014; Boschman et al., 2015; Kavanoz et al., 2015; Orr & Kukner 2015; Hung, 2016; Park et al., 2016); and, it can be examined through a variety of underlying constructs.

Park et al., (2016: 2) cite Singh (2003) who identified five levels or dimensions of blended learning thus: "simple blending of offline and online (1^{st} level), blending self-paced and live collaborative learning (2^{nd} level), blending structured and unstructured learning (3^{rd} level), blending custom content with off-the-shelf content (4^{th} level), and blending learning, practice, and performance support (5^{th} level)". Evidently, enhancement of the effectiveness of teaching and the learners' learning experiences entail the 5^{th} level or dimension, which is heavily involved in terms of the teachers' role in establishing the environment of group creativity, innovation, adaptability and flexibility (Boschman et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). Broadly, ICT education is associated with constructivist learning environments wherein teachers integrate digital technologies to support and enhance "collaborative instructional strategies" and learners enjoy "distinct, interactive, individualized and inquiry-based learning activities", as well as the opportunity for meaningful knowledge construction and innovation (Kavanoz et al., 2015: 95). But most teachers are not adequately prepared for blended learning, notwithstanding their recorded proficiencies in the use of "social and communications technologies" (Kavanoz et al., 2015: 95).

Additionally, blended learning is complex because its implementation involves understanding of other constructs, such as hybrid, blended, flipped and inverted, out of which a framework of two dimension could be established (reading from Margulieux, Bujak, McCracken & Majerich, n.d. cited in Park et al., 2016). Broadly, the two dimensions of this framework are: "information transmission vs. praxis"; and, "delivery via instructor vs. delivery via technology" (Margulieux et al., n.d. cited in Park et al., 2016: 2). Drawing from this general framework, four types of blended learning are identified through learning experience taxonomy, which are: "face-to-face mixed" (course with laboratory); "lecture hybrid" (part face-to-face, part online lecture);

“practice hybrid” (part face-to-face, part online praxis); and, “online mixed” (Boschman et al., 2015; Orr & Kukner, 2015; Park et al., 2016). Depending upon the depth of inquiry that the teacher envisage for a specific disciplinary content, appropriate instructional pedagogical designs have to be conceived with one of these learning experience taxonomies in mind; and, such a balancing act cannot be dictated from a generic source material because creativity mindsets, innovation, adaptability and flexibility would be stifled. For the sake of emphasis, it has to be noted that the potential for “disciplined improvisation”, creativity and innovation in education exists for all individuals and groups, rather than being a preserve of a special breed of persons (O’Brien, 2012; Goatley & Johnston, 2013; Holbrook, May, Albers, Dooley & Flint, 2013; Vaughn & Parsons, 2013; Vaughn & Parsons, 2013; Boschman et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016).

There are a series of constructs that explain the complexities of participation in the e-learning environment with the stated purpose of blending with the conventional face-to-face didactics (Halverson et al., 2014; Park & Jo, 2014; Porter et al., 2014; Boschman et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). Having a computer or Tablet and e-book is far from being a sufficient condition and cause for active and effective teaching. The teacher has a duty to investigate the different instructional design pedagogies for mediation of such blended learning in ways that creates an environment of collaborative reasoning, group creativity, innovation, adaptability and flexibility. If the teachers cannot plan instructional activities creatively, then learners would not engage creatively because the teaching would not be designed for “creativity and innovation”. Equally, learners graduating from such a teaching and learning environment would most probably have fragmentary technological knowledge that would be inadequate for their participation in the global knowledge economy where creativity mindsets and innovative applications are prime resources. However, teachers are responsible for designing instructional activities that would facilitate such a teaching and learning environment wherein group creativity, innovation, adaptability and flexibility run supreme; hence, their ICT literacy and command of the abilities to integrate technological, pedagogical and content knowledge in blended learning is of importance.

To demonstrate the dominant adoption level and patterns of blended learning, a study conducted in a private university in South Korea is used as an example. The datasets which are derived from the Learning Management System and the institution’s course database proved to be effective in determining the adoption level and patterns of blended learning implementation in the country (Park et al., 2016). From the total courses, only 60% were studied in order to uncover the extent of online activities which were incorporated for practice. However, the majority of the selected courses revealed a low pattern of usage of the online activities. Thus, the findings indicated that the country is at "adoption and early implementation" (level 2) within the blended learning adoption spectrum (Graham et al., 2013; Park et al., 2016). Regardless of the institution's willingness to promote blended learning strategies through the university official document, more structured policies and support are needed for preparation of the institutional-wide blended learning implementation and necessary culture changes (Park et al., 2016). Since the study's observations were only based on behavioural part of the online activities, the precise identification of the type of blended learning was challenging and hence an in-depth analysis to examine planned instructional methods of selected courses in both online and offline environments was recommended (Park et al., 2016).

The study purposefully sampled 612 courses which adopted both online and offline learning environments. Four types of blended courses were identified using the "C-D-S-I model (C= Communication or Collaboration, D= Delivery or Discussion, S= Sharing or Submission and I= Inactive or Immature)". The findings revealed that 50% of the courses were classified as Type I while 24.3% is Type C, 18% is Type D and the remaining 7.2% is Type S (Park et al., 2016). Learners in Type C courses tend to participate online in small-groups and in conversations with the teacher and/or peers in relation to their studies. Blended learning provides flexibility in time usage and thus allowing learners to reflect and refer what they have learned from face-to-face sessions to collaborate through online group work with the purpose of engaging in authentic problem solving (Park et al., 2016). The engagement allows the teacher to address needs of learners' individual groups by assisting them to concentrate on subject-based matters based on their interests and therefore remaining "student-centred". Learners in Type D courses use online discussions as substantial learning activity designed to support learners while sharing their experiences, insights, and perspectives related to course content without time and place constraints (Park et al., 2016). Learners who are not active in class tend to be more vocal through online discussions and this engagement creates a strong class community and a balance between online and offline environments. Unlike Type C and D courses, Type S offers less online student-centred activities such as resource links and assignment submission menu. As a result, Type S does not alter conventional didactics but only uses the online environment to supplement classroom sessions and learning materials (Park et al., 2016). However, teachers in Type S may also plan to complement class activities with the online environment without reducing face-to-face sessions. The findings of this study suggests that educational technology in South Korea is mostly utilized for circulation of learning resources and lecture notes, announcements, questions and answers as well as assignment submission whereas online activities such as group work, quizzes, and discussion forums were the least used.

3.2.4. Teaching Creatively and Teaching for Creativity

Given this degree of complexity of blended learning, it should be evident that teachers would inescapably be required to teach “more creatively”, in order to stimulate the learners to be equally creative in learning content (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Park et al., 2016; Salminen et al., 2016). Creativity is one of the core constructs of blended learning, together with innovativeness, adaptability and flexibility (Boschman et al., 2015; Orr & Kukner, 2015; Park et al., 2016). According to Orr & Kukner (2015: 69), teachers’ “creativity mindsets and their abilities to improvise within their own disciplines”, integral to encouraging learners to be creative in learning content, are dependent upon literacy strategies. To this extent, computer and ICT literacy among teachers is integral to the successful implementation of upper level blended learning for analysis and planning. There are different disciplinary content literacies, relevant to disciplines, which involve “the ability to draw upon prior knowledge, general and specific content-related literacy practices to learn about new content in a subject area” (McKenna & Robinson, 2014 cited in Orr & Kukner, 2015: 70). Creativity mindset refers to the ways in which teachers and learners in specific disciplines interact with text of all forms, inclusive of print, digital, media and visual, to learn course content, which could be tenably construed as an outcome of “intentional infusion of literacy” (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Siddiq et al., 2016).

Whereas "teaching creatively and teaching for creativity" are integral to each other, as already argued, they are not synonymous; and, they are in practice mediated through the constructs of "disciplined improvisation and adaptability" because creativity "as a concept or characteristic has social and economic implications" at individual and group level activities (Orr & Kukner, 2015: 70). Indeed, all individuals and groups are potentially creative, but "creativity is not a static feature" (Orr & Kukner, 2015: 70). According to O'Brien's (2012: 331) conception of "creativity mindset", it prepares learners' "for unknown and rapidly changing futures" by, among other things, deepening "knowledge growth", informing "innovation", developing "new scientific knowledge" and supporting "problem-based learning". As a result, O'Brien (2012: 331) conceives creativity mindsets thus:

> "Sophisticated perceptions of learning; a willingness to see teaching as a process of collaborative learning and the careful orchestration of multifaceted learning experiences in which the teacher is not always central; and most importantly, the kind of open-minded, open-hearted, courageous visions of self-as-teacher that casts the learners into lead roles and teachers as occasional director and frequent understudy".

All the qualities of creativity mindsets as described by O'Brien (2012) are inconsistent with a prescribed set of universally adopted instructional activities. Blended learning requires teachers to creatively establish an online and offline environment that engages four closely linked characteristics which include creativity, innovation, adaptability and flexibility (Ghizo, Campano & Simon, 2013; Goatley & Johnston, 2013; Holbrook et al., 2013; Boschman et al., 2015; Orr & Kukner, 2015; Park et al., 2016). Prescription of instructional activities for each disciplinary content literacy would stifle the realization of "disciplined improvisation and adaptability" as well as the creativity mindsets design itself. For these reasons, teachers have to learn how to "teach for creativity", beyond their "teaching creatively" (Orr & Kukner 2015: 70), through among other things, "unsystematic and intuitive" approaches (Boschman et al., 2015; Hung, 2016), rather than relying solely on a prescribed set of instructional activities and pre-determined and inflexible designs.

Being “a process of higher order thinking and engagement” (O’Brien, 2012: 331) that is intricately interlinked with “innovation” (Ghizo et al., 2013; Goatley & Johnston, 2013; Holbrook et al., 2013; Vaughn & Parsons, 2013; Boschman et al., 2015; Orr & Kukner, 2015; Park et al., 2016), creativity would not be amenable to rigid prescriptions of instructional activities and designs, because teachers have a duty to “develop innovative approaches” in the processes of inquiry and “response to issues they encounter in their practice” (Cochran-Smith and Lytle 2009 cited in Orr & Kukner, 2015: 71). That is, instructional activities design should define contested educational spaces of evolving processes of adaptability and innovation involving “ideas, practices and materials” (Goatley & Johnston, 2013; Holbrook et al., 2013; Vaughn & Parsons, 2013; Boschman et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Park et al., 2016). The notion of “disciplined improvisation”, as conceived by Sawyer (2004 cited in Orr & Kukner, 2015: 71), affirms the centrality of innovation in “teaching creatively and teaching for creativity” where the teacher is the “facilitator for the entire group’s creativity”. In as much as the teachers’ “disciplined improvisation” is entailed in responses to a combination of various situations such as “curriculum outcomes, materials available, and learners’ questions and reactions”, they “must have a high degree of pedagogical content knowledge” in order that their creativity may open spaces for learners to react creatively (Sawyer, 2004: 13, 15 cited in Orr & Kukner, 2015: 71). So, teachers require “creative performance skills” to “effectively facilitate a group improvisation with learners” (Sawyer, 2004: 17 cited in Orr & Kukner, 2015). Therefore, "creative lesson planning" results in teachers' adoption of the best approach to use in knowledge transfer and acquisition also allows them to flexible and adapt to learners' responses, needs and pursuits (Orr & Kukner, 2015).

Another characteristic of blended learning linked to creativity is adaptability (O’Brien, 2012; Ghizo, Campano & Simon, 2013; Goatley & Johnston, 2013; Vaughn & Parsons, 2013; Boschman et al., 2015; Orr & Kukner, 2015). Vaughn and Parsons (2013, 81 cited in Orr & Kukner, 2015) observed that "adaptive teachers, then, are innovative in their approach, crafting instruction in the moment to meet the specific needs of their students. Innovation requires teachers to use their knowledge of students, context, pedagogy, and self to cultivate student understanding and to adapt their instruction to fit the unique needs of the situation”. Therefore, blended learning requires teachers to successfully adapt their pedagogic knowledge content to specific learner contexts. Apparently, "adapting" blended learning is contrasted with "adopting" it as Gillis (2004: 616, cited in Orr & Kukner, 2015) assets that " as a former science teacher, my experience is that strategies adapted (rather than adopted) to fit the content (discipline specific strategies) are more effective than general literacy strategies". The integration of e-learning with conventional didactics requires a cultivated ability to skilfully adapt blended learning in different subject areas for disciplined improvisation of learners (Ghizo, Campano & Simon, 2013; Vaughn & Parsons, 2013; Orr & Kukner, 2015). Therefore, creative teachers understand the adaption and application of blended learning as a tool for learning to simultaneously improve learners' ICT skills and content knowledge.

Closely related to creativity, innovation and adaptability is flexibility (O'Brien, 2012; Ghizo, Campano & Simon, 2013; Goatley & Johnston, 2013; Vaughn & Parsons, 2013; Boschman et al., 2015; Orr & Kukner, 2015). Flexibility in teaching and learning environments offers learner-led activities and acknowledges that creativity, innovation and adaptability is not only limited to certain content areas (Orr & Kukner, 2015). Davies et al. (2014: 35 cited in Orr & Kukner, 2015) suggest that in addition to considerations of the physical environment to support creative learning, emphasis must also be placed upon the pedagogic environment in how a teacher "organize[s] learning and teaching" with the purpose of "teaching for creativity" (p. 35). That is, flexibility of the online and offline environments is important for the successful implementation of blended learning with the goal of teaching for creativity. However, realities in schools which are mostly created through plans, policies and strategies to control and manage teaching and learning strategies constrain pedagogic flexibility which adversely affect teachers' and learners' creativity (O'Brien, 2012; Ghizo, Campano & Simon, 2013; Goatley & Johnston, 2013; Vaughn & Parsons, 2013; Boschman et al., 2015; Orr & Kukner, 2015).

In Eastern Canada, one teacher creatively engaged learners in her grade eight science class which involves "drawing to learn" and "creating to learn" (Orr & Kukner, 2015). Accordingly, drawing to learn worked well in the class as learners were taught new vocabulary and were also made to translate their work in drawings. With creating to learn activities, learners used an application known as Educreations on iPads to develop a slideshow which presents the terminology in which they write the definition, introduce a picture, animate it and then have fun with it (Orr & Kukner, 2015). The teacher's use of vocabulary learning strategies adapted from pre-service facilitators' training, illustrates awareness of the impacts that drawing and creating digitally have on learner knowledge acquisition and retention of content-specific and technical terms. In a grade 12 physics class, another teacher gave learners an activity to create a newspaper front page on universal gravitation research. Basically, the activity was used to demonstrate how writing a newspaper front page can creatively and effectively address physics curriculum outcomes (Orr & Kukner, 2015). The project provided learners with opportunities for creativity through writing and drawing in order to demonstrate their understanding of universal gravitation. According to the teacher, the main purpose of the activity was to bring creativity and motivation which physics usually lacks (Orr & Kukner, 2015). Apparently, the activity enabled learners to be creative in a course where this was not common and learners' positive responses to this innovation indicated that they were motivated by the opportunity in translating the meaning of the course content.

Observations from the two case studies revealed a positive influence of learners' engagement in collaborative, creative mindsets and innovative learning (Orr & Kukner, 2015). Additionally, the third case study, a grade seven social studies class where learners were given a class activity which involved creating different kinds of information texts about Japan and its historic contexts, revealed that there was more buy-in from learners as compared to traditional activities. Similarly, in a grade nine maths class, it was discovered that learners liked working with each other and as a result they were able to collaborate for creativity compared to when they work as individuals (Orr & Kukner, 2015). As part of creative teaching, assessment plans infused with blended pedagogies in creative ways, enabled learners to demonstrate their innovative ways. Learners seemed to be disciplined improvisers by keeping the curriculum outcomes of the subject areas in focus while they improvise ways to show their understanding of course content (Orr & Kukner, 2015). For example, use of the given activities, such as the newspaper front page, instead of tests can be a strategy to create "differentiated assessments" in order to accommodate learners who might not be good in traditional assessments such as "end-of-unit tests" (Orr & Kukner, 2015). Therefore, creative use of blended learning strategies provided learners with a better understanding of content and enabled them to work towards curriculum expectations mostly around critical thinking while allowing teachers to assess their progress on these outcomes both formally and informally. Although creativity, innovation, adaptability and flexibility are beneficial for teaching and learning purposes their implementation is time consuming.

3.3. Inquiry for Blended Learning: Levels and Processes

Literature confirms that “Collaborative inquiry processes are intelligible in conversations” between the two levels of depth, which are: shallow and deep (Boschman et al., 2015; Orr & Kukner, 2015; Park et al., 2016). The former involves “cumulative talk” for information sharing whereas the latter refers to “exploratory talk” which solicit collaborative engagement for critical discussion and reflective inquiry (Boschman et al., 2015; Kavanoz et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). Based on the learning objectives taxonomy, four levels of depth in collaborative teacher conversations are identified as follows: “No inquiry”; “Sharing and Reacting”; “Analyzing and Generalizing”; and, “Planning and Problem-solving” (Henry, 2012 cited in Boschman et al., 2015: 252). According to Boschman et al. (2015: 252), “Problem solving entails both analysing as well as planning activities and is therefore … a form of deep inquiry”. Teachers, who plan blended learning activities, continuously try “new and innovative forms” of instructional activities because they are tacitly involved with deep inquiry (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Park et al., 2016; Salminen et al., 2016).

Thus, drawing from Henry’s (2012) framing of collaborative teachers’ conversations, Boschman et al. (2015: 252) discern four levels of depth of inquiry in instructional design as follows: “no collaborative inquiry”; “shallow inquiry by sharing knowledge and information”; “deep inquiry that builds understanding by analysing and synthesizing new information”; and, “using understanding to achieve learning goals in novel situations by planning”. The teacher has to determine at all times, what form of integration of knowledge is appropriate for each of the planned level of inquiry. Collaborative inquiry involves deeper levels, which entail analysing and planning (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016; Salminen et al., 2016), and a mere access to the source book is inadequate. Hence, teachers who are not adequately equipped with "fundamental knowledge and skills for effectively integrating technology" are likely to exhibit signs of resistance to adoption of blended learning (Kavanoz et al., 2015: 95). Indeed, analytical and planning domains in blended learning are highly demanding on the teachers' efforts. As Boschman et al. (2015: 252) put it, the "difference between sharing and planning" is that "no decision is explicated" in the former whilst in the latter "the decision is explicit and on details of the learning activity".

Blended learning without collaborative design conversations would be non-existent because of the absence of an inquiry process that integrates knowledge domains of technology, pedagogy and content (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Park et al., 2016; Siddiq et al., 2016). The non-existence of shallow or deeper level of inquiry would, therefore, discount a teaching and learning environment as non-blended. Blended learning involves iterative processes and reflective activities, pointing to the complexity of instructional design problems wherein teachers may as well rely on "unsystematic and intuitive" approaches (Boschman et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung 2016; Park et al., 2016). To be effective, teaching and learning have to emphasize the significance of inquiry processes, which involves "experimenting, reflecting, collaborating, problem-solving, (and) analyzing" (Boschman et al., 2015: 259). Indeed, TPACK does not provide "sufficient information for the integration" digital technologies into instructional designs and practices (Kavanoz et al., 2015). Internet and World Wide Web, for example, provides for several technologies that could be used simultaneously; and, TPACK does not equip teachers with sufficient "technological content knowledge" and instructional settings that would enable them to "create optimal and natural environments for learning" (Kavanoz et al., 2015: 95; Ninlawan, 2015: 1733). Hence, Kavanoz et al. (2015: 95) propose the construct of Web Pedagogical Content Knowledge to cover for the shortfall of the TPACK in Web pedagogical knowledge, which focuses on "perceived self-efficacy and attitudes towards using Web for pedagogical purposes" (Kavanoz et al., 2015: 95). Drawing from social cognitive theory, "the significance of self-efficacy … as a critical variable for the prediction of individual behaviour" is extended to ICT education to capture Web or Internet self-efficacy, referring to both learners' and teachers' "self-perceived confidence in and expectations of successfully executing Internet actions" necessary to undertake the required activities for blended teaching and learning (Kavanoz et al., 2015: 95).

An example from a study conducted by Boschman et al., (2015) focused on how depth of inquiry is related to TPACK in design talks during "collaborative design of technology-rich curriculum activities". The study discovered that over time, the majority of teacher reach deeper inquiry levels. Apparently, teachers' orientations of teaching and learning early literacy included analysis thereby reaching a deeper level of inquiry (Boschman et al., 2015). Teachers seem to have a better understanding of the practical complexity of the design problem and how technology, pedagogy and content work together during knowledge transfer which encourage analysis of the subject matter (Boschman et al., 2015). Therefore, teachers' collaborative inquiry design is translated to classroom practice. Furthermore, the study differentiated between non-existing, shallow and deep levels of inquiry. According to the findings of the study, the design is an interactive process in which the teacher shares knowledge and information by proposing the types of learning activities that align to specific inquiry levels (Boschman et al., 2015). Using analysis to build their understanding, teachers also reflect on their teaching and learning related actions which also work towards the development of TRACK.

3.4. Required Characteristics of Teachers and Learners for Blended Learning

According to Noh et al. (2014: 145), “Although teachers may believe that computers can lead to improved teaching and learning, they may choose not to use this technology if they have low confidence in their abilities to use computers”. Besides, evidence suggests that the ICT revolution has not been realized in terms of the enhancement of pedagogical and blended learning (Pegrum et al., 2013; Boschman et al., 2015; Orr & Kukner, 2015; Kearney et al., 2015; Hung, 2016; Park et al., 2016). Indeed, the new techniques are not supposed to supersede and replace traditional face-to-face didactic sessions; instead, they are recommended for supplementation that advances the learning goal of analyzing and applying, beyond mere remembrance and comprehension (Subramanian et al., 2012; Littlewood et al., 2013; Gu et al., 2015; Webster & Son, 2015; Wolff et al., 2015; Hung, 2016). According to Suh (2004: 1040 cited in Webster & Son, 2015: 85), the question of how to integrate computer technology in teaching and learning is one of the “major challenges facing educational policy in the information age”. However, as Valtonen et al. (2015: 49) put it, the value of ICT for teaching and learning “is widely recognized”. E-learning is indeed associated with the “so called twenty-first century skills” at a global scale (Ahonen & Kinnunen, 2015; Valtonen et al., 2015; Ninlawan, 2015; Park et al., 2016; Salminen et al., 2016; Siddiq et al., 2016). But the practice of blended learning remains a complex challenge and undertaking for all countries alike (Boschman et al., 2015; Orr & Kukner, 2015; Park et al., 2016).

Given the strife for transformational pedagogy from passive to active learning, ICT has become “inevitable” and “ubiquitous” across the world that there have been insinuations that the online environment provides for “deeper learning” than the traditional face-to-face classroom contact model (Pegrum et al., 2013; Button et al., 2014; Peeraer & Van Petegem, 2014; Boschman et al., 2015; Gu et al., 2015; Kearney et al., 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016). But the impacts of ICT on knowledge acquisition continue to be contested, notwithstanding shared acknowledgement of attendant advantages of learner learning flexibility and self-pacing (Kavanoz et al., 2015; Orr & Kukner, 2015; Hung, 2016). In some cases, it has been argued that learners who use e-learning have been likely to achieve higher grades than those who relied solely on the face-to-face classroom model alone (Button et al., 2014; Gu et al., 2015; Hanus & Fox, 2015; Hung, 2016). Citing Collins & Halverson (2009), Peeraer & Van Petegem (2014: n.p.) show that whereas technology has transformed society, its impact on education has remained uncertain as most studies could not establish a positive correlation with learners’ achievements. In practice, the uptake of ICT in education has in general been mixed, with the result that educational revolution did not take place in teaching and learning (Peeraer & Van Petegem, 2014; Boschman et al., 2015; Kavanoz et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). There are those voices that questioned heavy reliance on digital technology for gamification of learning on the grounds that there is a probability that it could lead to demotivation and poor performance among learners, if not properly applied (Hanus & Fox, 2015; Ninlawan, 2015; Wolff et al., 2015; Hung, 2016; Park et al., 2016). Cognitive formulations involve extremes that computers are essentially incompatible with teaching, on the one end, whilst at the other end some studies affirm that ICT improves pedagogy (Schmidt et al., 2014: 286 cited in Webster & Son, 2015: 85).

However, there is cognitive convergence on the idea that e-learning does not necessarily replace the traditional face-to-face classroom interactions (Button et al. 2014; Boschman et al., 2015; Orr & Kukner, 2015; Wolff et al., 2015; Hung, 2016; Park et al., 2016; Salminen et al., 2016), even among those digital technology fanatics. As already discussed, there are a variety of degrees of combinations at which digital pedagogies can be integrated with conventional face-to-face didactics (Garrison & Vaughan, 2013; Graham et al., 2013; Halverson et al., 2014; Park & Jo, 2014; Porter et al., 2014; Boschman et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016; Siddiq et al., 2016). To this extent, blended learning signifies the "substantial importance" of planning, teachers "availability in online-learning environments" wherein they have to "deal with or balance multiple roles" whilst having to simultaneously exhibit "significantly higher levels of critical thinking" as facilitators (Hung, 2016: 121). It is, therefore, imperative to understand the readiness for blended learning among teachers-as-learners in terms of their ICT literacy, beyond mere instructional designs and institutional support through learning management systems (Kavanoz et al., 2015; Ninlawan, 2015; Hung, 2016; Park et al., 2016; Salminen et al., 2016; Siddiq et al., 2016). For the successful adoption of blended learning, both teachers and learners must possess certain skills as well as attitudes and self-efficacy. Additionally, teachers' roles and responsibilities must be aligned to the requirements of the blended learning which are discussed in the following sub-sections.

3.4.1. Teachers' and Learners' Skills Required for Blended Learning

Teachers require specific pedagogic skills to make appropriate decisions about "the best approaches" to teaching particular contents and to creatively plan lessons for flexibility and adaptability to learners' reactions in-the-moments of interactions, according to prevalent needs and pursuits (Boschman et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). Teachers require "careful planning and analytical evaluation" because they are important in supporting disciplined improvisation (Orr & Kukner, 2015: 71). Overall, creativity mindsets entail innovation, flexibility and adaptability. To achieve these teachers adopt innovative approaches to craft instructional design activities that "fit" the unique contexts and needs of learners as well as meet the learners' specific empowerment expectations and interests to develop identities as experts and scientists, using "their knowledge of learners, context, pedagogy" and self to cultivate understanding (Vaughn & Parsons, 2013: 81). In this way, teachers are required to "open spaces within a curriculum" in order to, as it were, "scaffold" learning (Vaughn & Parsons, 2013: 89). That is, adaptation is more effective than adoption because general literacy strategies are less potent than those adapted "to fit" the disciplinary content-specific strategies; and, the latter involve "disciplined improvisation" or cultivation of the ability to skilfully adapt literacy practices and integrate them" into specific disciplinary content which ensures that literacy is "used as a tool for learning so that learners improve their literacy and content knowledge simultaneously" (Gillis, 2014: 616, 618). Evidently, flexibility in the teaching and learning environment encourages learner-centred activities as well as group-led creativity and innovation (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016; Salminen et al., 2016). Teachers' creativity mindsets should inform the design of their pedagogical activities because "pedagogic environment" relating to the organization of teaching and learning is a critical requirement in relation to "teaching for creativity", beyond mere "considerations of the physical environment" necessary for supporting "creative learning" (Davies et al., 2014: 35).

E-learning requires, at the minimum, specific levels of computer and ICT literacy as well as pedagogic technological informatics. Computer literacy refers to "an understanding of the concepts, terminology and operations that relate to general computer use" (Computer Literacy USA, 2012 cited in Button et al., 2014: 1311). According to Bundy (2005 cited in Button et al., 2014: 1311), information literacy means the ability to recognize the need for information, to determine the extent of the need, to access it efficiently, to critically evaluate it and its sources, and to collect or generate, classify, store, manipulate, redraft and incorporate it into existing knowledge systems or base. Pedagogic technological informatics involve the skills necessary for teachers to integrate teaching, computer and ICT sciences in their management and communication of data, information and knowledge in facilitation of learning (authors' own formulation drawn from Button et al., 2014; Boschman et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016; Siddiq et al., 2016). Successful implementation of blended learning is, therefore, dependent upon the levels of computer and ICT literacy among learners and teachers (Button et al. 2014; Noh et al. 2014; Porter et al., 2014; Boschman et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Webster & Son, 2015; Hung, 2016; Park et al., 2016). Indeed, teachers require training and experience in digital technologies and social media, if they were to use them successfully in teaching and learning (Salminen et al., 2016). To be equipped with lifelong learning skills, learners and teachers need to be supported with ongoing education and informatics as current education methodologies and teaching strategies increasingly incorporate e-learning (Button et al. 2014; Boschman et al., 2015; Gu et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016).

Collectively, computer and ICT literacy for the application of blended learning involves issues of the user's "capacity" or "self-efficacy" rather than mere access for both the teachers and learners (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016; Siddiq et al., 2016). Whereas Noh et al. (2014: 144) argued that "Computers and computing technology are … indicative of good teaching and student learning" and therefore digital technology has revolutionized social networking, the norm has not held with the onset of educational ICT (Peeraer & Van Petegem, 2014; Ninlawan, 2015; Hung, 2016). Perhaps, the low levels of applications of ICT in education, amidst excessive technological resourcing, is a function of the negligible "capacity" and "self-efficacy" among educators in blended learning. Drawing, respectively, from Bandura's (1977) and Ford's (1992) conceptions of "self-efficacy" as "a person's ability to be successful in organizing and executing actions towards a specific goal" and "capacity" as beliefs about personal empowerment (both cited in Webster & Son, 2015: 85), computer and ICT literacy should involve the teachers' and learners' ability to successfully use the E-learning environment for knowledge acquisition through analysis, application and evaluation. Equally, blending an E-learning environment with the traditional face-to-face classroom interactions is not unproblematic because it requires among other things computer and ICT literacy relating to Internet skills and their use to retrieve information, which are largely conditional upon acquisition of costly personal computers and training (Elder & Koehn, 2009; Bond, 2010; Deltsidou et al., 2010; Button et al., 2014; Gu et al., 2015).

Additionally, ICT literacy relating to the skills of managing large volumes of data when conducting Internet database searches are as important as those for the basic use of computer for information retrieval from the Internet (Elder & Koehn, 2009; Bond, 2010; Deltsidou et al., 2010; Button et al., 2014; Gu et al., 2015; Orr & Kukner, 2015; Domingo & Gargante, 2016; Park et al., 2016; Salminen et al., 2016; Siddiq et al., 2016). Computer and ICT competences among learners and teachers are critical to the successful blending of E-learning in teaching and learning (Button et al., 2014; Noh et al., 2014; Halverson et al., 2014; Park & Jo, 2014; Peeraer & Van Petegem, 2014; Porter et al., 2014; Boschman et al., 2015; Gu et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Park et al., 2016). Hence, computer and ICT literacy are often stipulated as the preconditions for the implementation of online learning environment and for lifelong learning (Button et al., 2014; Gu et al., 2015; Kavanoz et al., 2015; Siddiq et al., 2016) because they determine the degree of understanding and institutional strategies, structure and support for adoption of blended learning as well as transition from lower to upper levels for high quality teaching and learning environment (Halverson et al., 2014; Park & Jo, 2014; Porter et al., 2014; Boschman et al., 2015; Kavanoz et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016).

For these reasons, e-learning entails costly interventions relating to financial, training and technical support for both learners and teachers (Moule, Ward & Lockyer, 2010; Nguyen, Zierler & Nguyen, 2011; Gu et al., 2015; Hung, 2016; Park et al., 2016). Both computer and ICT literacy, which cannot be acquired through osmosis, are fundamental to technology informatics in teaching and learning (Bond, 2010; Button et al., 2014; Noh et al., 2014; Boschman et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Webster & Son, 2015; Hung, 2016; Park et al., 2016). That is, learners and teachers alike require financial, technical and training support in order to acquire and improve their technology informatics necessary for successful implementation of blended learning. Learners and teachers should be able to manage digital technology and information as well as be provided with the "opportunities for progressive development of ICT competence" (Button et al., 2014: 1320). Additionally, there is time cost, because blending means that whilst a traditional face-to-face interaction model is maintained, teachers should find time to "develop E-learning resources" rendering the online learning environment time-intensive (Button et al., 2014: 1320). Crews, Miller & Brown (2009), Chapman (2010), Moule et al. (2010), Nguyen et al. (2011), Boschman et al. (2015) and Webster & Son (2015) demonstrated that the amount of time involved in developing and facilitating e-learning is multifaceted because teachers are, beyond interacting with the learners on the online learning environment, required to learn the new technologies and to prepare new lectures that incorporate ICT.

As already discussed, Hung (2016) suggests that teachers have, among other things, to plan instructional activities for discipline-specific course content, to be available “in the online-learning environments”, to learn as learners, “to deal with or balance multiple roles”, to be self-disciplined in managing time and organizational skills for their participation in social interactions, to apply cognitive strategies and to exhibit “significantly higher levels of critical thinking”, because the use of digital technologies in education is not free of effort. The time, energy and computer and ICT literacy of teachers cannot be “a taken-for-granted” construct of the blended learning environment. Besides, e-learning informatics are in a continuous state of flux, implying that teachers and learners are challenged to keep up with the developments, especially in regard to pedagogical, technological and content knowledge as well as their various dimensions of integration (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Park et al., 2016). There is universal agreement that the construct of ICT is not separate nor independent of blended learning; instead, the latter entails integration of technological, pedagogical and content knowledge (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Park et al., 2016). As already discussed, the forms of knowledge integration required for successfully application of blended learning are complex (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016).

3.4.2. Teachers-as-Learners: Preparing for Creativity, Innovation, Adaptability and Flexibility in Blended Learning

The reality is, many teachers were taught and trained in traditional and passive classrooms and as a result the majority still need to adapt to the new online learning environments (Hung, 2016). Therefore, teachers-as-learners should be in a position to "realize the significant change that takes place when their roles and responsibilities shift from those of a teacher to those of a learner" during their in-service training (Hung, 2016: 121). For Hung (2016: 121), “teachers-as-learners” should be more responsible than teachers-as-teachers for practising self-discipline … for using cognitive strategies … for using time management and organizational skills … and for participating in social interaction” within the blended online and offline learning environment. As such, it is important to understand the factors that drive teachers-as-learners’ levels of readiness to participate in the adaptation and implementation of online environments for blended learning. An understanding of teachers-as-learners' readiness to engage in blended learning, can better assist teachers in enhancing their online-learning experiences necessary for blended pedagogies and offering of online courses. Teachers-as-learners are characterized by a number of factors and limitations which should be considered in the adaptation, implementation and design of blended learning (Hung, 2016). Learners' age, gender and educational level have little influence on the learning, acceptance and implementation of online environments. Evidence suggests that family and/or institutional support as well as job responsibilities are some of the key factors affecting the performance of teacher-as-learners of online learning environments (Park & Jo, 2014; Park et al., 2015; Hung, 2016; Park et al., 2016). Additionally, self-directed learning, institutional support, communication self-efficacy and learning-transfer self-efficacy ideas are key pedagogic measures that determine the success of teachers-as-learners (Park & Jo, 2014; Park et al., 2015; Hung, 2016; Park et al., 2016).

Self-directed learning is "a process in which learners take the initiative and responsibility for establishing personal learning goals, understanding personal needs, identifying resources for learning, selecting and implementing learning strategies, and monitoring personal performance" (Knowles, 1975 & Loyens et al., 2008 cited in Hung, 2016: 123). For a knowledge-based economy, self-directed learning is an important process that successfully pursues lifelong learning. Learners with the ability to learn independently are more likely to perform better in "online education contexts" than those who lack this ability (Hung, 2016). These abilities have chances of improvement in a course that has adopted a "personalized and collaborative learning system" that enables learners to be more proactive in "planning, organizing and monitoring" their knowledge acquisition activities (Park & Jo, 2014; Park et al., 2015; Hung, 2016; Park et al., 2016). Additionally, an effective online Self-directed learning environment provides learners with control over their instruction as well as responsibility and initiative in their own learning (Hung, 2016; Park et al., 2016). Therefore, there is a strong relationship between the use of technologies in learning and good performance which is promoted by self-directed learning among teachers who are learners. Teachers' online learning also relies on institutional support as well as communication and learning-transfer self-efficacy (Park & Jo, 2014; Park et al., 2015; Hung, 2016; Park et al., 2016). For learning purposes, teachers require their superiors' and colleagues' support where the former relates to the prioritization that supervisors and managers give to subordinates' training and the latter is more on the assistance that teacher learners get from peers as they try to master the required organizational skills and knowledge (Hung, 2016). Additionally, the organizational atmosphere is also important for the establishment of overall behavioural, emotional, attitudinal and ideological setting of learner teachers for ease of adaptability and flexibility during their training (Hung, 2016; Park et al., 2016). With support from superiors and colleagues as well as the institutional environment, teachers who undertake in-service training are more likely to adapt to the learning environment and success than those who do not (Park & Jo, 2014; Park et al., 2015; Hung, 2016; Park et al., 2016).

Communication self-efficacy, measured by "text-based asynchronous communication" provides learners with "temporal and spatial flexibility", further improves teacher's cognitive levels of knowledge construction develops critical reflection and collaborative learning (Kavanoz et al., 2015; Hung, 2016; Park et al., 2016). For teachers-as-learners, this communication assists and allows them to create and manage time for information searching, thinking, and reflection of the given subject matter (Hung, 2016; Park et al., 2016). The in-service training teachers are given a practical experience which will assist them to understand how learners communicate with their teachers and peers during online learning. Thus, communication self-efficacy in online learning is an essential dimension for overcoming the limitations of online communication that could be faced by teachers. Online training alone is not enough if teachers are unable to transfer the knowledge they have gained during their training to learners. The application and transfer of teacher's acquired skills and knowledge in a learning environment is what is required for the success of blended learning. Learning-transfer self-efficacy which is the belief and ability to be able to share knowledge and skills gained by teachers during their in-service training with learners (Kavanoz et al., 2015;

Hung, 2016; Park et al., 2016). In blended learning, teachers' existing knowledge and skills are applied in new situations and setting that uses both the online and offline learning environments for creative, innovative, adaptable and flexible knowledge acquisition (Kavanoz et al., 2015; Hung, 2016).

Hung's (2016) study which used "Teacher Readiness for Online Learning Measure" is characterized by self-directed learning and institutional support as well as communication and learning-transfer self-efficacy is considered as a valid and reliable instrument. Firstly, the study uncovered that teachers who took online courses and directed their own learning by developing their study plans and managing their own time developed self-discipline, a skill that strengthened their online learning (Hung, 2016). Secondly, teachers-as-learners were also motivated by institutional support they received from their superiors and peers in their work places (Hung, 2016). The support motivated the in-service training teachers to successfully complete their courses. Thirdly, the findings further revealed that trained teachers have been confidently communicating with their peers "posting questions, responding and expressing themselves" through online discussions (Hung, 2016). Moreover, the same teachers use asynchronous online discussion as a tool to support learners' communication and interaction through online environments. It is reasonable to conclude that in-service trained teachers on blended learning have better online communication self-efficacy and feel comfortable and flexible to share their knowledge with learners. Therefore, participation in online discussions is directly linked to positive learning attitudes and improved learning. Lastly, learning-transfer self-efficacy was demonstrated by the trained teachers' through their enjoyment of challenges and sharing of ideas with others as well as expressing their confidence in the application of the acquired skills and knowledge (Hung, 2016). Seemingly, trained teachers indicated job satisfaction as well as motivation and willingness to transfer knowledge to learners using online environments. As already argued, a blended learning environment is also dependent upon the teacher’s decision-making about instructional designs for collaborative reasoning, group creativity, innovativeness, adaptability and flexibility. Blended learning that is devoid of the conditions entailed in these constructs would remain a sterile and passive information sharing environment for both learners and teachers.

3.4.3. Attitude and Self-efficacy Necessary for Blended Learning

ICT literacy, in general, can be described in what Kavanoz et al. (2015) denote Internet self-efficacy, which is dependent on an individual's personal "judgment" of the own "ability to apply Internet skills in a more encompassing mode" as well as what they believe they could achieve through online resources in teaching and learning. Internet self-efficacy goes beyond mere computer skills to embrace a diversity of digital skills "such as navigating the WWW, downloading/uploading files, creating bookmarks" and so on as well as the teachers' attitude towards the Internet as one of the most important constructs for the Web Pedagogical Content Knowledge (Kavanoz et al., 2015: 95). Siddiq et al. (2016: 1) have established that teachers' and learners' adoption and use of digital information and communication skills is "positively related to ICT self-efficacy, the frequency of ICT use, and perceived usefulness of ICT". Beyond quantitative frequency of use, teachers' ICT literacy involves qualitative aspects and "digital skills such as accessing, evaluating, and sharing and communicating digital information" (Siddiq et al., 2016: 1). Indeed, teachers' and learners' "computer knowledge previous experience, awareness and proficiency" shape their "perceived self-efficacy in using various forms of technological tools" (Kavanoz et al., 2015: 95). It is this self-efficacy in the Web Pedagogical Content Knowledge that would fundamentally determine the successful integration required through the TPACK.

Teachers and learners who doubt their Internet skills or are not satisfied with them, would perceive the Web and/or Technological Pedagogical Content Knowledge as difficult to use, therefore exhibiting low levels of confidence in their abilities and "self-efficacy beliefs" (Kavanoz et al., 2015; Ninlawan, 2015; Hung, 2016; Park et al., 2016; Siddiq et al., 2016). Reciprocally, such low confidence and self-efficacy beliefs would strengthen negative attitudes against the use of Internet. In this way, the lack of Web or TPACK capacity would in itself drain potential for building ICT literacy among teachers and learners as attitude is a powerful determinant for predicting behaviour. Citing Fishbein & Ajzen (1975: 6) in Kavanoz et al. (2015: 95-96) define attitude, from a social cognitive theory, as "a learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object". Additionally, the user commitment theory and continuous adoption of technology asserts that the wide adoption of social media is a direct function of its “usefulness, ease of use, personalization” and immediacy (Zhang et al., 2014; Domingo & Garganté, 2016; Salminen et al., 2016; Siddiq et al., 2016).

Self-efficacy and higher levels of confidence in the Internet, therefore, are correlated with the opportunity to participate and contribute “useful knowledge”, enjoyment, happiness, adaptability and flexibility, which could be achieved by promoting collaborative learning (Zhang, de Pablos & Xu, 2014; Zhang, Gao, Yan, de Pablos, Sun & Cao, 2015; Domingo & Garganté, 2016; Salminen et al., 2016; Siddiq et al., 2016). Relevant literature identifies “self-efficacy, perceived usefulness, perceived ease of use, teaching and learning beliefs, ICT anxiety, and general attitudes towards computers” as fundamental determinants of teachers’ and learners’ ICT integration (Siddiq et al., 2016: 2). To be sure, these determinants of teachers’ and learners’ ICT integration are a direct function of their “perceptions of their ICT skills and the usefulness of integrating ICT in teaching and learning” (Siddiq et al., 2016: 2). That is, teachers’ “motivation and willingness” to integrate digital technologies and Internet in the teaching and learning will largely depend upon their attitude towards the Web-based instructional practices (Kavanoz et al., 2015; Ninlawan, 2015; Hung, 2016). Attitudes towards the Internet determines the behavioural intentions in blended learning; hence, Kavanoz et al., (2015: 96) argue that “appropriate attitude towards the Web is a pre-requisite for positively embracing web-based instruction”, thereby rendering insights into teachers’ self-efficacy and attitude towards Internet and Web Pedagogical Content Knowledge is crucial to efforts designed for their professional development in preparation for the ubiquitous and inevitability of educational ICT. Also, teachers “need more knowledge on how to evaluate the pedagogical usability of digital learning material” as well as the ethical considerations involving the digital learning environment, social media, the pedagogical advantages and disadvantages as well as the learning styles of the “Net Generation” (Salminen et al., 2016: 355).

As Oz et al. (2015: 360) assert, “motivation sets the psychological context” for successful learning “as both the cause and product of effective instruction”. However, there is a myriad factors and contexts that can shape motivation, but self-efficacy and confidence in ICT literacy can serve a psychological boost for adoption of digital technologies, Internet and social media in the teaching and learning environment (Oz et al., 2015; Domingo & Garganté, 2016; Salminen et al., 2016). Hence, Oz et al. (2015: 360) cites Gardner's (1985) description of attitude as "an evaluative feedback to some referent or attitude object and is thus linked to a person's values and beliefs". So, the adoption and use or the lack thereof among teachers and learners cannot be taken for granted because it may as well be reflective of the divergent cultures involved in the context. Indeed, the construct of "integrativeness and attitudes towards learning situation" is critical as it relates to "an individual's openness to other cultures and taking on the characteristics of another cultural … group", thereby defining the state of being motivated to learn as described through the socio-educational model (Oz et al., 2015: 360). Given that "motivation provides answer to a person's desire to adopt certain learning behaviours", it equally "implies that the more strong beliefs one holds about positively valued outcomes, the more positive attitudes s/he will have toward the behaviour or action, or the other way round" (Oz et al. 2015: 360). But attitude is more complex than this description as recent definitions demonstrate. A refined conception of attitude shows that it consists of three interrelated components: cognitive, affective and behavioural (Oz et al. 2015). Reading from Vandewaetere and Desmet's (2009) definitions, Oz et al. (2015: 360) describe the three components thus:

> "The cognitive component involves the beliefs, thoughts or perceptions of the objects of the attitude or situations related to attitudes. The affective component concerns the individual's feelings and emotions towards the cognitive element and appraisal of these feelings. The behavioural component refers to one's tendency to adopt particular learning behaviours".

In Turkey, Kavanoz et al. (2015) conducted a study to uncover pre-service teachers' perceived self-efficacy and attitudes with regard to Web Pedagogical Content Knowledge necessary for blended learning. Most of these teachers start their jobs with a high level of Internet self-efficacy as they had the opportunity to associate themselves with technology from a very young age. Moreover, the computer courses which they completed allowed them to gain experience on how to use the Internet for teaching and learning purposes (Kavanoz et al., 2015). The relationship between teachers' attitudes towards Web-based instruction and their perceived self-efficacy was also examined. The findings revealed that the pre-service teachers seem to manifest positive attitudes towards Web-based instruction and thus, the two have a significantly positive relationship. Computer courses which required teachers to use the Web for their own learning and for preparing language might have caused an increase in their computer literacy, eventually improving their self-efficacy and attitudes towards using the Web in teaching. These findings are consistent with the results of the study by Torkzadeh, Chang and Demirhan (2006, cited in Kavanoz et al., 2015) who reported that teacher's implementation of computer training significantly improved their computer and Internet self-efficacy development of the participants in their study. Pre-service teachers' self-efficacy regarding Web Pedagogical Content Knowledge is very important, as the majority of those who are members of the Net Generation, have trust in themselves and are able to integrate the online environment into their teaching approaches.

3.4.4. Teachers' Roles and Responsibilities in Blended Learning

Kavanoz et al. (2015) and Ninlawan (2015) discuss the responsibilities and amount of work that teachers are confronted with in the teaching innovation and educational technology of the 21st century. According to Kavanoz et al. (2015: 94), effective and successful integration of technology in education depends on the teachers' "pedagogical and personal beliefs". Teachers have a responsibility to ensure that their teaching is designed for "group creativity", wherein courses are tailored according to the learners' needs and in-the-moment pursuits whilst simultaneously adjusting the same needs and interests, in order to encourage them to learn creatively (Kavanoz et al., 2015; Ninlawan, 2015; Hung, 2016). Teachers have to achieve this balancing act successfully through complex processes of integrating basic knowledge in seven areas: field of their teaching, science of education, curriculum, content and classroom management, learners and their characteristics, outcomes, objectives and values as well as knowledge in context (Ninlawan, 2015; Boschman et al., 2015; Orr & Kukner, 2015; Park et al., 2016).

Ninlawan (2015: 1733) recommends that teachers have to be disciplined as facilitators of blended learning in the digital environment and to effectively manage classrooms by exhibiting the following constructs and characteristics: "Spirit of being a teacher", "Skills in developing integrated courses", "Ability to come up with innovation, teaching techniques, and an ICT-based classroom", "Enthusiasm to help the learners, based on psychology", and "Ability to use English to communicate". These expectations of teachers in the 21st century teaching innovation and educational technology are consistent with the observations made by Boschman et al. (2015), Kavanoz et al. (2015), Orr & Kukner (2015), Hung (2016), Park et al., (2016) and Siddiq et al. (2016), concerning the facilitation of blended learning. As Ninlawan (2015: 1733) declares, "Innovation and educational technology always change". Given the significance of the role that teachers play in facilitating blended learning and motivating learners for creative engagement, they are required to continuously "improve themselves to be visionary and well-rounded" (Ninlawan, 2015: 1733) in pedagogical, technological and content knowledge as well as their various forms of integratedness (Boschman et al., 2015; Kavanoz et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016).

Additionally, Ninlawan (2015: 1732) finds "positive correlations between teachers' professional development and classroom management … concerning creative and innovative skills, communication, information, and media awareness, and computer literacy and information technology". The current generation of learners, variously described as the "Net Generation", "the digital natives" or "Y-generation", who were born and socialized in technology, have reinforced the significance of ICT integration in education and the teachers' digital literacy (Kavanoz et al., 2015; Hung, 2016; Park et al., 2016; Salminen et al., 2016). The "digital natives", as it were, are heavily reliant on a variety of social media technologies, creating pressures for teachers to incrementally catch-up and to improve their ICT literacy in order to meet the changing learning expectations and aspirations of the current generation of learners (Kavanoz et al., 2015; Hung, 2016; Park et al., 2016; Salminen et al., 2016; Siddiq et al., 2016). The "digital natives" command substantial digital information and communication skills which embrace "knowledge, beliefs, attitudes, and values" about ICT, Internet and their usage (Siddiq et al., 2016: 1). Importantly, teachers were not at liberty to treat ICT as a separate entity that is optional to teaching and learning because "the need for sufficient digital technology skills and pedagogical knowledge to maximize learner learning" became an incremental imperative (Kavanoz et al., 2015: 94). Hence, teachers require "professional development in teaching innovation and educational technology in the 21st century" (Ninlawan, 2015: 1732). It is important for teachers to attend professional development workshops, seminars and programmes to prepare themselves to be able to teach and share the 21st century knowledge economy skills that promote educational creativity, innovation, adaptability and flexibility required by learners.

3.5. Determinants of Blended Learning Environment

ICT epitomizes globalization and educational innovation (Peeraer & Van Petegem 2014), wherein creativity mindsets are explicated through constructs of innovation, adaptability, teaching for creativity and flexibility (Boschman et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016; Salminen et al., 2016). The latter educational requirements entail a teacher with abilities to design instructional activities that solicit for group creativity and innovation out of the curriculum, which often progresses through unsystematic and intuitive routes (Boschman et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). In many ways, the teachers should have the abilities to analyse and plan multiple integration of pedagogical, technological and content knowledge in order to establish a "high quality teaching and learning environment" (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). The requirement for blended learning of online and offline modes sets an added challenge to the teachers', as well as learners', ICT literacy. Citing Kao, Wu & Tsai (2011), Hung (2016: 121) observes, "favourable and durable organizational conditions support teacher learning". That is, teachers have complex multiple roles to play in active learner learning because their "roles and responsibilities" are in a state of flux as they search for "disciplined improvisation" for creativity, innovation, adaptability and flexibility (Boschman et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016; Salminen et al., 2016).

Teaching effectively and creatively for "group creativity", innovation, adaptability, flexibility and learners' active learning place a momentous challenge on the design of instructional pedagogical activities for blended learning (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). Given the positive correlation of self-efficacy relating to Web or Technological Pedagogical Content Knowledge and attitudes towards Web-based instructional designs and activities (Boschman et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016), blended learning requires the teachers to exhibit "the ability and willingness to combine technological, pedagogical and content knowledge" (Kavanoz et al., 2015: 94). Therefore, the teachers' ICT literacy should be of paramount significance to the successful creation of an effective high quality blended teaching and learning environment. However, there is negligible insight into the teachers' perceptions of the "usefulness" and "ease of use" of ICT in learning as well as their own personal self-efficacy and attitude towards blended pedagogies, which collectively bear "greater influence" on the adoption of instructional practices appropriate for deep inquiry, creativity and innovation (Zhang, de Pablos, Wang, Wang, Sun & She, 2014; Ninlawan, 2015; Domingo & Garganté, 2016; Siddiq, Scherer & Tondeur, 2016).

Developed countries with the state-of-the-art ICT infrastructure have continued to struggle to integrate E-learning in education, notwithstanding the positive benefits associated with digital technology, because blended learning is more complex than its conception and definition suggest (Boschman et al., 2015; Ninlawan, 2015; Valtonen et al., 2015; Park et al., 2016). To this extent, infrastructure is not a sufficient condition to precipitate successful implementation of E-learning; instead, digital informatics is critical to the understanding of strategies, structure and support for blended learning as well as "transition from lower to upper level for the high quality teaching and learning environment" (Park et al., 2016: 2). That is, levels of computer and ICT literacy among learners and teachers, which are not an osmotic process, define the primary determinants for successful implementation of blended learning (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). However, E-learning is time intensive and blending it with the traditional face-to-face interactions entails significant investment of time and resourcing for the learners and teachers alike (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). Acquisition of skills for developing the online courses, facilitating learning and interacting with learners requires training, financial and technical support for teachers too (Garrison & Vaughan, 2008; Deltsidou et al., 2010; Marginson, 2010; Garrison, 2011; Button et al., 2014; Peerear & Van Petegem, 2014; Boschman et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Webster & Son, 2015; Hung, 2016; Park et al., 2016). Thus, implementation of ICT and digital technologies for teaching and learning begs questions of the levels of computer and ICT literacy as well as technology informatics among teachers in particular, beyond mere delivery of infrastructure and access.

Among other requirements, teachers should have the ability to teach creatively and for creativity by engaging in complex integration of pedagogical, technological and content knowledge to establish a conducive environment for group creativity, innovation, flexibility and adaptability of instructional design activities to the specific needs of the learners, their in-the-moment interest pursuits and socio-emotional contexts. These competences are denoted elsewhere in this chapter as “attitude” and “self-efficacy”, in accordance with the constructs drawn from the pertinent literature (see, for example, Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Webster & Son, 2015; Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Siddiq et al., 2016). The inevitability of the move towards incorporation of e-learning in South Africa, a developing country, is so ubiquitous that it may seem to be unproblematic. As already argued, the availability of the computer and ICT infrastructure does not automatically determine the effectiveness of application in teaching and learning (Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016). Hence, there are different adoption levels that are dependent upon a variety of factors, including institutional *strategies*, *structure* and *support* to the notion of the learning management system (Graham et al., 2013; Boschman et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). To this extent, a variety of constructs, inclusive of creativity, flexibility, adaptability and innovativeness, have been studied to determine their relationship with successful implementation of blended digital and conventional pedagogies (O’Brien, 2012; Davies, Jindal-Snape, Digby, Howe, Collier & Hay, 2014; Boschman et al., 2015; Orr & Kukner, 2015; Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016).

As a result, there has been a shift towards blended learning, which integrates traditional classroom interaction strategies with the online teaching and E-learning model (Garrison and Vaughan 2008; Garrison & Vaughan, 2013; Button et al. 2014; Halverson et al., 2014; Park & Jo, 2014; Porter et al., 2014; Boschman et al., 2015; Wolff et al., 2015; Hung, 2016; Park et al., 2016; Salminen et al., 2016) and/or a variety of other nuanced techniques and approaches (Subramanian et al., 2012; Littlewood et al., 2013; Hanus & Fox, 2015; Orr & Kukner, 2015). An exclusively online learning environment is possible, but there are serious limitations that arise due to the nature of knowledge required and complexity of blended learning (Halverson et al., 2014; Park & Jo, 2014; Porter et al., 2014; Boschman et al., 2015; Kavanoz et al., 2015;

Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). Whereas it could be easy to transfer codified knowledge through e-pedagogies alone, the tacit version would be lost in the process because it is vested with the teacher and it therefore requires face-to-face contact to be experienced by the receiver (Storper & Venables, 2004; Smedlund, 2006; Bramwell & Wolfe, 2008; Hong, 2008; Rosenthal & Strange, 2008; Youtie & Shapira, 2008; Marginson, 2010; Halverson et al., 2014; Park & Jo, 2014; Porter et al., 2014; Boschman et al., 2015; Orr & Kukner, 2015; Park et al,. 2016). For this reason, it is crucial to distinguish the different constructs that inform the e-learning environment and effective participation therein.

For this reason, it is always important to adopt blended learning to incorporate various techniques and approaches, rather than exclusive reliance on one or the other model (Subramanian et al., 2012; Littlewood et al., 2013; Halverson et al., 2014; Park & Jo, 2014; Porter et al., 2014; Boschman et al., 2015; Hanus & Fox, 2015; Orr & Kukner, 2015; Wolff et al., 2015; Park et al., 2016). However, incorporating techniques such as “gamification”, “pause procedures”, “team-based” activities, “case-based scenarios”, “role-play and commitment-generating exercises” (Subramanian et al., 2012; Littlewood et al., 2013; Boschman et al., 2015; Hanus & Fox, 2015; Kavanoz et al., 2015; Orr & Kukner, 2015; Wolff et al., 2015; Park et al., 2016) into traditional designed-didactic sessions may entail additional time, energy and resources, which the institutions and teachers may not be willing to invest (Button et al., 2014; Orr & Kukner, 2015; Gu et al., 2015; Ninlawan, 2015; Hung, 2016; Park et al., 2016). Therefore, infrastructure is not necessary a sufficient rather a necessary condition for the adoption of blended learning.

3.5. Conclusion

This chapter confirmed that blended learning involves the integration of conventional didactics with e-learning for effective knowledge acquisition among learners which takes place either online and/or offline. However, successful adoption of blended learning depends on the integration of three knowledge domains, which are: technological knowledge, pedagogical knowledge and content knowledge. Additionally, teachers’ and learners’ attitudes and self-efficacy are necessary to determine their perceptions, competence and usefulness of technology for knowledge transfer and acquisition. The depth of inquiry and different categories of the levels of blending were also discussed in the chapter which are key in learning that promotes innovation, adaptability, flexibility, and creative mindsets. Therefore, the teachers' mandate is to teach creatively and teach for creativity using online and offline learning environments. Most importantly, it is vital to understand the models, approaches and principles of blended learning in order to avoid its misconception and the replacement of conventional didactics with e-learning instead of blending. The subsequent chapter discusses the international experiences of planning and governance as well as the preconditions of blended pedagogies with a specific focus on selected countries per HDI group in order to provide a surrogate for measuring South Africa's positioning in the knowledge economy as well as the national development performance within global capitalism and knowledge economy.

Chapter 4
Planning and Governance for Blended Pedagogies: The International Experiences

4.1. Introduction

Development in the world is currently knowledge-based, largely dependent on the exchange of information for participation in the knowledge economy and national development. As a result, countries that are equipped with technology and knowledge find it easy to participate in the "new electronic world" and tend to be the main players in its "socio-cultural and economic developments" (Guemide & Benachaiba, 2012; Valtonen et al., 2015; Webster & Son, 2015; Yilmaz et al., 2015). The advent of computer and internet technologies has brought continuous and rapid developments in technology-based applications for many people, organizations and institutions worldwide (Teo, 2011; Al-Mansour & Al-Shorman, 2012; Ertmer et al., 2012; Kirkwood & Price, 2013; Button et al., 2014; Pandey & Tiwari, 2014; Valtonen et al., 2015; Webster & Son, 2015; Yilmaz et al., 2015). The understanding of “society as a network” is due to the rapid growth in the use of computers and the “new technological paradigm” which is characterized by the high speed at which information and knowledge are generated, processed and shared (Castells & Cardoso, 2005 cited in Rolando, Salvador & Luz, 2013). Various Internet tools allow “access, processing and production of information available in text format, image, sound, data, multimedia and hypermedia documents, constituting an essential language of communication in contemporary society” (Lévy, 2001 cited in Rolando et al, 2013). Additionally, computer and internet technologies are the basis for the so called "e" phenomenon such as "e-communication, e-education, e-trade, e-health and e-business", among others (Yilmaz et al, 2015: 290). Thus, ICT has changed the way people communicate, buy, sell, network, seek jobs and learn, among other transformations (Pandey & Tiwari, 2014).

International institutions such as the British Educational Communications and Technology Agency (BECTA), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the World Bank have made efforts to advise and promote the use of ICT in teaching and learning (Rolando et al., 2013; Button et al., 2014;

Pandey & Tiwari, 2014; Rolando, Salvador, Souza, A & Luz, 2014; Valtonen et al., 2015; Webster & Son, 2015; Yilmaz et al., 2015). As a response, both developed and developing countries have implemented public policies and plans aimed at increasing and improving the use of ICT in their teaching and learning (Rolando et al., 2013; Button et al., 2014; Pandey & Tiwari, 2014; Rolando et al., 2014; Valtonen et al., 2015; Webster & Son, 2015; Yilmaz et al., 2015). The policies for most of these countries involve providing high speed access to the Internet, procurement of hardware, software and other digital resources, as well as providing technical and pedagogical support to educational institutions inclusive of teachers' professional development (Button et al., 2014; Pandey & Tiwari, 2014; Valtonen et al., 2015; Webster & Son, 2015; Yilmaz et al., 2015). For participation in the knowledge economy, many countries are integrating ICT into education (Teo, 2011; Al-Mansour & Al-Shorman, 2012; Ertmer et al., 2012; Kirkwood & Price, 2013; Button et al., 2014; Pandey & Tiwari, 2014; Rolando et al., 2014; Valtonene et al., 2015; Webster & Son, 2015; Yilmaz et al., 2015). Seemingly, with the appropriate planning approaches and governance models, infrastructure as well as culture and skills required from both teachers and learners, ICT can bring aspired changes to education. Developed countries such as Australia, Canada, the United Kingdom and the United States of America have incorporated e-learning in education, relating to various curricula; however, complexities concerning computer and information literacy among both learners and teachers have hindered the advancement of the envisaged pedagogic efficacies (Button et al., 2014; Pandey & Tiwari, 2014; Rolando et al., 2014; Glušac et al., 2015; Valtonen et al., 2015; Wolff et al., 2015).

For the purpose of this study, the target population consists of South Africa and other fourteen selected countries. The selection of the countries was purely on the basis of their 2014 and 2015 rankings in terms of the Human Development Index (HDI). In terms of the 2014 and 2015 HDI rankings, the following countries were conveniently selected for discussions in this chapter: Australia, the Republic of Korea, and Poland with very high HDI; Algeria, Thailand and Brazil with high HDI; Vietnam and Zambia with medium HDI; and, Kenya with low HDI (United Nations Development Programme, 2014, 2015). According to the United Nations Development Programme (UNDP, 2015: 211), HDI is "a composite index measuring average achievements in three basic dimensions of human development – a long and healthy life, knowledge and decent standard of living”. The HDI of the fifteen selected countries inclusive of South Africa, categorized into four levels as very high, high, medium and low, was used for a significant degree of comparability in terms of their planning approaches, governance models, infrastructure, culture and skills for blended learning. The HDI categories are based on HDI fixed cut-off points, which are derived from the quartiles of distributions of component indicators. The cut-off points are HDI of “less than 0.550 for low human development, 0.550–0.699 for medium human development, 0.700–0.799 for high human development and 0.800 or greater for very high human development” (UNDP, 2015: 204).

Generally, the findings of this chapter reveal that the four levels of development are directly linked to the conception of developed and developing countries. Seemingly, countries with the very high and high development levels are developed countries whereas medium and low levels represent the developing countries. The classification of countries using the four HDI levels does not offer any unique development characteristics compared to the categorization which uses the concepts: developed and developing countries. The two classifications are interrelated and thus, for the purpose of this study countries in the very high and high, and, medium and low HDI group will be referred to as developed and developing countries, respectively. The analysis of the two categories of countries in relation to the planning approaches and governance models adopted as well as the infrastructure, skills and culture required for successful adoption and implementation of blended learning is important to determine South Africa’s chances of victory in modernizing education. Notwithstanding that the latter, which is categorized as a developing country, seems to be in the forefront of most African countries in terms of development. As a result of its development status in the continent, South Africa seems to assume that it is on the same development level with developed countries. Due to its high quality plans, South Africa awarded itself a space to compete with developed countries. Therefore, this chapter will theoretically determine if the level of development matters or not for the successful adoption and implementation of blended learning.

For the purpose of this chapter, nine countries were purposively selected to provide a backdrop against which the readiness of various nations and the appropriateness of their planning approaches, governance models, infrastructure, culture and skills for blended pedagogies are determined. The selected nine countries for this chapter represent the four different HDI groups and their discussions do not follow any rigid order. Therefore, the usage of these countries per HDI group in discussing and addressing different themes in the chapter depends on the availability of literature on the subject matters. This chapter consists of nine sections including the introduction and conclusion. As per selected nine countries according to their HDI rankings, the chapter is structured as follows: the second and third sections discuss the planning approaches and governance models, respectively. Whereas, the fourth and fifth sections discuss the tenets of conventional didactics and the principles of e-learning, respectively, in the sixth section, the precondition for blended pedagogies are discussed. The seventh section provides the diverse international experiences of the appropriateness of planning approaches, governance models, infrastructure, culture and skills for blended pedagogies. The prospects and challenges of blended pedagogies from both developed and developing countries are also discussed in the eighth section.

4.2. Planning Approaches adopted for Blended Learning

As already noted in chapter two, planning is based on certain norms and standards that seek to reduce future uncertainties, therefore, multiple approaches that can be adopted for the planning of blended learning in various countries. These approaches include economic planning, physical development planning, policy analysis and planning, interpretative planning and collaboration planning, among others. As per HDI group, various countries will be used to determine the commonly adopted approaches in order to identify similarities and differences in this regard and most importantly to juxtapose the appropriateness of South Africa’s planning approaches to blended learning. To fulfil the objectives of this section, seven countries are discussed across the four HDI groups: Australia, Poland and the Republic of Korea with very high, Thailand with high, Vietnam and Zambia with medium and Kenya with low HDI.

4.2.1. Very High Human Development Index Countries’ Planning Approaches

This sub-section discusses the planning approaches adopted by Australia, Poland and the Republic of Korea in order to establish the common approaches adopted by countries in this group as follows:

4.2.1.1. Australia

In Australia, the move towards blended pedagogies is driven by ICT related public policy which is currently governing the country in that regard. The Melbourne Declaration (Ministerial Council on Education, Employment, Training and Youth Affairs, 1999), Ministerial Statement on ICT in Australia (Ministerial Council on Education, Employment, Training and Youth Affairs & Ministerial Council for Vocational and Technical Education, 2008) and the Digital Education Revolution (2009) are in the forefront of the implementation of educational ICT in the country. Collectively, these policy documents outline the infrastructure, teacher skills, learning resources and governance that is required to enable the effective use of ICT within the Australian education system (Misko, Choi, Hong & Lee, 2004; Baker, n.d.; Baker, 2009; Bowman, Lawson & McKillup, 2016; Pleschová & McAlpine, 2016). The documents were in turn derived from the country's policies that are already in place and the international ICT initiatives (Baker, 2009; Blackley & Walker, 2015; Bowman et al., 2016; Pleschová & McAlpine, 2016).

The national ICT policy for schools related to pedagogies and digital content for online learning has identified four key elements which focus on the “achievement of high-quality learning outcomes”, “support for development of skills”, “involvement of learners as active participants” in their knowledge creation and acquisition as well as “fair access to the technology” (Misko et al., 2004; Baker, 2009; Department of Education and Early Childhood Development, 2009; Bowman et al., 2016; Pleschová & McAlpine, 2016). Both high quality and the appropriate digital content should be provided to both teachers and learners through learning environments that are technologically rich in order to enable new forms of teaching and learning, collaboration, innovation and effective communication (Baker, n.d.; Ministerial Council on Education, Employment, Training and Youth Affairs, 1999; Baker, 2009; Department of Education and Early Childhood Development, 2009). Australia has developed various strategies and plans aimed at supporting the implementation of e-learning which are informed by the ICT policies in place. Therefore, the country has adopted the policy analysis and planning approach to guide the development of its educational ICT which places the government at the forefront of implementation of blended learning.

4.2.1.2. Poland

The strategy for the development of the information society in Poland known as the Lisbon Strategy 2000-2010 which includes a comprehensive plan and policy for ICT development, outlines the vision and mission of the country with a forecast for 2020 (Ivan-Ungureanu & Marcu, 2006; Ministry of Interior and Administration, 2008; Grabowska & Ogonowska, 2013). The strategy, before being amended in 2005, consisted of two action plans namely the eEurope 2002 and the eEurope 2005. The eEurope 2002 aimed at leading Poland's citizens into “information civilization” in as many areas of their lives as possible, to support “social cohesion and build confidence” in the new technologies, whereas the eEurope 2005 is dedicated specifically to the development and implementation of e-government, e-business, e-health and e-learning (Ivan-Ungureanu & Marcu, 2006; Ministry of Interior and Administration, 2008; Runiewicz, 2008; Grabowska & Ogonowska, 2013; Truskolaska, Łuka, Toruj, Wrona & Smagowska, 2015). In 2005, the amended Lisbon Strategy and an additional strategy called the "i2010 - A European Information Society for Growth and Employment" were published in response to the identified challenges related to the adoption of ICT (Ivan-Ungureanu & Marcu, 2006; Ministry of Interior and Administration, 2008; Grabowska & Ogonowska, 2013). The letter "i" in the name of the latter strategy referred to information space, innovation, investments and inclusion in ICT initiatives with the main focus on e-government and e-learning (Ministry of Interior and Administration, 2008; Grabowska & Ogonowska, 2013; Truskolaska et al., 2015). From these European Strategies, Poland derived its ICT strategies and plans which influenced the development of e-learning in the country and apparently, the policy analysis and planning approach was adopted.

4.2.1.3. Republic of Korea

The rapid development of ICT in Korea and its fast penetration into public and private sectors emanate from the policy initiatives by the government (Misko et al., 2004; Lee, Yoon, & Lee, 2009; Hwang, Yang & Kim, 2010; Yoo, Han & Huang, 2012; Lee & Lee, 2015; Park et al., 2015; Webster & Son, 2015; Park et al., 2016). The Korean Government has adopted a three-pronged approach of intervention to rapidly develop ICT in the country. Firstly, the government has created the “right environment for the development of ICT” mainly by establishing “pro-market policies of liberalisation and privatisation of the ICT industry”. Secondly, it has intervened at the “non-market end of the supply chain” through the funding of the public internet backbone known as the Korean Information Infrastructure (KTI). Thirdly, the government has been involved at the “non-market end of the demand chain” by providing ICT training for about ten million Koreans inclusive of homemakers and those who are employed in government agencies, the army and schools (Misko et al., 2004; Lee et al., 2009; Yoo et al., 2012; Lee & Kim, 2015; Lee & Lee, 2015;). The role of government initiatives in Korea has been crucial to the rapid development of ICT in general, particularly to the promotion of e-learning (Misko et al., 2004; Lee et al., 2009; Hwang et al., 2010; Park et al., 2015; Webster & Son, 2015; Park et al., 2016). The Korean government has also developed specific plans to turn the country into an “information society” within a short period (Misko et al., 2004; Lee et al., 2009; Yoo et al., 2012; Lee & Kim, 2015). With the hope to "modernise and globalize", the Ministry of Education and Human Resources Development in the Republic of Korea made massive investments in educational ICT between 1978 and 2001. These investments were guided by "The Comprehensive Plan for Developing ICT Use in Education" and the "Brain Korea (BK21) Plan" which aimed at improving infrastructure in schools as well as providing teacher training and promoting research (Misko et al., 2004; Lee, Yoon, & Lee, 2009; Hwang et al., 2010; Lee & Lee, 2015; Park et al., 2015; Webster & Son, 2015; Park et al., 2016). The Brain Korea Plan involved a two-phase process in which the first phase (1999-2005) was considered so successful that the budget for the second phase (2006-2012) was increased (Misko et al., 2004; Lee eat al., 2009; Hwang et al., 2010; Lee & Lee, 2015).

The Closing Digital Divide Act of 2000 established the Korea Agency for Digital Opportunity and Promotion (KADO) as well as the Digital Divide Committee as part of the digital divide project wherein the latter committee was responsible for facilitating community participation (Misko et al., 2004; Lee eat al., 2009; Hwang et al., 2010; Lee & Lee, 2015). For the duration of the project, 500 000 primary and secondary school learners mainly from low-income families were given an opportunity to participate in extra-curriculum computer courses between the years 2000 and 2001 (Misko et al., 2004; Lee eat al., 2009; Hwang et al., 2010). Additionally, 50 000 low-income learners particularly with good grades received free personal computers with a free five-year internet subscription (Misko et al., 2004; Lee, Yoon, & Lee, 2009; Hwang et al., 2010; Lee & Lee, 2015). During the same time, the government body that oversaw education in Korea changed its name from the Ministry of Education and Human Resources

Development to the "Ministry of Education, Science and Technology (MEST)" in order to reflect the growing interests in educational technology (MEST, 2009). The success of Korea's ICT sector is largely due to the policy interventions that the government has adopted with the key goal being to promote universal access to technology. Thus, for the development of ICT and the implementation of e-learning, the Korean government has adopted and mainly drives policy analysis and planning as well as community development planning approaches.

The planning experiences from Australia, Poland and the Republic of Korea, generally suggest that most countries in the very high HDI group adopt the policy analysis and planning approach for planning of the implementation and adoption of blended learning. It appears that countries such as Poland based their planning on the continental ICT policies in order to address their educational needs through the adoption and implementation of blended learning. Therefore, the country relied on and was guided by international policies. Both Australia and the Republic of Korea, derived their e-learning and/or blended learning policies from the national ICT policy. These national ICT policies identified education as the most important sector that could prepare and drive the nation towards developing 21st century skills necessary for their participation in the knowledge economy. Notwithstanding that the planning focus of most of these countries is on the provision of an ICT infrastructure and teachers' skills development, they still hope for the successful adoption of and implementation of ICT within the education sector despite providing already providing the necessary infrastructure. This practice conforms to the theoretical findings revealed in chapter two which confirmed that most countries seem to focus on the provision of infrastructure more than any other precondition such as planning as well as governance and thus, countries in the very high HDI group are not an exception.

4.2.2. Planning Approaches for Countries with High Human Development Index

To understand the planning approaches adopted by countries in the high HDI group, Thailand was selected and its experiences were discussed as follows:

4.2.2.1. Thailand

ICT implementation in Thailand across various sectors was formally initiated in 1992 when the government set up the National IT Committee, a high level policy body that is chaired by the Prime Minister (Saekow & Samson, 2011; Khlaisang & Likhitdamrongkiat, 2015; Ninlawan, 2015; Pruet et al., 2016). One of the key responsibilities of the National IT Committee was to develop a number of policies and plans that are used as frameworks and guidelines to govern ICT development in the country (Saekow & Samson, 2011). The policies and plans include the National IT Policy called IT 2000, the second ten-year phase of national IT policy or IT 2010, the Thailand ICT Master Plan Issue 1 (2002-2006) and the Second ICT Master Plan (2009-2013). With the IT 2000, the goal of the National IT Committee was to ensure that the country utilized ICT to “achieve economic prosperity and social equity” (Saekow & Samson, 2011; Khlaisang & Likhitdamrongkiat, 2015; Ninlawan, 2015; Pruet et al., 2016). This policy had three main objectives namely: “building an equitable national information infrastructure”, “investing in human resources to accelerate the supply of ICT manpower and developing an ICT literate workforce” and “achieving good governance through the use of ICT” (Saekow & Samson, 2011; Khlaisang & Likhitdamrongkiat, 2015; Ninlawan, 2015). Although many development programs were achieved under IT 2000 policy, those concerning human resources and government sector were still incomplete. One crucial project worth mentioning is called the “Schoolnet Thailand” which was aimed at empowering all schools by giving them access to a large pool of online information resources and using the Internet without access charge regardless of where they are located (Saekow & Samson, 2011; Pruet et al., 2016). The implementation of “Schoolnet Thailand” resulted in several thousand schools being connected to the Internet and the initiation of programmes and activities necessary to promote the use of Internet for teaching and learning.

The IT 2010 was established in order to exploit the benefits of ICT necessary to move Thailand to a “knowledge-based society and economy”. The development focused on the good use of ICT that would drive overall national economic and social development by “building human capital”, “promoting innovation”, and “investing in information infrastructure meant to promote the information industry” (Saekow & Samson, 2011). To achieve these goals, five main flagships were identified which included “e-Society”, “e-Government”, “e-Commerce”, “e-Industries”, and “e-Education” (Saekow & Samson, 2011; Khlaisang & Likhitdamrongkiat, 2015; Ninlawan, 2015). The e-Education flagship covered issues concerning life-long learning, computer literacy, human resource development, virtual education as well as creation of useful information, content and knowledge, among others (Saekow & Samson, 2011). As a result of some of its unfulfilled objectives, the IT 2010 plan bore the Thailand ICT Master Plan Issue 1 (2002-2006) wherein the latter hoped to close the digital divide, continuously develop human capacity and link policy with practice. Additionally, the Second ICT Master Plan (2009-2013) which is both a tool and an opportunity for increasing the competitiveness of Thailand was developed by the National IT Committee (Saekow & Samson, 2011; Khlaisang & Likhitdamrongkiat, 2015; Ninlawan, 2015; Pruet et al., 2016). Its focus was on “developing ICT human resources;” “developing high speed ICT networks”; and “developing good governance frameworks” for national ICT inclusive of e-learning in the country (Saekow & Samson, 2011; Ninlawan, 2015). Additionally, as part of the One Tablet Per Child Policy of 2012, the Ministry of Education has distributed 800 000 Tablet computers to learners which are installed with a range of learning contents (Ninlawan, 2015; Pruet et al., 2016). The content in the Tablets is meant to develop learners’ creativity and innovation abilities in an attempt to build their 21st century skills. Therefore, from the country’s ICT planning experiences, it is clear that Thailand has adopted a policy analysis and planning approach which in this case gives the state planning control of educational ICT over other institutions.

From the national ICT policies, Thailand has developed plans and strategies that have been adopted to ensure its participation in the knowledge economy. Thailand’s experiences points out that for countries in the high HDI group, policy analysis and planning is adopted as the most common approach towards the implementation of e-learning and/or blended learning. The countries in this HDI group depend on their national ICT policies mostly developed by the government in order to address the needs of their citizens through educational technology. The planning approaches adopted by the countries in this HDI group are similar to the one embraced by very high HDI countries, both categorized as developed countries.

4.2.3. Countries with Medium Human Development Index’s Planning Approaches

Vietnam’s and Zambia’s e-learning and/or blended learning planning experiences are used to represent countries in the medium HDI group and their discussions are as follows:

4.2.3.1. Vietnam

In order to rapidly improve ICT implementation across the country, including in education, Vietnam's ICT national plan highlights the expansion of technological implementation and training especially in colleges and universities (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). Moreover, the plan appeals for the evaluation of current educational ICT programmes and the removal of low-impact training mostly offered to teachers in preparation of blended learning implementation (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015) which do not contribute much to improving their Technological Pedagogical Content Knowledge. Specifically, this plan must be implemented in two main steps which include the development of new curricula at all levels of education and the consideration of blended learning and teaching of all advanced ICT-focused training in English in order to comply with the goal of improving language expertise in the country (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). The plan hopes to meet demands for "IT human resources and to promote the socio-economic development of the country as well as to meet the demand for educational reform in terms of innovation in content, teaching and learning methods, as well as in educational management" (UNESCO, 2013: 61). Seemingly, Vietnam's experiences of planning for the implementation of e-learning and/or blended learning suggests that the country has adopted the policy and analysis planning approach.

4.2.3.2. Zambia

The National e-Learning Strategic Plan that has been developed by the Ministry of Education promotes the development of an ICT infrastructure in technical and vocational education and training (TEVET) institutions (Ministry of Education, 2010; Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy, Lord, Cross, Jackson & Simpson, 2011; Annie, Ndhlovu & Kasonde-Ng'andu, 2015). The plan outlines a number of objectives which include making ICT infrastructure available and fully integrated and effectively functional throughout Zambia, applying e-learning in all learning and socio-economic activities as well as pledging the government's explicit commitment to the establishment of e-learning throughout the country (Ministry of Education, 2010). To practically realise the objectives, the Zambian government together with international stakeholders such as the Asian Development Bank, Malawi Innovation Challenge Find and Endeva, among others, initiated the iSchool project which delivers the Zambian National Curriculum online with the hope of changing the teaching methods that are used in schools by delivering exciting and hands-on knowledge acquisition to learners, regardless of their age, ability and location as well as providing necessary teacher training (Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011). The project uses interactive e-learning that relies on ICT as a delivery mode in order to enhance productivity of the country's workforce and thus provide computers, netbooks and/or Tablets as well as Internet connectivity to selected schools (Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011). The country had developed its own National e-Learning Strategic Plan to respond to the needs of the 21st century learners and further adopted collaborative planning approach for the delivery of e-learning infrastructure and the development of skills among teachers and learners.

The experiences from Vietnam and Zambia reveal that countries in the medium HDI group adopt various planning approaches for the adoption and implementation of e-learning and/or blended learning. Respectively, policy and analysis and collaborative planning approaches were adopted in Vietnam and Zambia. For Zambia, perhaps the adoption of collaborative planning, especially with international organizations, suggests that the country accepts that it needs support for the successful implementation of blended learning. As a developing country, it also needs to learn from developed countries hence the partnership with well-developed and established organizations. However, although still a developing country, Vietnam adopted the most common planning approach that most countries in the Very high and high HDI group prefer. Thus, Vietnam believes that by following in the foot-steps of the developed countries in planning for the adoption and implementation of e-learning and/or blended learning, success is guaranteed. Generally, the variation in the adopted planning approaches for countries within the medium HDI group confirms the uniqueness of the countries' resources, infrastructure and skills necessary for blended learning.

4.2.4. Low Human Development Index Countries' Approaches of Planning

Kenya is used as an example to represent countries with low HDI and its planning experiences for blended learning are discussed as follows:

4.2.4.1. Kenya

Various legislations in Kenya, inclusive of the Science and Technology Act, Cap. 250 of 1977, the Broadcasting Corporation Act of 1988 and the Communications Act of 1998, consider ICT adoption for national development (Ministry of Information & Communications, 2006). In response to the legislation, the New Partnership for Africa's Development e-Africa Commission has been implementing the New Partnership for Africa's Development (NEPAD) e-School project since 2003 in 17 African countries including Kenya, among others (NEPAD e-Africa Commission, 2009; Onderi, Ajowi & Malala, 2013; Nyagowa, Ocholla & Mutula, 2014). The initiative provides a framework and a systematic approach for ICT integration in education on the African continent. The objectives of the e-School initiative are to "impart ICT skills to students in order to enable them to participate in the knowledge society, enhance teachers' capacities through the use of ICT in teaching, and improve school management and increase access to education" (NEPAD E-Africa Commission, 2009 cited in Nyagowa et al., 2014: 236). Through this initiative, NEPAD estimated that by 2008 and 2013, all youth who complete their studies from an African high school and primary school respectively, would be ICT literate (Onderi et al., 2013; Nyagowa et al., 2014). The common ideological framework behind the deployment of e-learning in Kenya is to "increase productivity in schools, impart teamwork skills and lifelong learning habits among learners and deal with the dual task of both increasing access to school and improving quality of teaching" (Nyagowa et al., 2014: 236). To realise the goals set by the National ICT Policy multiple stakeholders inclusive of the private sector headed by the Ministry of Education, Science and Technology as well as the NEPAD e-Africa Commission collectively planned for the implementation of blended learning within various educational institutions (Ministry of Education, Science and Technology, 2004; Onderi et al., 2013). Therefore, for planning of blended learning, Kenya has adopted both collaborative as well as policy and analysis planning approaches.

Lessons can be drawn from the Kenyan planning experience that given the country's level of development, partnerships especially from organizations of developed countries, are needed for their guidance and sharing of experiences of planning for successful implementation of blended learning. Thus, developing countries with a low

HDI tend to adopt a variety of models for the governance of successful adoption and implementation of blended learning which is an expectation for South Africa.

4.3. Governance Models for Implementation of Blended Learning

Governance within and beyond the state focusses on non-hierarchical coordination modes and the involvement of non-state stakeholders in the formulation and implementation of public policies and plans for development. Therefore, the participation of both state and non-state stakeholders is supposed to improve quality of public policies and effectiveness of their implementation for blended learning. As revealed in chapter two, there are three models of governance that deal with institutional processes and rules for authority decision making, informed by different stakeholders, specifications and norms namely: the monocentric, multilevel and adaptive models. Monocentric governance is referred to as a model in which the state is at the centre of political power and authority and that has control over society, economy and resources (van Kersbergen & van Waarden, 2004; Kok & Veldkamp, 2011; Termeer et al., 2010; Pereira & Ruysenaar, 2012; Stojanovska et al., 2014). The multilevel governance model asserts that policy and administration starts internationally, then infiltrating down to and between different policy and administrative levels. The adaptive governance model is an integrated, multidisciplinary approach meant to confront complex and uncertain natural resources issues (Pereira & Ruysenaar, 2012; Stojanovska et al., 2014). Therefore, this sub-section discusses the governance models which are adopted by nine countries across the four HDI groups inclusive of Australia, Poland and Republic of Korea with very high HDI, Algeria, Thailand and Brazil with high HDI, Vietnam and Zambia with medium HDI as well as Kenya with low HDI.

4.3.1. Models of Governance for Countries with Very High Human Development Index

To represent countries with the very high level of development Australia's, Poland's and the Republic of Korea's governance models are discussed. The discussion hopes to uncover the governance models adopted by these countries specifically for blended learning.

4.3.1.1. Australia

The Australian governance of educational ICT is within and beyond the state with the involvement of non-state stakeholders in the formulation and implementation of public policies and plans for development in this regard (Clarke, 2004; Misko et al., 2004; Baker, n.d.; Baker, 2009; Department of Education and Early Childhood Development, 2009). The participation of both state and non-state stakeholders is believed to have positive effects on both the quality of educational ICT policies and the effectiveness of their implementation in teaching and learning environments (Clarke, 2004; Misko et al., 2004; Baker, n.d.; Baker, 2009; Blackley & Walker, 2015). Hence, Australia has adopted the adaptive model for the governance of the country's educational ICT based on the evidence that it has been improving its policies and plans for e-learning since 1999 until 2008 (Ministerial Council on Education, Employment, Training and Youth Affairs, 1999; Ministerial Council on Education, Employment, Training and Youth Affairs & Ministerial Council for Vocational and Technical Education 2008; Clarke, 2004; Misko et al., 2004; Baker, n.d.; Baker, 2009; Department of Education and Early Childhood Development, 2009; Blackley & Walker, 2015). In addition to the changing policies and plans due to unexpected challenges, the Australian government in partnership with business have a number of initiatives that also assist in the governance of e-learning in schools. The initiatives include the Victorian Essential Learning Standards, ePotential ICT Capabilities Resource, School ICT Progression Strategy and Ultranet, among others which mostly focus on support of e-learning, development of both teachers' and learners' technology skills as well as the use of technology (Department of Education and Early Childhood Development, 2009).

4.3.1.2. Poland

The governance model adopted for the implementation of blended pedagogies determines their success. In Poland, a single government centre under the Ministry of Interior and Administration was developed and tasked with the management, promotion, development and supervision related to ICT advancements in the country (Ministry of Interior and Administration, 2008; Runiewicz, 2008; Grabowska & Ogonowska, 2013; Truskolaska et al., 2015). The responsibility to plan, coordinate and supervise the implementation of the objectives of the Strategy for the Development of the Information Society in the country lies with that centre. In its implementation plan, the tasks and scope of responsibilities of concerned departments and relevant government officials from national, regional and local levels will be also be outlined (Ministry of Interior and Administration, 2008; Runiewicz, 2008; Grabowska & Ogonowska, 2013). The development of the Strategy for the Development of Information Society in Poland was preceded by a series of highly extensive consultations with various stakeholders and experts who represented institutions and organizations that are in fact illegible to express their views on ICT related matters (Ministry of Interior and Administration, 2008; Grabowska & Ogonowska, 2013; Truskolaska et al., 2015). However, the outcomes from their consultations were only visibly incorporated by the Polish Government in the development of the vision and core principles of ICT specifically for e-learning rather than for governance purposes. Therefore, Poland adopted the monocentric model for the governance of the integration of e-learning with conventional didactics in the country.

4.3.1.3. Republic of Korea

In Korea, the fast development of e-learning has been a result of the rapid development of ICT that is mainly supported and funded by the government through a number of its adopted ICT policies and plans (Misko et al., 2004; Lee et al., 2009; Hwang et al., 2010; Yoo et al., 2012; Park et al., 2015; Webster & Son, 2015; Park et al., 2016). However, more precise, the rapid diffusion and growth of e-learning in the country is attributable to specific government policies meant to develop, boost and promote e-learning. Additionally, a specific set of government policies and plans adopted by the Ministry of Education and Ministry of Labour with the goal of developing human resources for participation in the knowledge economy have also been influential in ICT advancements (Misko et al., 2004; Lee et al., 2009; Hwang et al., 2010; Lee & Kim, 2015; Park et al., 2015; Webster & Son, 2015). Blended learning in Korea has been driven by strong cooperation among three government key players namely: the Ministry of Education, Science, and Technology, Korea Education and Information Service, and sixteen Metropolitan Provincial Offices of Education (Misko et al., 2004; Lee et al., 2009; Hwang et al., 2010; Yoo et al., 2012; Park et al., 2015; Webster & Son, 2015; Park et al., 2016).

The Ministry of Education, Science, and Technology is the body responsible for the processes related to educational ICT policy making and its implementation, whereas the Korea Education and Information Service plays an exclusive role in supporting and developing the implementation strategies and plans of the National educational ICT policy (Misko et al., 2004; Lee et al., 2009; Hwang et al., 2010; Park et al., 2015; Webster & Son, 2015; Park et al., 2016). The latter is tasked with the development of the “guidelines for content development, and quality evaluation, monitoring progress of government initiatives and performance analysis” (Misko et al., 2004; Lee et al., 2009; Hwang et al., 2010; Park et al., 2015; Webster & Son, 2015; Park et al., 2016). The sixteen Metropolitan Provincial Offices of Education autonomously implement national ICT policy in order to achieve the goals that regional schools and learners would expect to attain in terms of quality education and social inclusion by providing equal opportunities for learners in their regions (Hwang et al., 2010; Lee & Kim, 2015; Park et al., 2015; Webster & Son, 2015; Park et al., 2016). Clearly, educational ICT in South Korea is governed through major policies developed and implemented solely by the government. The lack of or limited involvement of the private sector and other non-governmental organizations suggests that Korea has adopted the monocentric model for the governance of blended learning.

Generally, countries with a very high level of development adopt the monocentric model for the governance of e-learning and/or blended learning. Both experiences from Poland and Republic of Korea confirm that the state is in charge of the implementation of blended learning. For countries with the highest level of development, the adoption of monocentric governance in dealing with blended learning suggests that the government has all the necessary resources needed in this regard and therefore, does not necessarily need the contributions of non-state organizations. A top-down strategy which relies on the government’s identification of areas of concern addressed by policies and plans for action is adopted. However, for Australia an adaptive model seemed to be appropriate for the governance of blended learning. The model allows the country to make changes and adjustments due to the changing circumstances around blended learning.

4.3.2. High Human Development Index Countries’ Models of Governance

In order to have a general understanding of the governance models adopted by countries in the high HDI group to juxtapose South Africa’s appropriate models and readiness for implementation of blended learning, Algeria, Thailand and Brazil’s experiences are used for the discussion.

4.3.2.1. Algeria

The integration of e-learning with conventional didactics lacks strategic planning and effective policies to set clearly defined goals; nor does it allow for discussion or organisation of possible processes of integration and consultation with various stakeholders and participants in this process to better avoid particular challenges (Guemide & Benachaiba, 2012; Ghomari, 2015). The Ministry of Posts, Information Technology and Communications (MPTIC) in Algeria, has been mandated by the government to implement and manage the national ICT policy (Guemide & Benachaiba, 2012; Ghomari, 2015). In 2000, the first important ICT policy drafted was concerned with the creation of the regulatory authority for post and telecommunications, and the split of Algeria Posts and Telecommunications into two state-owned companies, the incumbent telecom and post operators named Algeria Telecom and Algeria Poste, respectively, with the intention of speeding up ICT development (Guemide & Benachaiba, 2012; Ghomari, 2015). Simultaneously, the government has also secured collaboration with a number of international agencies in order to develop the ICT status in the country (Guemide & Benachaiba, 2012; Ghomari, 2015). For an enabling environment, improved access and affordable ICT for all, the World Bank collaborated with the Ministry of Post IT in order to develop and also implement projects in that regard (Guemide & Benachaiba, 2012; Ghomari, 2015). Therefore, Algeria seems to have adopted the multilevel model for the governance if it’s blended learning.

4.3.2.2. Thailand

The national ICT policies together with their master plans have been the key frameworks and guidelines that govern ICT development in Thailand. The Ministry of Education has initiated a policy to govern the adoption of ICT in education, inclusive of “IT connectivity and high quality digital learning and teaching materials” (Saekow & Samson, 2011; Ninlawan, 2015). For strengthening of innovative ways for the adoption of blended learning at all education levels, universities, schools, and various educational institutions are working together. The Commission on Higher Education under the Ministry of Education has developed the e-learning web portal called “Thailand Cyber University” project which is a “web portal for online courses” where various universities, schools and institutions can offer their e-learning courses, share information and communicate with others (Saekow & Samson, 2011). Through the

Thailand Cyber University, a web-based Learning Management System, a number of educational institutions currently offer thirty comprehensive online degree courses and hundreds of training courses. Although the Commission on Higher Education has made efforts to encourage educational institutions to adopt blended learning in their curricula, many of them still do not have e-learning adoption readiness and governance strategies such as policies, legislative frameworks and technology (Saekow & Samson, 2011; Ninlawan, 2015). Therefore, the necessary components necessary to enhance blended learning such as connectivity, capability, contents and culture still need to be well clarified, prepared and governed. Given the Thailand educational ICT background, a monocentric model of governance is adopted as the state is in charge of the policies and strategies governing blended learning.

4.3.2.3. Brazil

In the current society based on the large movement of information and knowledge, through information and communication technology, a policy of continuing education for the use of technology in the educational process is necessary in Brazil (Rolando et al., 2013; Rolando et al., 2014; Garbin et al., 2015). The Brazilian Ministry of Education established a department known as the Capes (Brazilian abbreviation for Coordination for the Improvement of Higher Level Personnel) responsibly for the implementation of e-learning in the country since 2007 (Rolando et al., 2013; Bujokas & Rothbeg, 2014; Rolando et al., 2014; Garbin et al., 2015). The Capes' Directorate of Elementary Education is funding innovative and creative approaches through programmes conceived to change poor educational performance in the country (Bujokas & Rothbeg, 2014; Rolando et al., 2014; Garbin et al., 2015). Furthermore, Rolando et al. (2013: 46) assert that “Resolution CNE/CP No. 1/2002 of the National Council of Education suggests that qualifying for the teaching activity should include the use of information and communication technologies”.

In support of the Resolution, Brazil’s National Conference on Education recently emphasized the importance of e-learning as well as the effect of a policy of “Teacher Education Program” for the use of technology by in-service teachers in preparation for technological knowledge transfer to learners (Rolando et al., 2013; Rolando et al., 2014). To speed up the implementation of blended learning, the Brazilian science and technology policies are implemented by providing low cost access to high speed internet and the distribution of personal computers or Tablets to both teachers and learners through the Capes (Rolando et al., 2013; Bujokas & Rothbeg, 2014; Rolando et al., 2014; Garbin et al., 2015). Even though the provision of internet and computers or Tablets is not yet standardized throughout the country, the Capes' recent actions include extensive funding for providing access to Internet and computers to almost all Brazilian schools within a short period of time (Rolando et al., 2013; Bujokas & Rothbeg, 2014; Rolando et al., 2014). The governance of e-learning by the state within higher education institutions and schools aimed at the implementation of blended learning suggests that Brazil has adopted the monocentric model. Seemingly, the government without the intervention of the private sector is in control of the implementation of blended learning in the country.

Like with countries in the very high HDI group, a monocentric model seems to be the most appropriate for the governance of blended learning in countries with a high level of development. In Thailand and Brazil the decision making authority is the government and the management of blended learning developments is also its the responsibility. By contrast, Algeria adopted the multilevel approach which promotes interactions among governments and the private sector collectively operating between various administrative levels. Algeria's adoption of the multilevel model confirms the government's recognition and acceptance that successful blended learning requires the involvement of various stakeholders at different levels notwithstanding their development levels. Therefore, South Africa too should draw lessons from developed countries such as Algeria if it wants to succeed in the adoption and implementation of blended learning.

4.3.3. Governance Models for Countries with Medium Human Development Index

For analysis of the governance models adopted by countries in the medium HDI group, experiences in Vietnam and Zambia are discussed in the succeeding sub-sections.

4.3.3.1. Vietnam

In 2001, Vietnam officially recognized the need to improve IT competencies primarily through the implementation of blended learning (Thanh, 2010; Peeraer & Van Petegem, 2015). The Ministry of Education and Training in the country has encouraged the adoption and implementation of technology-based learning in order to realize the targets outlined in the national ICT plan (Thanh, 2010; UNESCO, 2013; Peeraer & Van Petegem, 2015). In order to achieve its responsibilities associated with national education planning and initiatives, the Ministry of Education and Training of Vietnam has collaborated with international organizations such as United Nations Educational, Scientific and Cultural Organization (UNESCO) to improve access and implementation of e-learning in the Vietnamese education (UNESCO, 2013). The Ministry of Education and Training launched the “Year of ICT” in 2008 which was dedicated towards producing a breakthrough in educational innovation by providing all schools with basic Internet access and funding several academic reviews of ICT policy and implementation (Thanh, 2010; Peeraer & Van Petegem, 2015).

During this period, the Vietnamese Telecom company known as Viettel got involved in the implementation of blended learning by providing Internet access to all schools in the country. As a result of the company’s contribution to educational ICT, by the end of 2012, all schools with stable electricity had been supplied with free Internet access (UNESCO, 2013; Peeraer & Van Petegem, 2015). Additionally, Intel contributed to the educational transformation by offering training programmes which consisted of a series of modules intended to train teachers to integrate basic ICT in their classrooms and further demonstrate how technology can serve as an effective tool in pedagogy (Thanh, 2010; UNESCO, 2013; Peeraer & Van Petegem, 2015). Although the state seems to be driving the blended learning initiatives through the Ministry of Education and Training, business and other organizations are also involved. The partnership between the state, business and non-governmental organizations suggests that Vietnam has adopted the adaptive model for the governance of blended learning.

4.3.3.2. Zambia

The ICT sector in Zambia is governed by a national ICT policy developed by the Ministry of Communications and transport that was adopted in 2006 (Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011; Annie et al., 2015). The policy provides opportunities to make a difference through education by adopting and using ICT as a tool to reduce the skills development and digital divide by increasing the chances of Zambian citizens to participate in the knowledge economy (Ministry of Communications and Transport, 2006). Consequently, educational ICT is an enabler through which an “information-centred society” can be developed wherein every citizen is able to create, access, utilize and share information and knowledge which leads to productive, competitive and sustainable economic growth necessary for poverty reduction in Zambia (Ministry of Communications and Transport, 2006; Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011; Annie et al., 2015). Thus, the ICT policy emphasizes the potential of ICT in improving the quality of education and training by the adoption and implementation of e-learning. In terms of the governance of the educational ICT and e-learning, the policy recognises the private sector as a key partner to government with a critical role to play in the development processes of Zambia in building an “information society” (Ministry of Communications and Transport, 2006). The private sector is expected among other things: “to serve as the key driver for the development of the Zambian economy by providing domestic and foreign investments in ICT services and infrastructure development; and facilitate the mobilisation of funding/investments to implement ICT initiatives outlined in the policy” (Ministry of Communications and Transport, 2006: 60). Therefore, the government has adopted the adaptive model of governance to be able to work closely with the private sector to develop implementation plans and strategies as well as to gather the necessary resources for e-learning.

Clearly, countries with a medium level of development prefer the adaptive model for the governance of the implementation and adoption of e-learning and/or blended learning. Both Vietnam’s and Zambia’s adoption of the adaptive model reveals that the countries are aware of their worlds which are characterised by continuous and unexpected changes mostly accompanied by unpredictable consequences. In most cases the changes are a result of the countries’ limited experiences, infrastructure, skills and culture for the implementation of blended learning. Thus, the countries have created a scope for flexibility to be able to make changes and adjustments in terms of their plans and resources for blended learning as they continuously learn from their experiences.

4.3.4. Low Human Development Index Countries’ Governance Models

In order to get an insight into the experiences of the countries in the low HDI group with regard to the governance for blended learning, Kenya’s practices and experiences are revealed as follows:

4.3.4.1. Kenya

The Kenya government appreciates and recognizes that for its country to participate in the knowledge economy, an ICT literate labour force is needed (Ministry of Education, Science and Technology, 2004; NEPAD e-Africa Commission, 2009; Onderi, Ajowi & Malala, 2013; Nyagowa et al., 2014). Therefore, the government has invested in efforts that ensure that education is used as a natural platform for providing the nation with ICT skills and so be able to build a sustainable economic growth (Ministry of Education, Science and Technology, 2004; Ministry of Information & Communications, 2006). These investments are driven by the National Information and Communication Technology Policy housed in the Ministry of Education, Science and Technology and it incorporates contributions made by various stakeholders (Ministry of Information & Communications, 2006; Ministry of Education, Science and Technology, 2004). In cases where there are partnerships for ICT development between the state and local and/or international organizations, this policy framework also ensures that Kenya fully benefits from the partnerships and Kenyan-led solutions are always given priority (Ministry of Education, Science and Technology, 2004). To facilitate rapid development of ICT skills in the country, the Ministry of Education, Science and Technology works with and coordinates other stakeholders in the establishment of ICT capacities across the country.

The education and training sector plays a major role in the implementation of the proposed ICT policy as the country depends on well-developed and competent human resources trained by this sector (Ministry of Education, Science and Technology, 2004; NEPAD e-Africa Commission, 2009; Onderi et al., 2013; Nyagowa et al., 2014). To realise the goals of the policy, the adoption of the New Partnership for Development (NEPAD) and its recommendations for ICT development were welcomed by the country. With multiple stakeholders headed by the Ministry of Education, Science and Technology, the NEPAD e-Africa Commission ensured the implementation of the e-School (Ministry of Education, Science and Technology, 2004). Collectively, the efforts of various stakeholders to provide adequate infrastructure as well as access, content, training of teachers at all levels of education were recognised in the national ICT policy (Ministry of Education, Science and Technology, 2004; NEPAD e-Africa Commission, 2009; Onderi et al., 2013; Nyagowa et al., 2014). For the governance of e-learning in the country, Kenya has adopted the adaptive model, which also takes into consideration the participation of various stakeholders at different levels.

Kenya's adoption of the adaptive model for governance of blended learning confirms that countries with medium and low level of development allow themselves to learn and make changes along the processes of implementing blended learning. Furthermore, the choice of governance model confirms that educational technology is a foreign phenomenon for the developing countries and as a result they are still working towards familiarizing themselves with it and its related practices. For a developing country like South Africa, an adaptive model seems to be appropriate for the governance of blended learning.

4.4. Tenets of Conventional Didactics in Developed and Developing Countries

Apparently, conventional didactics alone in this time of knowledge economy offer the level and standard of education that may deny learners the opportunities to compete in the knowledge economy arena. Chapter two revealed that traditional teachers' delivery of information to learners is criticised for reinforcing passive learning and suboptimal knowledge acquisition. As a result, these teaching methods do not equip learners with the 21st century skills necessary for the participation in the knowledge economy and national development. This section presents the tenets of conventional didactics in both developed and developing countries, once again representing very high and high, and, medium and low HDI groups, respectively. Experiences from four countries where each group is represented by two countries are discussed in the succeeding sub-sections.

4.4.1. Developed Countries' Tenets of Conventional Didactics

Conventional didactics experiences from Australia and Poland are discussed in order to provide an understanding of the practices in countries with both the very high and high levels of development.

4.4.1.1. Australia

Traditional face-to-face teaching methods are still dominant in education mainly because of the limited resources and congested curricula adopted in Australia (Aqda, Hamidi & Rahimi, 2011; Intarapanich, 2013; Blackley & Walker, 2015; Turbill, 2015; Pleschová & McAlpine, 2016). These methods have been used for teaching for many decades, and most teachers feel comfortable and confident in this way of teaching. For teachers who have not experienced other methods of teaching and learning other than the conventional didactics, it is difficult to implement e-learning because of not having full control of their classrooms - as it does not come naturally to many of them who were trained in the “chalk and board” method (Intarapanich, 2013; Blackley & Walker, 2015; Turbill, 2015). For these Australian teachers, the human face between them and their learners plays a very important role towards knowledge acquisition, however ineffective. Compared to e-learning, conventional didactics allow learners to be treated as human rather than “simply rational beings”, addresses teaching needs effectively taking into consideration habit, enthusiasm and identity, as well as “cognitive factors related to learning”, which can all be addressed in classrooms (Aqda et al., 2011; Intarapanich, 2013; Blackley & Walker, 2015; Turbill, 2015; Pleschová & McAlpine, 2016).

Seemingly, there are three functions that teachers fulfil in teaching and learning in Australia which include communicating, modelling, and motivating, which are comprehensively integrated into individual and group activities and regular feedback, with learners involved in active processes rather than passive knowledge transmission (Aqda et al., 2011; Turbill, 2015; Pleschová & McAlpine, 2016). Face-to-face classrooms, in turn, offer learners effective knowledge acquisition to and amongst learners as well as from the teacher. Learners are able to discuss current issues as they arise and also keep each other up-to-date with new knowledge in line with their area of study (Aqda et al., 2011; Intarapanich, 2013; Blackley & Walker, 2015; Pleschová & McAlpine, 2016). Ultimately, the face-to-face classrooms in Australia result in the formation of “community of learners “ who share their personal family and home life as well as teaching and learning experiences in their classrooms, something which the online environment cannot offer.

4.4.1.2. Poland

The conventional methods of teaching and learning which are mostly based on a teacher-learner model have impacted greatly on pedagogy over the past years (Plasschaert, Manogue, Lindh, McLoughlin, Murtomaa, Nattestad & Sanz, 2007;

Dobrzański & Honysz, 2008; Stasiecka, Stemposz & Jodłowski, 2008; Kok, 2009; Kiliçkaya & Krajka, 2010; Marcinek, Janbicka, Heino, Palmgren & Koidla, 2011. Półjanowicz et al., 2011; Zieliński, 2014). For many centuries, conventional didactics were the only methods of knowledge transfer and acquisition that maintained the existence of schools worldwide, inclusive of Poland (Plasschaert et al., 2007; Dobrzański & Honysz, 2008; Stasiecka et al., 2008; Półjanowicz et al., 2011). These conventional didactics usually include a combinations of teaching sessions, group discussions and laboratory practical sessions with most of the theoretical content presented in classrooms (Plasschaert et al., 2007; Stasiecka et al., 2008; Półjanowicz et al., 2011). In Poland, these traditional methods of teaching use learners' facial and body expressions to assess the way that they receive a lesson (Kok, 2009; Kiliçkaya & Krajka, 2010; Marcinek et al., 2011; Zieliński, 2014). Given the expressions, the teacher can respond instantly by elaborating more on facts which learners seem not to understand (Kok, 2009; Kiliçkaya & Krajka, 2010; Marcinek et al., 2011; Zieliński, 2014).

Additionally, learners can be questioned directly on what they were taught while their reactions and responses are used to assess their level of participation and understanding of the lessons delivered. If there is a need, a lesson can be rehearsed and repeated in order to respond to difficulties that learners brought to the fore (Kok, 2009; Kiliçkaya & Krajka, 2010; Marcinek et al., 2011; Zieliński, 2014). Unfortunately, the direct question-and-answer sessions do not necessarily give a true reflection of learners' understanding of the subject matter. However, conventional didactics are mostly considered to be cost-effective as the content is usually delivered to a large group of learners at once (Plasschaert et al., 2007; Stasiecka et al., 2008; Półjanowicz et al., 2011). Although conventional didactics still plays a crucial role in learners' knowledge acquisition in Poland, there is a need to improve education by using a combination of facilitation methods that emphasise learning skills and competence rather than just knowledge provision (Marcinek et al., 2011; Zieliński, 2014). This kind of transformation is bound to improve the country's participation in the knowledge economy for national development purposes.

4.4.2. Tenets of Conventional Didactics in Developing Countries

In order to have a general understanding of the tenets of conventional didactics in developing countries, Vietnam's and Zambia's experiences are discussed in the two subsequent sub-sections.

4.4.2.1. Vietnam

Generally, Vietnamese learners were regarded as usually "obedient, shy and unwilling" to question what they are taught in class (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). This passive learning style seems to persist even among learners who study at the tertiary level. Learners depend on teachers as their main source of knowledge whose facts cannot be questioned (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). The "passive, reproductive and surface" learning style seems to be a reflection of the Asian culture which requires obedience and respect to older people in high ranks (Tuyết, 2013). Therefore, teachers are also considered as the "fount of knowledge" whom learners should respect for the benefit of their own learning (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). The respect and obedience are meant to maintain a "sense of harmony" by not asking questions to challenge what has been delivered in class (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). In addition to the culture, the conventional didactics popularly known as traditional face-to-face teaching methods perpetuates passive learning. During the traditional classes, teachers remain the authority and teach learners while the former remain inactive and sometimes not even engaging in class activities (Tuyết, 2013). The culture and conventional didactics in Vietnam developed learners who acquire knowledge through 'learning and repeating" processes which do not encourage creativity, innovation, flexibility and adaptability (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). As a result, the Vietnamese learners produced through conventional didactics lack the 21st century skills which are associated with collaboration, creativity, innovation, flexibility and adaptability necessary for national development.

4.4.2.2. Zambia

Zambia is among a number of African countries that lack comprehensive class sets of teaching materials and infrastructure, specifically those which are in support of interactive and active learning (Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy, Lord, Cross, Jackson & Simpson, 2011; Annie, Ndhlovu & Kasonde-Ng'andu, 2015). As such, teachers usually choose to use conventional teacher-centred pedagogic methods which excessively rely on the "chalk and talk" to lecture, explain, discuss and/or tell a specific subject matter to learners. The use of "expository teaching methods" is common in Zambia where it involves "the provision of an explanation of a particular concept, thought or experience in the classroom context to a learner by the teacher with very little participation or involvement of the former" (Annie et al., 2015: 399). More often, these teaching methods promote "superficial learning" (Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011) and as such, fail to encourage productive interaction, innovation, flexibility, creativity and adaptability among learners or with their knowledge acquisition materials. During lessons, the role of learners is to sit and listen to the teacher, even if they did not understand the subject matter (Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011; Annie et al., 2015). Conventional didactics, therefore, do not offer necessary opportunities for Zambian learners to develop their intellectual capabilities and to also engage in critical thinking as well as active knowledge construction and acquisition in preparation for participation in the knowledge economy (Haßler, Hennessy & Lubasi, 2011; Annie et al., 2015). Although attempts have been made to enhance teacher education programs with more interactive, innovate, creative and collaborative pedagogies, classroom practice rarely reflects the new approaches.

Generally, experiences from both developed and developing countries confirm the theoretical claim that conventional didactics promotes learners' passive rather than active knowledge acquisition. Additionally, these methods of teaching are teacher-centred and as a result promote active knowledge transfer to passive learners. Regardless of the level of development, evidence suggests that memorizing and repeating processes promoted by conventional didactics do not encourage creativity, innovation, flexibility and adaptability in education. More often, learners depend on teachers as their main source of knowledge whose facts cannot be questioned or interrogated and thus, leaving the former without 21^{st} skills associated with creativity, innovation, flexibility and adaptability. However, for developed countries such as Australia and Poland, conventional didactics do still play an important role in education. Experiences from Australia revealed that conventional didactics allow a platform wherein learners are treated as human rather than simply rational beings by addressing their educational needs effectively, taking into consideration their habit, enthusiasm and identity, as well as “cognitive factors related to learning”. In Poland, conventional didactics use learners' face and body expressions to assess the way that they receive a lesson which could be used to judge if ever they understand what has been taught or not. For some developed countries, conventional didactics are still necessary for effective learning whereas most developing countries seem to suggest that the adoption of e-learning can do better in education.

4.5. Experiences of e-Learning Pedagogies: Are they Worth the Investments?

As already noted in chapter two, e-learning pedagogies are guided by a number of principles to ensure their successful implementation and appropriate contribution towards the national development through education and participation in the knowledge economy. The identified principles include: matching and integration of digital technologies with the existing curriculum, facilitation of learners’ engagement and participation, encouragement of collaborative learning, provision of innovative approaches, coherence, consistency and transparency as well as application. Using the application of the principles in various countries across the for HDI levels, experiences from nine countries are discussed to determine the success and contributions of e-leaning towards the development of 21st century skills.

4.5.1. Very High Human Development Index Countries’ e-Learning Pedagogies Experiences

Countries with a very high level of development are represented by e-learning experiences gathered from Australia, Poland and Republic of Korea respectively in the following sub-sections.

4.5.1.1. Australia

Although there are massive changes brought about by ICT in how people share, use, develop and process technology, the majority of teachers and learners in Australia are still not reaping the benefits of educational ICT (Clarke, 2004; Baker, n.d.; Baker, 2009; Department of Education and Early Childhood Development, 2009; Blackley & Walker, 2015). According to Baker (n.d.: 2), "knowledge about how students learn is essential if teachers are to create learning activities that are intellectually rigorous, use physical and online environment effectively, and are attuned to new ways of learning in the digital age". Generally, Australian teachers are familiar with constructivist theories of learning design; however, they find it difficult to apply the same theories to online learning activities (Clarke, 2004; Baker, n.d.; Baker, 2009; Aqda, Hamidi, & Rahimi, 2011; Blackley & Walker, 2015; Pleschová & McAlpine, 2016). In this case, the majority of teachers tend to resort to the behaviourist approaches for online teaching and learning (Clarke, 2004; Baker, n.d.; Baker, 2009) which relies on assumptions, observational learning and internal events such as thinking. In order to capacitate teachers with the necessary skills required for the implementation of effective e-learning, an appropriate introduction and outline of a range of learning theories for using ICT is usually offered. The Western Australian science teachers stated that although they felt more prepared to search the Internet and to use the email for personal communications they are not as yet ready to join collaborative online discussion groups or to design web pages (Aqda et al., 2011; Rolando et al., 2013; Pleschová & McAlpine, 2016). Unsurprisingly, teachers' use of the Internet for teaching and learning is mainly based on searching for information rather than on joining or creating collaborative online discussions groups with their learners (Aqda et al., 2011; Rolando et al., 2013; Blackley & Walker, 2015).

These declarations suggest that even in allegedly ideal conditions where all teachers and learners would have free access to individual computers, knowledge transfer by means of the digital technologies could still be based on searching for information on specific content (Aqda et al., 2011; Rolando et al., 2013; Pleschová & McAlpine, 2016). However, pre-service teachers with little experience in e-learning, respond better to its incorporation with conventional didactics. This is most likely as a result of enhanced attitudes and confidence to the use of ICT (Aqda et al., 2011; Pleschová & McAlpine, 2016). Generally, Australian teachers seem to have adopted e-learning but mainly by means of distributive tools like in many other countries. Seemingly, teachers still require assistance in understanding how learners acquire knowledge and how to teach them the the application of e-learning approaches to support them (Clarke, 2004; Baker, n.d.; Baker, 2009; Department of Education and Early Childhood Development, 2009; Blackley & Walker, 2015). Teachers still need to accept that e-learning must be learner-centred and take into consideration individual and group needs and interactions. Thus, connectivism and cooperative learning which take into account the new set of teaching and learning requirements brought by ICT in providing a basis for collaborative learning through the blended pedagogies (Clarke, 2004; Baker, 2009; Department of Education and Early Childhood Development, 2009; Pleschová & McAlpine, 2016) are approaches teachers need exposure to. Although e-learning presents new challenges for both teachers and learners, it also enables them to experience new forms of learning, innovation, collaboration and effective communication (Clarke, 2004; Baker, n.d.; Baker, 2009; Department of Education and Early Childhood Development, 2009; Blackley & Walker, 2015; Pleschová & McAlpine, 2016).

4.5.1.2. Poland

Observing the computerization of societies across the world, Poland also considered the adoption of educational ICT for knowledge sharing and acquisition (Plasschaert et al., 2007; Dobrzański & Honysz, 2008; Runiewicz, 2008; Stasiecka et al., 2008; Kok, 2009; Kiliçkaya & Krajka, 2010; Marcinek et al., 2011; Półjanowicz et al., 2011; Zieliński, 2014; Truskolaska et al., 2015). According to the Lisbon Strategy, the adoption of ICT in education and training should be able to promote life-long learning, improve the recognition of their qualifications as well as strengthen the country's participation in the knowledge economy (Grabowska & Ogonowska, 2013; Truskolaska et al., 2015). The implementation of e-learning in the country resulted in the increasing use of remote methods of education such as distance learning especially within the higher education sector (Półjanowicz et al., 2011; Truskolaska et al., 2015). Electronic methods of communication led to the development of online distance teaching methods wherein personal contact between the teacher and learners is unnecessary (Marcinek et al., 2011; Półjanowicz et al., 2011). The extensive use of digital technologies with an emphasis on learner-centred study has affected both the online and physical learning spaces (Plasschaert et al., 2007; Runiewicz, 2008; Marcinek et al., 2011; Truskolaska et al., 2015).

The new information technologies influence teaching and learning patterns and their evolution is reflected in the development of virtual learning environments (Kok, 2009; Marcinek et al., 2011; Półjanowicz et al., 2011; Zieliński, 2014). With the hope to promote learner-centred education, most universities in Poland have created a user-centred range of services including distance-learning programmes and facilities (Plasschaert et al., 2007; Dobrzański & Honysz, 2008; Runiewicz, 2008; Stasiecka et al., 2008; Kok, 2009; Kiliçkaya & Krajka, 2010; Marcinek et al., 2011; Półjanowicz et al., 2011; Zieliński, 2014; Truskolaska et al., 2015). However, the adoption of ICT is not intended to replace conventional didactics, but instead it is used as a strategy meant to complement the traditional way of knowledge transfer and acquisition with the hope of drawing learners' attention towards education by using technology (Dobrzański & Honysz, 2008; Runiewicz, 2008; Stasiecka et al., 2008; Kok, 2009; Kiliçkaya & Krajka, 2010; Marcinek et al., 2011; Półjanowicz et al., 2011; Zieliński, 2014). E-learning results from an interactive access to knowledge contained in e-resources through reading materials, lessons and assessment tasks that learners can refer to whenever the need arises (Plasschaert et al., 2007; Stasiecka et al., 2008; Kiliçkaya & Krajka, 2010; Półjanowicz et al., 2011; Truskolaska et al., 2015).

Compared to conventional learning, e-learning has the ability to provide satisfaction and efficiency in teaching and learning. Additionally, educational ICT allows learners to have control over their learning contents, sequence, pace and time as well as media which allows them to tailor their personal experiences to acquire knowledge (Dobrzański & Honysz, 2008; Runiewicz, 2008; Stasiecka et al., 2008; Kok, 2009; Kiliçkaya & Krajka, 2010; Marcinek et al., 2011; Półjanowicz et al., 2011; Zieliński, 2014). E-learning further allows teachers to repeat the same quality of education and processes without limitations of time, place and the number of learners involved (Dobrzański & Honysz, 2008; Stasiecka et al., 2008; Truskolaska et al., 2015). Therefore, Poland aims at integrating e-learning with conventional didactics denoted “b-learning” (blended learning) to improve learners’ technological skills and draw their attention towards education (Marcinek et al., 2011; Półjanowicz et al., 2011; Zieliński, 2014). However, e-learning has not as yet made significant changes in Polish education as it is still considered to be at a very early stage of development (Plasschaert et al., 2007; Dobrzański & Honysz, 2008; Runiewicz, 2008; Stasiecka et al., 2008; Kok, 2009; Kiliçkaya & Krajka, 2010; Marcinek et al., 2011; Półjanowicz et al., 2011; Zieliński, 2014; Truskolaska et al., 2015).

4.5.1.3. The Republic of Korea

One of the most significant changes in Korea in the field of education for participation in the knowledge economy is the paradigm shift from “teacher-centred” to “learner-centred” education (Lee et al., 2009; Lee & Kim, 2015; Park et al., 2015; Webster &

Son, 2015; Park et al., 2016). The emergence of the integration of e-learning with conventional didactics is meant to facilitate the wide adoption of learner-centred education and other essential changes in educational practices. The development of e-learning in South Korea was strongly related to the “rapid growth of its Information and Communications Technology (ICT) industry” and the need for educational transformation (Misko, Choi, Hong, & Lee, 2005 cited in Lee et al., 2009). Thus, high-quality e-learning services have been promptly developed due to the nation-wide telecommunication infrastructure and high-speed Internet (Lee et al., 2009; Yoo et al., 2012; Lee & Kim, 2015 Park et al., 2015; Park et al., 2016). As a result of its dense student population and high educational standards, South Korea’s investments in e-learning were very cost-effective. South Korea, for example, invested billions of US$ between 1978 and 2001 in ICT in order to “modernize and globalize the education system”, also changing the name of the Ministry of Education and Human Resources Development to the Ministry of Education, Science and Technology (Webster & Son 2015: 84). The Korean government has been one of the driving forces behind the rapid growth of e-learning.

In 2001, the “Law for Developing On-Line Digital Contents Industry” was endorsed to promote digital contents for education and the necessity to produce IT professionals in possession of the 21st century skills (Lee et al., 2009). Despite the fact that the country is one of the fastest growing in e-learning, it still does not do well in the adoption and implementation of blended learning (Lee et al., 2009; Lee & Kim, 2015; Park et al., 2015; Webster & Son, 2015; Park et al., 2016). But, as the South Korean experience demonstrates, years of investment in technological infrastructure in education ended-up with trained educators, seldom using ICT during face-to-face contact sessions due to the dearth of classroom implementation support and lack of time (Lee et al., 2009; Yoo et al., 2012; Lee & Kim, 2015; Park et al., 2015; Webster & Son, 2015; Park et al., 2016). Webster & Son (2015) and Park et al. (2016) report that in South Korea, where ICT resourcing in education is good, application has remained “very low” because most educators have low self-belief in their abilities and skills to use the technology in teaching and learning.

Although the majority of countries with a very high level of development have acknowledged the benefits of e-learning pedagogies; evidence suggests that the countries still face challenges in its adoption and implementation. In Australia, teachers seem to have mainly adopted e-learning by means of distributive tools such as computers and mobile devices like in many other countries. Although both Poland and the Republic of Korea have made significant investments in educational ICT, e-learning has not as yet made significant changes in these countries' education systems as they are still considered to be at a very early stage of development. Teachers still use the technology for personal fulfilment rather than the intended purposes. Seemingly, teachers in highly developed countries still require assistance in understanding how learners acquire knowledge for the application of e-learning approaches to support creative, innovative, collaborative, flexible and adaptable learning.

4.5.2. e-Learning Pedagogies: Illustrations from Countries with High Human Development Index

The experiences of e-learning pedagogies gathered from Algeria, Thailand and Brazil are discussed in order to provide a general understanding of the practices in countries with a high development level.

4.5.2.1. Algeria

E-learning was introduced into the Algerian education system as early as the 1990s (Guemide & Benachaiba, 2012; Ghomari, 2015). During its introduction phase, the government provided infrastructure such as hardware, computers, personal laptops and ICT labs to a large number of educational institutions (Ghomari, 2015). The aim behind the provision of the infrastructure was to be able to realize the benefits of teaching and learning through ICT by integrating e-learning with the curriculum. However, the integration of e-learning with conventional didactics did not succeed, mainly due to lack of teachers' Technological Pedagogical Content Knowledge. Most teachers who were supposed to adopt e-learning did not have any formal training or have received ineffective training which did not address their concerns and anxieties; while learners attended ICT overloaded theoretical courses which lacked the practical component. Instead of being a supporting initiative to teaching and learning, e-learning is a burden to its users. Ghomari (2015: 760) asserts that "teaching and learning is a tandem where psychological, pedagogical and cultural variables melt together imposing a kind of continual adjustment to balance between the evolving needs of learners and the requirements of the curriculum goals". Therefore, innovative approaches which proved to be able to provide effective and sustainable learning should be adopted in order to ensure "flexible access" to knowledge acquisition opportunities, "appropriate redesign of the learning environment" as well as consideration of underlying factors such as pedagogical, psychological and cultural influences in Algeria. The other challenge for teachers is to continuously "fine-tune" their teaching to learners' needs by adjusting their pedagogical approach to be able to empower learners through “knowledge construction and skill building" (Guemide & Benachaiba, 2012; Ghomari, 2015). The implementation of blended learning in Algeria enables teachers to meet learners' learning styles that should help the latter to be prepared for the workplace challenges by enhancing their competencies and skills. Therefore, responding to learners' needs prepares such learners to be "competitive in a fast-growing globalized world, and … to be the future national economic leaders in their respective economic sub-sectors" (Ghomari, 2015: 759).

4.5.2.2. Thailand

E-learning is an effective strategy adopted mainly to improve the quality of teaching and learning. Consequently, the integration of educational ICT with existing curricula can assist in supporting the transformation to a new learning pedagogy with the focus on student-centred approaches that enable students to learn in an innovative and creative way (Saekow & Samson, 2011; Atisabda, Kritpracha, Kaosaiyaporn & Pattaro 2015; Khlaisang & Likhitdamrongkiat, 2015; Ninlawan, 2015; Pruet et al., 2016). Blended learning provides the necessary environment and appropriate tools for “task oriented, up-to-date and continuous learning” (Saekow & Samson, 2011; Ninlawan, 2015). E-learning also enables organizations to train their “geographically scattered workforce” giving them 21st century knowledge and skills, with “greater efficiency at less cost” (Saekow & Samson, 2011; Pruet et al., 2016). Regarding the status of teaching with ICT in Thailand, teachers acknowledge the needs and benefits of implementing e-learning in schools. However, training teachers and then having teachers integrate e-learning in their teaching by themselves proved not to be working (Saekow & Samson, 2011; Atisabda et al., 2015; Khlaisang & Likhitdamrongkiat, 2015; Ninlawan, 2015; Pruet et al., 2016). Notwithstanding the training that the teachers received, the majority of them are still struggling to integrate e-learning with conventional didactics. As a remedy to this challenge, the Thai government and its responsible units must assist the teachers to successfully use ICT to improve their quality of teaching by taking on a holistic approach (Saekow & Samson, 2011; Atisabda et al., 2015; Pruet et al., 2016) which promotes innovation, creativity, adaptability and flexibility.

It appears, the approach adopted in Thailand does not include all the key critical factors which contribute to the success of e-learning development namely teachers, learners, educational institutes, regional policy, government policy, budget, leadership, community, change agents and professional development (Saekow & Samson, 2011; Khlaisang & Likhitdamrongkiat, 2015; Pruet et al., 2016). With the tablets that the Ministry of Education distributed to provide an ubiquitous teaching and learning environment, promote personalized learning and stimulate collaborative learning, the majority of teachers and learners still cannot use the technology in this regard. However, the current learning provision of the Tablet still lacks the promotion of interactivity and in most cases the passive method of learning still persist (Saekow & Samson, 2011; Atisabda et al., 2015; Pruet et al., 2016). For example, In Thailand, the majority of children watch video clips and listen to audio clips passively as a result of the lack of teachers' Technological Pedagogical Content Knowledge which is necessary for the effective application of blended learning (Atisabda et al., 2015; Khlaisang & Likhitdamrongkiat, 2015; Pruet et al., 2016). Additionally, teachers' e-learning training in the country still requires better quality professional development from qualified personnel in blended learning. The development and allocation of more computer teachers and technical personnel to facilitate teachers in schools can assist to encourage teachers to restructure their classrooms by adopting and implementing blended learning techniques and approaches.

4.5.2.3. Brazil

The implementation of e-learning among teachers and learners in Brazil has increased rapidly over the last decade although the increase is largely a result of the use of Internet tools for distance education both in undergraduate and graduate courses (Rolando et al., 2013; Rolando et al., 2014; Garbin, et al., 2015). E-learning enables the use of social networks to promote knowledge acquisition through the web and is a vehicle for engaging learners in their learning process supported by 21st century technologies. Since the implementation of e-learning, Martinho & Pombo (2009 cited in Rolando et al., 2013) noticed an increase of 10% in test scores among learners who were taught using projection pictures in power point, viewing educational videos and doing Internet searches. Furthermore, the findings indicated that 92% of the learners were positively influenced when they made use of such strategies and approaches for knowledge acquisition (Rolando et al., 2013; Rolando et al., 2014; Garbin et al., 2015). The learners reported that these strategies and approaches enriched their concentration levels and increased their enthusiasm and commitment to learn. However, the implementation of e-learning mostly occurs in a rather distributive way, in which teachers browse the web searching for videos, pictures and text materials to download, without or with little exchange of ideas and practices with their peers and knowledge with their learners. These kinds of exchanges seem to be limited because e-learning's potential to provide means for these kinds of interactions remains unnoticed by teachers (Rolando et al., 2013; Rolando et al., 2014; Garbin et al., 2015). In cases where teachers engage in online conversations among themselves, they tend to express the difficulties they experience when teaching certain topics and simultaneously create opportunities for more experienced teachers to share their teaching methods and resources with their peers (Rolando et al., 2014; Garbin et al., 2015). These online conversations allow teachers to overcome factors that restrict them to the conventional didactics and assist by introducing e-learning and its diversified teaching methodologies.

Drawing from Algeria, Thailand and Brazil's experiences, the introduction of e-learning has been mistaken for the provision of infrastructure such as hardware, computers, personal laptops and ICT labs to a large number of educational institutions. Apparently, the governments of countries with the medium HDI expected e-learning pedagogies to be adopted through osmosis processes with the provided infrastructure. Most teachers in these countries who are expected to adopt e-learning did not have any formal training or else they have received ineffective training which did not address their concerns and anxieties which results in learners who attend theoretically ICT overloaded courses which lack the practical component. Instead of being a supporting initiative to teaching and learning, e-learning is a burden to most countries with high level of development. Therefore, South Africa must draw lessons from developed countries both with very high and high HDI that the investments made in infrastructure do not necessarily guarantee successful adoption and implementation of e-learning pedagogies.

4.5.3. Medium Human Development Index Countries' e-Learning Practices

Experiences of e-learning pedagogies from developing countries with the medium level of development similar to South Africa are important for drawing necessary lessons for working towards blended learning. For this purpose, Vietnam and Zambia's experiences will be discussed in the two subsections in order to determine South Africa's likely e-learning expectations.

4.5.3.1. Vietnam

Today's employers expect their employees to have 21st century skills which enable them to adapt to various situations and to effectively communicate using ICT (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). Therefore, training learners to communicate effectively, cooperate with others and learn independently has become the recent basics of education in Vietnam (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). The required 21st century skills are beyond the focus of conventional didactics which generally promote teacher-centred and passive learning methods, individual achievement and the inactive transmission of information from teachers to learners (Thanh, 2010; Peeraer & Van Petegem, 2015). Therefore, Vietnam invested in importing numerous Western teaching and learning methods, especially those that emphasize a student-centred approach for modern educational transformations (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). The intention of the educational transformations is to provide learners with 21st century skills inclusive of "independence, creativeness, activeness and cooperativeness" required by the labour market (Thanh, 2010). However, there has been a noticeablely inadequate implementation of e-learning regardless of the high investments for improving access to technologies and developing the skills of teachers and learners (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). The inadequate implementation is mainly due to limited Technological Pedagogical Content Knowledge among teachers and lack of time to integrate e-learning with conventional didactics. Although blended learning plays a major role in pedagogy, teachers tend to replace conventional didactics with e-learning rather than integrating the two.

4.5.3.2. Zambia

In Zambia, a rapid increase in the adoption of technology for teaching and learning purposes has been noticed (Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011). Apparently, blended learning supports teaching and learning techniques and methods that support interactivity, collaboration and cooperation among teachers and learners (Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011). For example, one teacher confirmed the importance of blended learning by acknowledging that “When children learn using electronic media, we remember more of what we see, and therefore it's also an important part, to go from chalk and board, to students working on their own using the netbooks” (Haßler, Hennessy & Lubasi, 2011: 22). Thus, teachers value the educational developments brought by the use of digital resources in ensuring that learners participate and learn actively. Teachers’ enthusiasm and aspirations about their changed role also perpetuate the integration of e-learning with conventional didactics in the country. Consequently, teachers also acknowledged that the adoption of educational technology ensured that they learnt from their learners and that the personal enjoyment of knowledge sharing and acquisition for both teacher and learners has increased (Haßler, Hennessy & Lubasi, 2011). Before the implementation of e-learning, learners were able to identify areas in which teachers were struggling to incorporate ideas and now technology has resolved the challenge as both are mostly discussing and interrogating the subject matter (Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011). In addition to the professional changes, teachers also benefited personally from e-learning initiatives as they are able to communicate by email and even use the Internet outside the classrooms (Haßler, Hennessy & Lubasi, 2011). The advancements in education brought by e-learning were also noticed and appreciated by parents who became aware of intellectual changes in their children (Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011). Notwithstanding the challenges attached to e-learning and blended learning, Zambia benefits from the transformations. Although teachers are aware of the benefits associated with e-learning, they often relapse into the conventional teaching methods probably as a result of a lack of an appropriate e-culture.

Similarly to developed countries, Vietnam invested in ICT infrastructure with the hope of realising the benefits of e-learning. However, evidence indicates that even with the state-of-art technology, teachers still lack Technological Pedagogical Content Knowledge and time to integrate e-learning with conventional didactics. Instead of using the technology for educational transformation, the majority of teachers use it for personal reasons such as sending and receiving emails and accessing social media, among others. Ironically, Zambia confirmed the country's successful adoption and implementation of e-learning in the country. The country which has adopted a collaborative approach and an adaptive model for planning and governance of blended learning, is doing well in transforming its education system. Assumedly, the adopted planning approach and governance model bore out the realization of the contributions and success of e-learning in the country's education system. Thus, South Africa must take lessons about implementing blended learning from successful countries such as Zambia.

4.5.4. Countries with Low Human Development Index's e-Learning Experiences

Countries with low levels of development are also striving to adopt e-learning in order to transform their educational systems in the hope ofbeing able to offer 21st century skills to its learners. It is in this regard that Kenya's e-learning experiences will be discussed in order to provide an overview of what countries on the same level with it are facing.

4.5.4.1. Kenya

The advancement of ICT in Kenya has made it easier for accessing information through various gadgets such as computers, television, radio and mobile phones (Onderi et al., 2013; Nyagowa et al., 2014). Moreover, education has been made much easier and fun with the technology advancements especially with regard to the use of the Internet. The Internet makes obtaining information promptly from the web, rather than searching for it through time-intensive procedures in the libraries much simpler (Onderi et al., 2013; Nyagowa et al., 2014). Although teachers in Kenya are pleasantly surprised by activities that relate to lesson planning to integrate e-learning with conventional didactics, they are still facing challenges in the implementation thereof (Onderi et al., 2013; Nyagowa et al., 2014). Like other teachers in many other countries, they spend more time in the integration of e-learning into conventional didactics rather than the implementation of blended learning and the same is true for learners (Nyagowa et al., 2014). Therefore, this time-intensive teachers' approach towards blended learning leaves them without tangible benefits that contributes towards the advancement of education. Unfortunately for Kenya, technology has come with its shortfalls, which include among others the use of mobile phones by learners to cheat in the exam (Onderi et al., 2013) instead of using it productively for collaborative, interactive, flexible, innovative and adaptive learning. Generally, the quality of content provided by the NEPAD e-School project contributes positively to e-learning in the country (Onderi et al., 2013; Nyagowa et al., 2014) and most importantly to building of the 21st century skills. Nonetheless, one the common ideologies of NEPAD's e-Schools which addresses issues of "teamwork and lifelong learning" among teachers and learners has not as yet been realized in Kenya due to the limited implementation of blended learning.

For countries with a low level of development such as Kenya, implementation of e-learning pedagogies still remains the major challenge. The time-intensive teacher-approach leaves them with no any other choice but to replace conventional didactics with e-learning instead of blending the two. Moreover, the technology increased learners' chances of copying in the exam rather than using it to study for the exam. The technology is therefore, not used to realise the country's aspirations of promoting teamwork and lifelong learning among learners. For South Africa, which is moving towards the replacement of conventional didactics rather than blending, this experience must provide lessons on what needs to be done to achieve successful e-learning.

4.6. Preconditions for Successful Blended Pedagogies: Infrastructure, Skills and Culture

A collective of preconditions, inclusive of planning, governance, infrastructure, culture and skills, is critical for the successful blending of e-learning pedagogies with conventional didactics as well as for productive engagement of the knowledge economy and global capitalism. However, chapter two revealed that many countries prioritise the implementation of infrastructure as compared to equally and collectively considering other preconditions. This section outlines the preconditions that various countries with different levels of development have implemented and adopted for blended learning.

4.6.1. Preconditions for Blended Pedagogies in Countries with Very High Human Development Index

The discussion of the preconditions for blended pedagogies for countries with a very high level of development uses experiences from Australia, Poland and Republic of Korea in the succeeding three sub-sections.

4.6.1.1. Australia

For countries to participate in the knowledge economy, twenty-first century ICT skills are required and Australia is not an exception (Ministerial Council on Education, Employment, Training and Youth Affairs, 1999; Ministerial Council on Education, Employment, Training and Youth Affairs & Ministerial Council for Vocational and Technical Education 2008; Clarke, 2004; Baker, n.d.; Baker, 2009; Department of Education and Early Childhood Development, 2009; Blackley & Walker, 2015). Therefore, teachers are the first ones that should be able to use the twenty-first century resources and strategies to deliver knowledge to learners effectively. For implementation of the blended pedagogies, teachers need Technological Pedagogical Content Knowledge to be able to integrate educational ICT in the current curriculum, assessments, administration and professional learning (Ministerial Council on Education, Employment, Training and Youth Affairs, 1999; Ministerial Council on Education, Employment, Training and Youth Affairs & Ministerial Council for Vocational and Technical Education 2008; Clarke, 2004; Baker, n.d.; Baker, 2009; Department of Education and Early Childhood Development, 2009; Bowman et al., 2016).

In Australia, major investments have been made for the roll out of educational ICT infrastructure, digital content and curriculum as well as the development of teachers' skills (Ministerial Council on Education, Employment, Training and Youth Affairs, 1999; Clarke, 2004; Baker, n.d.; Baker, 2009; Department of Education and Early Childhood Development, 2009; Blackley & Walker, 2015). Additionally, the country has also invested in digital content which includes both interactive and non-interactive curricula with the hope of engaging and motivating students at all stages of schooling (Clarke, 2004; Baker, n.d.; Baker, 2009; Department of Education and Early Childhood Development, 2009; Blackley & Walker, 2015). However, only a minority of teachers and learners enjoy the full benefits associated with the infrastructure. Apparently, the obstacles towards reaping the full benefits of the infrastructure include the limited deployment of computers in schools, Internet connection, variety in digital content and curriculum as well as lack of integration of e-learning with conventional didactics in classroom practices (Ministerial Council on Education, Employment, Training and Youth Affairs, 1999; Ministerial Council on Education, Employment, Training and Youth Affairs & Ministerial Council for Vocational and Technical Education 2008; Clarke, 2004; Baker, n.d.; Baker, 2009; Department of Education and Early Childhood Development, 2009; Blackley & Walker, 2015).

4.6.1.2. Poland

The combination of multiple teaching and learning approaches for self-paced collaborative and enquiry-based study requires both teachers and learners to have ICT related skills as well as the culture and access to appropriate technology. Teachers in Poland have access to educational consultants and experts who have the responsibility to ensure that the former optimize the choice and mode of knowledge transfer and acquisition (Plasschaert et al., 2007; Stasiecka et al., 2008; Kok, 2009; Kiliçkaya & Krajka, 2010; Marcinek et al., 2011; Zieliński, 2014; Truskolaska et al., 2015). To ensure the sustainability of teachers' changing culture towards e-learning, the commitment of those who engage with and promote the national ICT educational objectives, they are rewarded appropriately (Plasschaert et al., 2007; Stasiecka et al., 2008; Kok, 2009; Kiliçkaya & Krajka, 2010; Truskolaska et al., 2015). To improve learners' ICT culture, they are given an insight into the teaching and learning methods and processes. Learners must be aware of the different knowledge transfer and acquisition methods and processes available as well as accurate information on their disadvantages and advantages (Stasiecka et al., 2008; Marcinek et al., 2011; Zieliński, 2014). Additionally, learners are given an opportunity to experience various studying and teaching methods and processes inclusive of ICT to ensure that they approach learning effectively and appropriately (Stasiecka et al., 2008; Kok, 2009; Kiliçkaya & Krajka, 2010; Truskolaska et al., 2015). Computer literacy amongst teachers and learners, as well as access to technological infrastructure with high speed internet connectivity are well established since the implementation of blended pedagogies in

Poland (Stasiecka et al., 2008; Kok, 2009; Kiliçkaya & Krajka, 2010; Marcinek et al., 2011; Zieliński, 2014; Truskolaska et al., 2015). Therefore, Poland strives to ensure that both teachers' and learners' skills and culture are changed and further maintained for the sustainability of the implementation of blended pedagogies.

4.6.1.3. The Republic of Korea

While having a good ICT infrastructure is not a complete condition for implementation of blended learning, it certainly provides a necessary basis for such development (Misko et al., 2004; Lee et al., 2009; Park et al., 2015; Webster & Son, 2015; Park et al., 2016). However, having the right hardware and software infrastructure is a crucial precondition for the adoption and implementation of blended learning in Korea. Teachers' and learners' access to computers and the Internet was the starting point for preparation for the integration of conventional didactics with e-learning in the country (Misko et al., 2004; Lee et al., 2009; Park et al., 2015). The government of Korea depended on the number of teachers and learners with access to computers and the Internet to largely determine the number of people who have an opportunity to adopt and implement e-learning (Lee et al., 2009; Park et al., 2015; Webster & Son, 2015; Park et al., 2016). Significant investment in ITC in Korean education continues unabated but with more prominence on ICT to acquire "employable skills" which are deemed important to new industries and media communication (Ministry of Science, ICT and Future Planning, 2014 cited in Webster & Son, 2015). However, during the decades of investments in educational technological infrastructure by the Korean government, very few attempts were made to support teachers with classroom implementation necessary for blended learning (Lee et al., 2009; Park et al., 2015; Webster & Son, 2015; Park et al., 2016).

A study conducted by Suh (2004) which surveyed 161 English teachers from primary and secondary schools in Gangwondo Province revealed that of the 90% who have received technological training, most of them did not use or seldom used computers in the classroom due to lack of time. Notwithstanding the availability and accessibility of infrastructure in schools, the majority of teachers still find it difficult to adopt blended learning mainly because of the limited time they have for it and its related activities. Therefore, the majority of teachers in Korea still do not know how to use their Technological Pedagogical Content Knowledge which compromises the adoption of blended learning in the country. Moreover, the integration of technology in education has been blamed on the "degradation of society's morals and culture", "potential psychological damage to children", and "hyperbolic attempts to inextricably link investment in computers to failures of TV and film use in education" (Bowers, 1998; Healy, 2004; Oppenheimer, 2003 all cited in Webster and Son, 2015).

Across all the three developed countries, infrastructure has been the most common precondition that has received significant attention from the planners and investors of blended learning. These findings suggest that different countries consider infrastructure as a sufficient precondition for the adoption and implementation of blended learning thereby compromising the success of the technological transformations. In Australia and the Republic of Korea, training of teachers to develop their Technological Pedagogical Content Knowledge is given little attention. In most cases teachers are just trained to use computers without necessarily paying attention to technological integration into the existing curriculum. However, Poland has massively invested in training of both teachers and learners in order to develop their ICT skills for the classroom and as a result, the benefits of blended learning are realised. As a strategy to promote e-culture, the Polish government offer rewards to the most dedicated teachers. Generally, the findings confirm that most countries invest in the provision of infrastructure rather than any other precondition.

4.6.2. Infrastructure, Skills and Culture for Countries in High Human Development Index Category

The evaluation of Algeria, Thailand and Brazil’s consideration of the preconditions necessary for the adoption and implementation of blended learning is used to provide an overview of countries with the same level of development.

4.6.2.1. Algeria

Successful blended learning depends on the development of a shared vision especially with primary stakeholders who include teachers and learners. Educational ICT policy-makers in Algeria, failed to realize that teachers and learners should have been included in policy planning so to identify a possible, sustainable and user-friendly integration process (Guemide & Benachaiba, 2012; Ghomari, 2015). Providing schools with the infrastructure and teachers' in-service training was not a sufficient condition for the adoption of blended learning, the participation of both teachers and learners in the planning of policies and change processes was of more importance. Teachers and learners who were engaged in the planning processes are likely to be successful in the implementation of blended learning as there is a sense of ownership of the technology between them (Guemide & Benachaiba, 2012; Ghomari, 2015). Algerian teachers' self-efficacy and attitudes towards the use of computers affected not only their experiences but also those of the learners that they teach. In addition to Technological Pedagogical Content Knowledge, teachers' ability and sense of confidence to use the technology for effective teaching enhances learners' knowledge acquisition as they also gain confidence in their ICT skills. Moreover, developing a "culture of teaching" and a "culture of learning" also have the potential to maximise the integration of e-learning with conventional didactics (Guemide & Benachaiba, 2012; Ghomari, 2015). Both teachers' and learners' cultures determine the extent to which they will be able to use educational ICT in an innovative and sustainable manner and thus, informing the level of adoption of blended learning in the country. Generally, the adoption level of blended learning in Algeria is still at an early stage specifically at adoption and early implementation (level 2).

4.6.2.2. Thailand

Despite the fact that increased connectivity in Thai schools has resulted in more positive teachers’ attitudes towards ICT for teaching and learning, there is still no progress in integration of e-learning with conventional didactics (Saekow & Samson, 2011; Khlaisang & Likhitdamrongkiat, 2015; Lee & Kim, 2015; Ninlawan, 2015; Pruet et al., 2016). The major reason is that the majority of in-service teachers are over 45 years of age therefore, a resistance to change is still found among these “late adopters” and “laggards” (Saekow & Samson, 2011). Even after these teachers have received training, implementation of blended learning seems to be a big challenge. For this reason, it is very important that teachers clearly understand the concept of blended learning before trying to force them to do new things with ICT which makes them feel uncomfortable and alienated (Saekow & Samson, 2011; Khlaisang & Likhitdamrongkiat, 2015; Ninlawan, 2015). In effect, quite a number of instances were found of teachers and learners being reluctant to use e-learning for knowledge transfer and acquisition.

For teachers, their training needs in relation to development of curriculum content, pedagogic skills, learning techniques as well as innovation and technologies that contribute to successful implementation of blended learning should still be addressed (Lee & Kim, 2015; Ninlawan, 2015; Pruet et al., 2016). The limited number of technical staff members needed to guide and advise teachers during the implementation of blended learning also pays a crucial role in the success of adoption of educational ICT (Saekow & Samson, 2011; Khlaisang & Likhitdamrongkiat, 2015; Lee & Kim, 2015; Pruet et al., 2016). However, a low number of instances were found with regard to problems with infrastructure which include hardware, and software related to e-learning development in Thai educational institutions (Saekow & Samson, 2011; Lee & Kim, 2015; Ninlawan, 2015; Pruet et al., 2016). Like many other countries, Thailand's state-of-art infrastructure is not a sufficient condition for successful implementation of blended learning. Evidence suggests that blended learning is governed and mostly supported by the government whereas it requires governance and support from both the public and private sectors in order to succeed.

4.6.2.3. Brazil

The transformation from conventional didactics to blended learning driven by the Brazilian government lacks appropriate policy for sustainable use of educational ICT (Kashefi, Ismail & Yusof, 2012; Rolando et al., 2013; Rolando et al., 2014; Garbin et al., 2015; Pereira, Ramos, Gouvêa & da Costa, 2015). Blended learning in the country is adopted to support and foster learning that is able to create situations based on real-world problems which are brought to the classroom. Additionally, the implementation of blended learning creates opportunities for "feedback and reflection", "construction of learning communities" and the "expansion of learning opportunities for teachers" (Rolando et al., 2013; Rolando et al., 2014). However, the majority of teachers who attended a continuing education course presented serious limitations with the implementation of blended learning and that, even having access to computers at home and also to computer labs in their schools they still do not make use of ICT in their classrooms (Kashefi et al., 2012; Rolando et al., 2013; Rolando et al., 2014; Pereira et al., 2015). Instead, most Brazilian teachers use the web to search for information that is incorporated in their classes as well as for email and chat mostly to communicate with friends and relatives and this general use of ICT has remained roughly unchanged (Kashefi et al., 2012; Rolando et al., 2013; Rolando et al., 2014;

Garbin et al., 2015). Even though in some educational contexts teachers used the Web for teaching more frequently than their Brazilian counterparts, such use is usually based on distributive tools (Kashefi et al., 2012; Rolando et al., 2013; Rolando et al., 2014; Garbin et al., 2015; Pereira et al., 2015). The manner in which e-learning is implemented calls for improvements in teachers' Technological Pedagogical Content Knowledge as a key factor for overcoming Brazil's serious educational problems.

For Algeria, the inclusion of teachers and learners in the planning processes for blended learning could be used as a strategy that would address the preconditions in a collective way. The country believes that if teachers and learners are involved then infrastructure, skills and culture will be appropriately addressed as they are the ones who will be using the technology. Thailand revealed that the main challenge is the resistance to adopt and implement blended learning especially by in-service teachers. Thus, culture is one of the preconditions that is barely taken into consideration by developed countries in striving to achieve blended learning. Even though infrastructure is given priority by countries with high development level, skills and culture compromise the successful implementation of blended learning. South Africa need to collectively consider all the necessary preconditions for blended learning, something which most developed countries have failed to do.

4.6.3. Countries in Medium Human Development Index Category's Preconditions for Blended Pedagogies

The practices concerning the consideration of preconditions for developing countries with a medium HDI are generated from Vietnam and Zambia's experiences.

4.6.3.1. Vietnam

E-learning changes the structure of the teaching environment in terms of its practices and physical characteristics. The changes in Vietnam are sometimes hindered by various local infrastructure conditions and cultural barriers (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). For such a Western learning method to be accepted and implemented successfully in Vietnam an understanding of the suitability of the new approach in the local context is needed (Thanh, 2010). There has been excellent improvement in physical access to ICT resources in schools in Vietnam; however, having computers, projectors and Internet access is not enough to transform education

(Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). Developed countries with the state-of-the-art ICT infrastructure have continued to struggle to integrate e-learning in education, notwithstanding the positive benefits associated with digital technology. To this extent, infrastructure is not a sufficient condition to precipitate successful implementation of E-learning; instead, technology informatics is critical (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). Despite extensive development and focus on ICT use in schools, “in practice, ICT is mainly used to replace existing teaching practice, in a very limited way” (Thanh, 2010: 22). That is, literacy achieved at required levels of computer and information communication technology, which are not an osmotic process, among students and educators define the primary determinants for successful implementation of E-learning.

4.6.3.2. Zambia

There is a need for multi-lateral partnerships between the leading Zambian government and its partner support and the private sector for effective implementation of blended learning initiatives in sustainable ways as a result of appropriate collective planning and governance (Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011). For the implementation of blended learning, teachers’ daily pedagogic realities and experiences as well as professional capabilities require ongoing support from various stakeholders. The support should ensure that all the necessary preconditions for blended learning assist teachers to establish and sustain creative, interactive, collaborative, innovative, adaptive and flexible learning (Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011). Simultaneously, long-term opportunities and resources must be ensured in order to create conducive environments for blended learning. As most learners are without technological training, the majority of teachers tend to teach ICT as an isolated subject instead of focussing on the implementation of blended learning (Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011). Additionally, lessons also get interrupted because of inadequate infrastructure such as frequent loss of power (Haßler, Hennessy & Lubasi, 2011). Whereas these regular power outages do not affect the netbooks used in class, they however, do affect Internet connectivity and also interrupt the use of online teaching and learning environments (Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011). Therefore, for Zambia to succeed in the implementation of blended learning, appropriate planning approaches and governance models must be adopted, infrastructure must be developed and skills and e-culture of both teachers and learners must be improved.

Evidently, lack of ICT skills and e-culture among teachers and learners in Vietnam is the most common challenge experienced in the adoption and implementation of blended learning. However, Zambia's experiences revealed that the country faces challenges related to infrastructure, skills and e-culture during the adoption and implementation processes of blended learning. Although the country provided computers and/or netbooks to educational institutions, electricity cuts which affect Internet connectivity remain a challenge in some institutions. Moreover, both teachers and learners still require ICT training and change in their e-culture in order to maintain sustainability of blended learning. Accordingly, South Africa's move towards the implementation of e-learning cannot ignore any of the preconditions if the country hopes for success and sustainability in the area of educational technology.

4.6.4. Infrastructure, Skills and Culture of Blended Pedagogies in Low Human Development Index Countries

For countries with a low HDI, Kenya's experiences will be used to establish the consideration of different preconditions.

4.6.4.1. Kenya

One of the critical objectives of the NEPAD e-Schools project is to empower teachers with ICT skills necessary for blended learning. The training of teachers and learners depends on the installation of suitable and quality ICT infrastructure as they are expected to use it for teaching and learning (Onderi et al., 2013; Nyagowa et al., 2014). After three years of the project implementation under the governance of various non-governmental organizations, the project was handed over to the Ministry of Education (Onderi et al., 2013). Unfortunately for teachers and learners, the handover of the project left them with Internet disconnection which adversely affected the implementation of blended learning (Onderi et al., 2013; Nyagowa et al., 2014). The reasons behind the disconnections was the inability of the Ministry of Education to afford Internet connectivity costs. In response, the e-Schools had to make arrangements to access the Internet through "dial-up connections" by using modems which are connected to the servers even though this connection mode is costly to sustain (Nyagowa et al., 2014). Notwithstanding the challenges encountered by the project, teachers and learners participating in the e-Schools projects, mostly attain ICT technical skills from the limited exposure to technology and training (Onderi et al., 2013; Nyagowa et al., 2014).

In addition to the technical skills, teachers are also required to dedicate more time and resources to attain ICT pedagogical skills that are necessary for the facilitation of effective integration of e-learning in education. Ironically, the e-Schools project over-relies on computer laboratories equipped with computers, “smart televisions”, “Smartboards” and “LCD projectors” as access points to educational ICT infrastructure (Onderi et al., 2013; Nyagowa et al., 2014). Although all the e-Schools computers have Internet connectivity meant for teaching and learning, it is normally used for personal communication (Nyagowa et al., 2014). These computer laboratories are not only limited in number, but they are also not accessible beyond school hours. The inaccessibility of the laboratories after class hours does not encourage and support independent as well as collaborative online learning which usually takes place when academic activities are over (Onderi et al., 2013; Nyagowa et al., 2014). Moreover, the learner to computer ratio in the limited number of laboratories is very uneven and therefore, results in learners having difficulty in adequately accessing the available educational technologies (Nyagowa et al., 2014).

Drawing from Kenya’s experiences, countries with a low HDI have more chances of experiencing challenges related to lack of infrastructure, limited skills and e-culture in their attempt to modernise teaching and learning. Evidence from Kenya suggests that government finds it difficult to provide infrastructure and necessary ICT training to teachers and learners. As a result, the adoption and implementation of blended learning heavily relies on the contributions made by the private sectors specifically from international organizations. Notwithstanding these challenges, the country still used the limited resources at its disposal to ensure that its learners are also equipped with the 21st century skills for them to be able to participate in the knowledge economy. For developing countries, both with medium and low HDI, the collective consideration of all the preconditions for blended learning serves as a key to the development of a knowledge society with 21st century skills that are important for the countries’ national development.

4.7. Appropriateness of Planning Approaches, Governance Models, Infrastructure, Culture and Skills for Blended Pedagogies: Illustrations from International Experience

International illustrations for appropriateness of planning approaches, governance models, infrastructure, culture and skills for blended pedagogies uses experiences from Republic of Korea with very high HDI, Thailand with high HDI, Vietnam and Zambia with medium HDI, and, Kenya with low HDI as follows:

In South Korea, a study aimed at discovering the insights into teachers' decision-making related to consideration of technology use was conducted by Webster & Son (2015). The study eventually produced a set of thirteen concerns that directly affect teachers' decisions concerning educational technology. These include "risk taking, image, learning seeking, universal site use, sociability, efficiency, cultural alignment, real materials usage, student-centred ideas, influence of learning experiences, technology use in the class, technology training, and attitude towards technology" (Webster & Son, 2015: 91). Therefore, balance between teachers' internal factors as well as external concerns and demands from the basis on which teachers make decisions about the adoption of blended learning. This study confirms that although teachers received training, their levels of self-efficacy are still low and their educational culture does not support the adoption of blended learning. The low levels of self-efficacy and lack of appropriate educational culture in this regard are blamed on the lack of support from government during the implementation phase of adopting blended learning. Teachers more often than not, struggled to apply technological skills gained from their education, training and experience. Instead, teachers were "doing what works rather than what they knew works best" (Webster & Son, 2015).

Decades after the introduction of educational technology in Korea, teachers still follow the same practices that they were taught in leaving teaching and learning in the country to take place in an academic world that is separate from technological reality which current learner live in. Classroom observations confirmed that:

> "Students ubiquitously used their Smart Phones to text (e.g., Kakao talk) with friends or to view various forms of media directly from the Internet while on the way to their classes. However, once they entered the classrooms, they were

> usually told to turn off their electronic devices, to open up their textbooks, and to listen for an hour and fifteen minutes to a teacher in front of a chalkboard. It was as if they had been transported back to the 1950s (or earlier) whenever they entered a classroom. The relief on many of their faces as they turned on their phones upon leaving and checked messages seemed like divers taking their first breaths again after plunging into the depths" (Webster & Sons, 2015: 92).

The inability of teachers to adopt blended learning is problematic as it does not conform to the "basic concept of continuity in learning for learners" (Dewey, 1938 cited in Webster & Son, 2015) and the notion that "school learning is at odds with authentic ways of learning to be in the world, and with social practice beyond the school gates" (Lankshear & Knobel, 2003 cited in Webster & Son, 2015).

In an empirical study, Lee at al. (2009) analysed acceptance of e-learning services from learners' perspectives in South Korea. Apparently, learners' acceptance of e-learning for integration with conventional didactics is influenced by a number of factors inclusive of "service quality constructs", "belief constructs", "intention to use e-learning" and "flow construct". Service quality constructs are characterised by instructor characteristics, teaching materials, and design of learning contents whereas belief constructs refer to perceived usefulness and perceived ease of use. Intention to use e-learning entails learners' willingness to adopt the technology for knowledge acquisition while flow construct involves playfulness to encourage the adoption and use of e-learning (Lee et al., 2009). These factors have strong and positive relationships with one another which clearly explain the skills and culture that are necessary for learners to easily adopt blended learning. Accordingly, the findings of the study revealed that instructor characteristics and teaching materials are positively related to perceived usefulness and design of learning contents is positively related to the perceived ease of use (Lee et al., 2009). These findings suggest that the more improvements in service quality of e-learning facilitated by teachers, the more learners tend to be positive towards e-learning adoption. Perceived usefulness is the greatest predictor of intention to use e-learning. In this line, the findings show that the easier to use learners feel e-learning is, the more useful they feel it is (Lee et al., 2009). Therefore, perceived usefulness in turn has a positive effect on the intention to use e-learning. For learners to continue using e-learning, teachers should design and develop it such that it delivers value to the former.

However, the usefulness of e-learning can be enhanced by providing improved educational services without increasing the complexity of the process and use of technology for blended learning. Moreover, playfulness positively affects learners' intention to use e-learning. One of the recent trends in education is working towards improving educational outcomes by incorporating amusement in learning activities (Lee et al., 2009). For example, "edutainment" typically seeks to actively involve teachers and learners by incorporating entertainment into lessons. A variety of edutainment tools which can be used innovatively by teachers to promote learning are easily available in the online game industry (Lee et al., 2009). However, the incorporation of playfulness into teaching materials often presents the greatest challenge to teachers who do not have the necessary Technological Pedagogical Content Knowledge. Compared to conventional offline teaching and learning, "growth opportunities of e-learning abound". As web technologies advance, teachers can enhance their e-learning activities without any additional costs by taking advantage of the declining cost of these technologies, thus resulting in its greater adoption and ease of use by learners.

Generally, ICT infrastructure in Thailand is growing at a stable pace although its quality is not sufficient enough to fulfil the needs of the population (Saekow & Samson, 2011; Khlaisang & Likhitdamrongkiat, 2015; Lee & Kim, 2015; Ninlawan, 2015; Pruet et al., 2016). With regard to access to computers, 26.8% of the total population have unrestricted access to the technology. In education, the ratios of the number of computers to the number of learners and number of computers per school are currently 1:40 and 6:1, respectively in schools under the Office of Basic Education Committee within the Ministry of Education (Lee & Kim, 2009). Moreover, more than half of the teachers in Thailand have already been trained in e-learning. Despite a number of achievements in e-learning, the Thai government is still investing massively in educational ICT. For example, more money has been invested in hardware, software and digital content development necessary for the integration of e-learning with conventional didactics. Mainly, the goals of these investments are to "raise the ratio of the number of computers to the number of learners to 1:20, acquire digital content for every subject area and every class level, offer professional development for teachers and educational personnel and provide secured and stable school network infrastructure" (Lee et al., 2009: 1322). In terms of the future trend in e-learning, the Thais intend to use the technology of the future (advanced technology) to help conquer the digital divide.

For successful implementation of blended learning in Vietnam, it was very important to target the learning management system in all higher education institutions, provide digital resources to both teachers and learners through an online portal as well as to reduce the digital divide between the poor rural and well-developed urban schools (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). Wi-Fi Internet connection in higher education institutions came out first on the list of the resources needed for the promotion of “cooperative learning and teamwork skills, critical thinking, research, problem solving and decision making skills, as well as self-study and self-improvement skills” (Peeraer & Van Petegem, 2015: 51). To adopt the learner-centred approach, the country prioritized active participation of learners, promotion of experimental learning and integration of extra-curricular activities and a review of the curriculum to allow more autonomy for teachers and learners (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). Basic ICT knowledge and skills among Vietnamese teachers and learners as well as subject specific technological training for teachers is necessary for active, creative, collaborative, flexible and adaptive teaching and learning (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). To fully achieve the benefits of blended learning, partnership and cooperation between the local and international organizations in terms of ICT in education, together with the participation of the public and private sector are key to the development process (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). Planning and policy development are the most critical; therefore, the Vietnam national policy and plan for technology in education should be consistent with the national vision for ICT in pedagogy and that it be sealed with a definite financial plan. These plans must be “comprehensive and cohesive”, and involve stakeholders inclusive of teachers and learners in their development and implementation (Thanh, 2010; Tuyết, 2013; Peeraer & Van Petegem, 2015). Generally, successful blended learning in various countries does not rely only on infrastructure but on a number of preconditions collectively working together to provide 21st century skills to learners who are expected to promote national development.

Whereas a national ICT policy has been developed and adopted and an adaptive model has been adopted for the governance of educational ICT, Zambia still experiences a lack of institutional and sectoral policies on the integration of ICT into education and training (Ministry of Communications and Transport, 2006; Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011; Annie et al., 2015). For example, while the Ministry of Communications and Transport has developed the national ICT policy, no e-learning policies have being developed by the education sector and thus, it is difficult to establish suitable guidelines and standards for the development of educational technology, teachers' Pedagogic Technological Content Knowledge as well as learners' computer literacy (Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011). The lack of these policies means the non-existence of teachers' and learners' ICT competency framework which is at the centre of ensuring technological changes in education and training (Hennessy & Lord, et al., 2011). Although the national ICT policy indicates the various ICT infrastructure available, more emphasis is placed on the use of personal computers, mobile technologies, radios, televisions, CD-ROMs and DVDs (Ministry of Communications and Transport, 2006). The policy in question strongly emphasizes the contribution of ICT to the national development and participation in the knowledge economy, and more importantly the need to include disadvantaged groups especially those located in rural areas (Ministry of Communications and Transport, 2006; Haßler, Hennessy & Lubasi, 2011; Haßler, Hennessy & Lord, et al., 2011; Annie et al., 2015). However, the policy is written in English only and not in any of the local languages and that makes it difficult for those who cannot speak or write the language to make contributions towards the planning of e-learning in order to meet their needs and culture (Haßler, Hennessy & Lubasi, 2011). Overall, to realise the benefits of e-learning investments, appropriate planning approaches and governance models must be adopted as well as infrastructure, skills and culture that reflect both teachers' and learners' needs.

In practice, teachers' integration of e-learning with conventional didactics in Kenya has not yet been realised in the classrooms (Onderi et al., 2013; Nyagowa et al., 2014). The inability of teachers to adopt blended learning is the result of their lack of Technological Pedagogical Content Knowledge and limited ICT resources (Onderi et al., 2013; Nyagowa et al., 2014), which are some of the necessary and sufficient conditions for the success of this kind of transformation. Although teachers were trained to use ICT for teaching and learning purposes, they still fail to use the technology to integrate e-learning into the existing curriculum (Onderi et al., 2013; Nyagowa et al., 2014). Therefore, to successfully implement blended learning the availability and accessibility of infrastructure as well as teachers' Technological Pedagogical Content Knowledge must first be developed. To improve teachers' and learners' training, fast Internet connectivity should be installed and those who initially did not benefit from previous training sessions should be given opportunities during school holidays. These initiatives hope to improve the level of e-learning adoption in Kenya by improving teaching methods and techniques and allowing its users more time to practise (Onderi et al., 2013; Nyagowa et al., 2014). Overall, the slow pace of the adoption of blended learning reflects at most, the inappropriateness of the planning approaches and governance models adopted by various countries across the four levels of development, limited infrastructure provided as well as lack of necessary skills and e-culture among teachers and learners.

4.8. Prospects and Challenges of Blending e-learning Pedagogies with Conventional Didactics: Developed versus Developing Countries

Currently, successful teaching and learning is driven by technology and its related softwares, infrastructure and services (Ahmadi, Keshavarzi & Foroutan, 2011; Makgato, 2012; Marinagi, Skourlas & Belsis, 2013; Rolando et al., 2013; Tagger, Trossen, Kostopoulos, Porter & Parisis, 2013; Yang, 2013; Yoon, Lee, & Lee, 2013; Ramoroka, 2014; Boschman et al., 2015; Çapuk & Kara, 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016). The use of the Internet, telecommunications, wireless applications, handheld electronics, social network software and the web, amongst others, explains how people acquire information, teach and learn (Ahmadi et al., 2011; Yang, 2013; Rolando et al., 2013; Fuentes-Bautista, 2014; Ramoroka, 2014; Boschman et al., 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016). Thus, the increased use of these devices, engines and software deem it necessary to rely on electronic media, assisted instruction information and communication technologies for blended learning. Blended learning which entails the integration of e-learning with conventional didactics uses a combination of “multimedia learning”, “technology-enhanced learning”, “computer-based instruction", "computer-based training", "computer-assisted instruction", "internet-based training" and "web-based training", amongst others together with traditional face-to-face methods for teaching and learning (Ahmadi et al., 2011; Makgato, 2012; Yang, 2013; Yoon et al., 2013; Ramoroka, 2014; Boschman et al., 2015; Çapuk & Kara, 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016). However, the successful implementation of blended learning relies on a number of preconditions such as planning, governance, infrastructure, skills and culture. It is in this context that this section discusses the prospects and challenges of blended learning in both developed and developing countries.

Blended learning uses a combination of conventional didactics with different types of media to deliver text, audio, images, and videos to enhance teaching and learning in both developed and developing countries (Ahmadi et al., 2011; Rolando et al., 2013; Tagger et al., 2013; Boschman et al., 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016). These tools also enable teachers and learners to send and/or receive emails and attachments, as well as to post, view, and print calendar entries and learning materials (Tagger et al., 2013; Ramoroka, 2014; Boschman et al., 2015; Orr & Kukner, 2015; Valtonen et al., 2015). Learners can also view and access course materials, syllabuses and other databases suggested by teachers for knowledge acquisition (Boschman et al., 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016). In addition, learners are able to submit assignments online and view assessment results without having any contact with their teachers. Teachers and learners can file frequently used pages and materials, check relevant references, and search relevant courses and words, take notes, make class presentations and create their own home pages through blended learning (Ramoroka, 2014; Boschman et al., 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016).

In both developed and developing countries, ICT assists teachers and learners to advance critical thinking, data collection and analysis skills and further promote active class participation (Makgato, 2012; Han, Eom & Shin, 2013; Lin et al., 2013; Marinagi et al., 2013; Yoon et al., 2013; Fuentes-Bautista, 2014; Boschman et al., 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016). The skills will assist both teachers and learners in solving challenges and problems that they face in their everyday lives. Accordingly, access to knowledge through ICT which is mostly presented in a visual format will be used to improve traditional and conventional learning methods (Boschman et al., 2015; Çapuk & Kara, 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016). However, word processing and the Internet for searching for information remains the most commonly used applications which do not necessarily contribute to learners' knowledge acquisition. Although other applications such as spreadsheets, databases and multimedia presentation tools, among others, can offer opportunities to engage and support learners, their use is limited and often operates at a “low cognitive level” (Lin et al., 2013; Marinagi et al., 2013; Park et al., 2016).

Generally, ICT in teaching and learning can improve the knowledge and skills of both teachers and learners, develop better high quality educational structure and encourage comprehensive learning (Ahmadi et al., 2011; Han et al., 2013; Lin et al., 2013; Marinagi et al., 2013; Yoon et al., 2013; Ramoroka, 2014; Boschman et al., 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016). Moreover, the use of ICT enables learners and teachers in both developed and developing countries to interact amongst each other and even learn from each other (Lin et al., 2013; Yang, 2013; Yoon et al., 2013; Fuentes-Bautista, 2014; Ramoroka, 2014; Boschman et al., 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016). International research reveals that about 60% of students use social networking tools to discuss class related issues which encourages learning outside schools and planning for the next lessons (Ahmadi et al., 2011; Marinagi et al., 2013; Rolando et al., 2013; Yang, 2013). Seemingly, apart from communicating with parents and friends, learners use social networks as a platform to discuss school work. In addition, ICT can be used to encourage and support real life related problems for learning and teaching both in and outside the classrooms (Makgato, 2012; Han et al., 2013; Lin et al., 2013; Marinagi et al., 2013; Rolando et al., 2013; Tagger et al., 2013; Fuentes-Bautista, 2014; Ramoroka, 2014; Boschman et al., 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016). According to Han et al. (2013), the uses of ICT in the classrooms capture real life situations better than print-based materials which usually present events in a linear format. Thus, the incorporation of ICT gives learners a feel of what is going on outside their classrooms while preparing them to be able to solve real and complex problems.

Despite a number of benefits associated with the use of ICT for teaching and learning, there are challenges which are being faced by teachers as well as learners in education. In most cases, teachers lack content knowledge necessary to be able to use ICT in their teaching as a result of limited/lack of training (Makgato, 2012; Han et al., 2013; Lin et al., 2013; Marinagi et al., 2013; Rolando et al., 2013; Fuentes-Bautista, 2014; Ramoroka, 2014; Çapuk & Kara, 2015). The use of ICT will be effective and efficient only if teachers are well trained to incorporate it in their teaching. Research has revealed that regardless of the use of ICT for teaching and learning, most teachers rarely use it in ways that are beneficial to educational contexts (Han et al., 2013; Marinagi et al., 2013; Rolando et al., 2013; Yoon et al., 2013; Ramoroka, 2014). In most cases, the use of ICT by teachers is common for class and test preparation, personal communication through e-mails and other social networks and not for teaching to enhance effective and efficient learning. The limited use of ICT for teaching and learning in most schools is, however, influenced by a number of factors which include restricted teachers' knowledge and abilities to use ICT, the demanding national curricula and lack of infrastructure, amongst others (Rolando et al., 2013; Yoon et al., 2013; Ramoroka, 2014; Boschman et al., 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016). Moreover, some learners do not know how to use ICT related software and infrastructures effectively for their own learning which makes it difficult for them to realise the benefits of blended learning (Ahmadi et al., 2011; Lin et al., 2013; Marinagi et al., 2013; Tagger et al., 2013; Yoon et al., 2013; Ramoroka, 2014; Boschman et al., 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016).

Whereas the online learning environment encourages teachers and learners, as it were, to engage in collaborative learning, to motivate each other and "to know each other outside of the classroom" (Button et al., 2014: 1313), there are pitfalls as some uses involve excessive social discussions, undue gamification and such other non-academic activities (Ninlawan, 2015; Hung, 2016). That indicates that ICT applications in teaching and learning in both developed and developing countries are not unproblematic (Valtonen et al., 2010; Valtonen et al., 2011; Valtonen et al., 2013; Noh et al., 2014; Boschman et al., 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Hung, 2016; Park et al., 2016). The use of social networks for educational purposes can create conflict between teachers and learners as the latter use the online environment to share their “personal and social life with friends and relatives” and can be resistant to its use for purposes related to educational activities. The separation or combination of learning and social life in these spaces is therefore, an additional challenge for didactic activities involving teachers and learners participating in blended learning (Valtonen et al., 2013; Noh et al., 2014; Boschman et al., 2015 Valtonen et al., 2013; Noh et al., 2014; Boschman et al., 2015; Çapuk & Kara, 2015). A variety of factors affect, negatively and/or positively, the implementation of blended learning among teachers and learners. Such anxiety with the use of ICT creates a negative impact on teaching and learning activities, unambiguously demonstrating the significance of self-confidence and self-belief associated with competence in technology informatics (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner, 2015; Hung, 2016). To a large extent, this potential for negative impact entails a significant level of technical support through, among other measures, establishment of institutional learning management systems (Elder & Koehn, 2009; Bond, 2010; Deltsidou et al., 2010; Button et al., 2014; Boschman et al., 2015; Hung, 2016; Park et al., 2016), which is not always possible especially in developing countries. Besides, the justification for the incorporation of e-learning is to create flexibility in the teaching and learning activities.

Chapman (2010) estimates that one hour of preparation of online content requires almost 80 hours of production, whereas developing one hour of online teacher-led facilitation requires over 40 production hours. Also, it was estimated that teachers’ interactions with learners on the online learning environment could take twice as much as the face-to-face facilitation time, thereby enforcing low levels of motivation for adoption (Crews et al., 2009; Chapman, 2010, Moule et al., 2010; Nguyen et al., 2011; Boschman et al., 2015; Ninlawan, 2015; Hung, 2016). Given that teachers too are captivated by the logic of the “goodness” of e-learning for effective teaching and learning, adoption of educational technologies is often accompanied by hyperbolic tendencies and the lack of requisite skills and, therefore, attendant poor quality of online courses, occasioned by the lack of consideration and incentivization of the time-intensive course development as overtime (Crews et al., 2009; Chapman, 2010, Moule et al., 2010; Nguyen et al., 2011; Noh et al., 2014; Çapuk & Kara, 2015; Hung, 2016). For the latter reason, developing and facilitating online learning is construed by most teachers as additional unpaid work because it does not supersede the conventional didactics. Most teachers tend to be less keen to invest the amount of time, cost and energy needed into developing online courses; and, relevant institutions that provide the digital technology infrastructure are not blameless in this regard as they do not seem to acknowledge that blended pedagogies and e-learning is time intensive (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner 2015; Webster & Son, 2015; Hung, 2016; Park et al., 2016).

Therefore most teachers and learners tend to use the technology and time allocated for lessons for other purposes not related to their studies. Beyond being time intensive, blended learning entails high financial costs too (Crews et al., 2009; Chapman, 2010; Moule et al., 2010; Nguyen et al., 2011; Boschman et al., 2015; Park et al., 2016). The acquisition of skills for developing the online courses, facilitating learning and interacting with students requires training, financial and technical support for educators too (Garrison & Vaughan, 2008; Deltsidou et al., 2010; Marginson, 2010; Ecampus, 2011; Garrison, 2011; Button et al., 2014; Peerear & Van Petegem, 2014; Valtonen et al., 2015; Webster & Son, 2015). To this extent, implementation of digital and information communication technologies for teaching and learning begs questions of the levels of computer and information literacy as well as technology informatics among students and educators, beyond mere delivery of infrastructure and access. These competences are denoted elsewhere in Chapter 3 as “capacity” and “self-efficacy” (Webster & Son, 2015).

More often than not, institutions in both developed and developing countries tend to prioritize acquisition and installation of computer hardware and software above teachers’ and learners’ technological training and incorporation in teaching and learning (Valtonen et al., 2010; Valtonen et al., 2011; Valtonen et al., 2013; Oyedemi, 2015; Valtonen et al., 2015; Webster & Son, 2015). Valtonen et al. (2015) observe that ICT is a broad concept and that it includes applications such as laptop computers, smart phones, social media, emails and internet online environment. Governments across the world, in both developing and developed countries, have made significant resources and effort investments in education technology (Teo, 2011; Al-Mansour & Al-Shorman, 2012; Ertmer et al., 2012; Kirkwood & Price, 2013; Peeraer & Van Petegem, 2014; Webster & Son, 2015). Although the majority of teachers in developed countries have access to ICT infrastructure, the same cannot be said of those who are in developing countries. Most teachers in developing countries, still lack regular access to ICT infrastructure and thus, are uncertain about how to design challenging and authentic e-learning lessons and assessments (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner 2015; Webster & Son, 2015; Hung, 2016; Park et al., 2016). In some cases, there are limited infrastructure and equipment to promote, encourage and support the use of ICT for teaching and learning in most schools especially many of those which are located in townships and rural areas (Makgato, 2012; Han et al., 2013; Rolando et al., 2013; Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner 2015; Webster & Son, 2015; Hung, 2016; Park et al., 2016). For most rural and township schools, the available computers are only accessible to teachers who mostly use them for personal communication rather than for teaching purposes.

Additionally, learner management remains a challenge for developing countries' teachers who are constrained to use computer laboratories with limited infrastructure as learning spaces, especially if they do not have experience in managing technology-rich learning environments (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner 2015; Webster & Son, 2015; Hung, 2016; Park et al., 2016). Fewer teachers have a clear conception of what a technology-rich learning environment comprises and are also unable to use such an environment to regularly support e-learning (Boschman et al., 2015; Kavanoz et al., 2015; Ninlawan, 2015; Orr & Kukner 2015; Webster & Son, 2015; Hung, 2016; Park et al., 2016). As a result, teachers and learners from such schools find it very difficult to apply blended learning in institutions of learning. Apart from the required training to use ICT for teaching and learning, most rural and township schools cannot afford the infrastructure and the software needed.

Developed countries such as Australia, Canada, the United Kingdom, Finland and the United States of America have incorporated e-learning in education through various curricula; however, complexities relating to computer and ICT literacy among both students and educators have hindered the advancement of digital pedagogies and the envisaged effectiveness in teaching and learning (Button et al. 2014; Boschman et al., 2015; Kavanoz et al., 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Wolff et al., 2015; Hung, 2016; Park et al., 2016; Salminen et al., 2016). Respectively, Boschman et al. (2015), Ninlawan (2015), Valtonen et al. (2015) and Park et al. (2016) report that in the Netherlands, Thailand, Finland and South Korea, where ICT resourcing in education is good, application has remained “very low” because most educators have low self-belief in their abilities and skills to use the technology in teaching and learning. Notwithstanding Noh et al.’s (2014) belief that ICT makes for good teaching and learning, the challenges for developed countries, where infrastructure is not problematic, are that educators’ capacity to use “pedagogically sound delivery models” and students’ skills in digital technologies have become critical to the successful implementation of e-learning (Teo, 2011; Al-Mansour & Al-Shorman, 2012; Ertmer et al., 2012; Kirkwood & Price, 2013; Button et al., 2014; Boschman et al., 2015; Kavanoz et al., 2015; Orr & Kukner, 2015; Valtonen et al., 2015; Webster & Son, 2015; Park et al., 2016; Siddiq et al., 2016).–This complexity is more than trivial for developing countries where infrastructure too may not be adequate, therefore demanding excessive e-investments of time and energy for both students and educators.

Besides, Webster and Son (2015) show that ICT resourcing does not necessarily yield positive implementation of e-pedagogies in teaching and learning. Undoubtedly, “the presence of institutional enablers is essential” to the successful incorporation of e-learning in the teaching and learning methodologies (Button et al. 2014: 1312). However, institutions have prioritized adequate access to digital technologies and resourcing ahead of the training requirements for students and educators regarding integration of E-learning informatics in teaching and learning (Deltsidou et al., 2010; Boschman et al., 2015; Gu et al., 2015; Kavanoz et al., 2015; Ninlawan 2015; Orr & Kukner, 2015; Oyedemi, 2015; Valtonen et al., 2015; Park et al., 2016; Siddiq et al., 2016). Provision of adequate digital technologies and computer resourcing is only a necessary condition to ensure successful implementation of e-learning (Boschman et al., 2015; Orr & Kukner, 2015; Hung, 2016; Park et al., 2016). As Webster & Son (2015: 84) observe, educators in South Korea have not employed educational technology “regularly and consistently” in their teaching, notwithstanding “considerable effort and expenditure” by government and universities to promote its use.

4.9. Conclusion

This study revealed the various planning approaches and governance models adopted by countries with different levels of development. Generally, the findings indicated that policy and analysis planning is the most commonly adopted approach across all the HDI groups. However, monocentric and adaptive governance models are commonly adopted in developed and developing countries, respectively. As experiences from the majority of countries confirmed, convectional didactics promote passive rather than active learning, instead the adoption and implementation of e-learning and/or blended learning are being considered in many countries. However, e-learning and/or blended learning come with challenges related to limited ICT training and lack of e-culture, among others. Generally, the different levels of development conform with the conceptualization of developed and developing countries. Seemingly, countries with very high and high HDI, and, medium and low HDI represent developed and developing countries, respectively. Given these findings, the question that needs to be asked in order to make a determination for the adoption and implementation of blended learning especially for a developing country like South Africa is: Does the level of development matter in this regard? The next chapter focusses on South Africa’s experiences with regard to planning, governance, infrastructure, culture and skills of blended learning.

Chapter 5

Digital Transformation in South Africa's Education System

5.1. Introduction

Information and Communication Technology has dramatically expanded the information base, reduced information costs, and created information goods which makes participation in the global knowledge economy among different nations a reality (Bidarian, Bidarian & Davoudi, 2011; Greef, 2015; World Bank, 2016). Technology has facilitated effective and efficient "searching, matching, and sharing of information" and contributed to collaboration of various organization and development agents as it influences how "organizations operate, people seek opportunities, and citizens interact" with their governments and other nations (World Bank, 2016: 8). Thus, the number of people using the Internet in the world has grown rapidly since 2005, however, more jobs and the provision of public services have fallen short of technological expectations (Odendaal, 2016; World Bank, 2016). The effects of technology on global productivity, opportunities for poverty eradication and the adoption of accountable governance has been less than what ICT can actually do (Bidarian et al., 2011; Odendaal, 2016; World Bank, 2016).

Ironically, the global digital divide is still growing regardless of the rapid growth of the technological gadgets and infrastructure such as the Internet, computers and mobile phone, among others (Odendaal, 2016; World Bank, 2016). In developing countries, more than half of the world's population are still without access to ICT and, as such, are unable to participate in the global knowledge economy (Bidarian et al., 2011; Odendaal, 2016; World Bank, 2016). Evidently, about six billion, four billion and nearly two billion people globally do not have access to high speed broadband, Internet and mobile phones, respectively (Bidarian et al., 2011; Odendaal, 2016; World Bank, 2016). Apparently, the digital divide persist across income, age, geography and gender, with the benefits being in favour of the wealthy, skilled, educated and influential people who were in a better position to take advantage of the modern technologies (Odendaal, 2016; World Bank, 2016). Such people thus are the ones who enjoy the benefits associated with the knowledge economy. Therefore, countries must create favourable environments for all their citizens by technologically enhancing and investing in education, promoting good governance and, most importantly, ensuring that the Internet is affordable, open and safe for all (Odendaal, 2016; World Bank, 2016).

South Africa, just like other developing countries, is focused on reducing the digital divide among its population by using ICT in ways that will empower and transform the country (Mayisela, 2013; Murtin, 2013; Xiao, Califf, Sarker & Sarker, 2013; Farrukh & Singh, 2014; Hart & Laher, 2015; Odendaal, 2016). To realize its dream, South Africa outlined in the White Paper on e-Education that all teachers and learners must to be ICT capable by 2013 (Department of Education, 2004). This admirable goal has, however, not yet been achieved three years after the target date. One of the main reasons for not achieving this goal was largely due to the "techno-determinist" view adopted by the government, which prioritise the provision of physical access to ICT infrastructure and consider it to be sufficient for creating, encouraging and supporting the development of ICT capable learners and teachers (Mayisela, 2013; Murtin, 2013; Xiao et al., 2013; Hart & Laher, 2015). Theoretically, it is very clear that the adoption of educational ICT goes beyond access of infrastructure and online material (Fu, 2013; Murtin, 2013; Farrukh & Singh, 2014; Hart & Laher, 2015). Thus, it is necessary for South Africa to consider the preconditions such as the planning approaches, governance models, infrastructure, skills and culture that collectively determine the successful adoption of ICT in education.

ICT does have the capacity to transform education positively through its support of collaborative, creative, innovative, adaptable and flexible teaching and learning that develops 21st century skills (Mayisela, 2013; Murtin, 2013; Xiao et al., 2013; Farrukh & Singh, 2014; Ramnarain, 2014; Greef, 2015; Hart & Laher, 2015; Sangari, 2015). When ICT is integrated with conventional didactics effectively, blended pedagogies can result in higher test scores, improved writing skills and developed self-efficacy among its users (Hart & Laher, 2015). The adoption and implementation of blended learning also enables teachers to effectively deliver lessons to a large number of learners at the same time (Mayisela, 2013; Murtin, 2013; Xiao et al., 2013; Farrukh & Singh, 2014; Hart & Laher, 2015), which should particularly be helpful in a South African context, where teacher-learner ratios are very high (Murtin, 2013). Blended learning in South Africa, however, cannot be achieved without the adoption of appropriate planning approaches and governance models as well as the implementation of necessary infrastructure and required skills and culture from both teachers and learners.

Therefore this chapter evaluates South Africa's adopted planning approaches and governance models, provision and availability of appropriate infrastructure as well as required teachers' and learners' skills and culture for the country's successful implementation of e-learning and/or blended learning. The chapter consists of nine sections inclusive of this introduction and the conclusion. An evaluation of South Africa's national and provincial planning approaches as well as the models for the governance of digital transformation within the educational system is provided in the second and third sections, respectively. The fourth and fifth sections respectively discuss the history of conventional didactics and the implementation of e-learning pedagogies wherein issues of blended and replacement are outlined. The sixth section discusses the necessary and sufficient conditions for blended pedagogies in a democratic South Africa. The appropriateness of the country's planning approaches, governance models, infrastructure, culture and skills for blended pedagogies is discussed as well as the prospects and challenges of this educational transformation are discussed in the seventh and eighth sections, respectively.

5.2. National and Provincial Planning Approaches: Towards Building a Knowledge Society

South Africa's political transformation has resulted in the country's participation in the global arena, exposing it to various pressures and challenges that mostly require innovative, creative and flexible interventions in a rapidly changing global environment (Department of Arts, Culture, Science and Technology, 1994). Over the past ten years transformation has resulted in changing landscapes and citizens who rely heavily on the Internet as the main medium of communication (Department of Communications, 2014). South Africa's population has increased from 37.8 million to 52 million between 1993 and 2011, and thus this increase calls for the adoption of technology to assist in the delivery of services such as health, water and education, among others, as e-services (Department of Communications, 2014). However, the major challenge for South Africa is to successfully integrate "global systems and communities" while the needs and aspirations of South Africans at local level should be satisfied (Department of Arts, Culture, Science and Technology, 1994). According to the Department of Arts, Culture, Science and Technology (1994: n.p.):

> "A national science and technology system focuses attention on the outputs of that system; that is new knowledge and new technologies. A strategy for S&T is aimed at ensuring that there is a sufficient supply of these outputs. A strategy based on a national system of innovation includes, but goes beyond that, seeking in addition to promote changing the ways in which society and the economy do things. It is specifically concerned with supporting and promoting the attainment of national objectives by the creative use of the outputs of the science and technology system".

Therefore, a national system of innovation developed through science and technology can only be regarded as effective and sustainable if the knowledge, technologies, products and processes produced by the system have been converted into increased wealth, by industry and the private sector, and into an improved quality of life for all members of society (Department of Arts, Culture, Science and Technology, 1994). The country should also ensure that its citizens have access to an affordable and fast ICT infrastructure that is able to create "internationally competitive knowledge economy, improve productivity and expand access to new markets" (Department of Communications, 2014: 14). Thus, South Africa's ability to participate in the global knowledge economy depends on the state of its ICT sector in terms of planning, governance, infrastructure, skills and culture towards the transformation. South Africa is recognised as one of the emerging economies in the world and the highest ranked among the developing countries in Africa (Grant Thornton International Ltd., 2015; Hart & Laher, 2015). The country’s position in Africa is partly due to its ICT infrastructure, which provides South Africa with opportunities to enter and compete in the global knowledge economy (Grant Thornton International Ltd., 2015; Hart & Laher, 2015). Accordingly, “technology has become so much part of our lives in the 21st century that even being fully literate now includes an aspect of computer literacy” (Mayisela, 2013: 1).

For a country that strives to be globally competitive, an effective ICT system is required, which is characterised by infrastructure that provides the backbone to a modern economy and its connections to the global economy (National Planning Commission (NPC), 2012). Thabo Mbeki, the former president of South Africa, has emphasized the importance and contribution of ICT in social and economic development at a number of the country's and international fora. He declared that "we must continue the fight for liberation against poverty, against under-development, against marginalisation" and "… information and communication technology … is a critically important tool in that struggle" (Imbizo for African Youth, 2001 cited in Department of Education, 2004). Therefore, appropriate planning approaches are needed for a country like South Africa to use ICT to liberate itself from poverty and inequality and under-development. The national ICT hierarchy support system in South Africa is decentralised through planning and policy implementing structures mostly at provincial and district levels (Department of Education, 2012; Vandeyar, 2013). Although ICT policy and planning is made by the national government, implementation powers are with the provincial government and municipalities (Department of Education, 2012; Vandeyar, 2013). Therefore, the succeeding two subsections discusses the country's ICT planning at national and provincial levels, respectively, in order to establish South Africa's readiness to implement ICT for participation in the global knowledge economy.

5.2.1. National Planning Approaches

In 2001, the Presidential National Commission on Information Society and Development involving public and private sectors was established mainly to advise the government on how ICT can be used to respond to development challenges and also enhance South Africa's global competitiveness (Department of Education, 2004). The commission identified three areas that could use ICT as a tool for national development, namely: education, health as well as small, medium and micro enterprises (SMMEs) (Department of Education, 2004). In order to implement the advice of the commission, the Department of Communications developed the Electronic Communications and Transactions Act (2002) which was introduced intentionally to lead all ICT initiatives in South Africa by recommending development of a five-year national e-strategy that aims to enable and facilitate electronic transactions in the public interest, including in the education sector (Department of Education, 2004). However, the costs, sustainability and efficient utilization of technology can be a major hindrance towards the implementation of ICT. The implementation of this act resulted in the Department of Education investing in national initiatives meant to increase access, enhancing of capacity of managers, teachers and learners, and provision of electronic resources of the highest quality (Department of Education, 2004).

Presently, the growth of wealth in the world's largest and successful economies is created by knowledge-based industries that rely heavily on human capital with 21st century skills and technological innovation (Department of Education, 2004; Department of Science & Technology, 2007; NPC, 2012). The White Paper on e-Education (2004) guides South Africa's approach towards the integration of ICT in pedagogy so as to increase access to learning opportunities by redressing inequalities, improving the quality of teaching and learning as well as providing personalised and real world learning experiences. Schools that implement e-education must utilize ICT to enhance teaching and knowledge acquisition, support the curriculum, access information that increases knowledge, inquiry and depth of investigation as well as planning and management of various school activities (Department of Education, 2004). Accordingly, the use of ICT in South Africa's schools should encourage:

> "Improved inventive thinking skills, such as creativity, problem solving, higher-order thinking skills and reasoning, along with improved effective communication. Improvements in interpersonal skills, such as writing, public speaking, teamwork and collaboration, and improved productivity skills, including creating high-quality products, have also been reported. ICTs encourage a teaching and learning milieu which recognises that people operate differently, have different learning styles and have culturally diverse perspectives. ICTs embrace inclusive education by providing opportunities, alternative methods of instruction and flexible assessments for learners who experience barriers to learning. Benefits to the broader society include increased opportunities for lifelong learning, communication and exchange essential to democratic living, and the creation of a pool of globally competitive human resources. The development and implementation of e-Education will create the pool from which our country can draw professional citizens and export African expertise around the world" (Department of Education, 2004: 16).

Therefore, the policy hopes that "every South African learner in the general and further education and training bands will be ICT capable, that is, use ICTs confidently and creatively to help develop the skills and knowledge they need to achieve personal goals and to be full participants in the global community" (Department of Education, 2004: 17). To successfully integrate ICT in education, all teachers require the knowledge, skills, values and attitudes, as well as the necessary support to become mediators of learning, interpreters and designers of learning programmes, assessors and subject specialists, among others (Department of Education, 2004).

To be able to participate in the global knowledge economy, the Department of Science and Technology (2007) published South Africa's ten-year innovation plan. The plan, in support of various sector departments, hopes to transform South Africa into a knowledge-based economy, in which its economic growth is led by the production and dissemination of knowledge to enrich all fields of human endeavour. That is, South Africa's innovations in science and technology should be able to effectively manage the negative effects of climate change in Africa; fight crime; produce drugs to combat disease; develop sustainable energy solutions; introduce drought-tolerant, disease-resistant crops; devise "intelligent" materials and manufacturing processes; revolutionise our communications; and change the work we do and the way we do it (Department of Science and Technology, 2007: 4) Accordingly, South Africa's knowledge-based economy depends on four interconnected and interdependent pillars, namely: innovation, economic and institutional infrastructure, information infrastructure as well as education. In this regard, the success of the plan would be measured by the degree to which science and technology contributes towards enhancing productivity, economic growth and socioeconomic development (Department of Science and Technology, 2007). A society that effectively uses its knowledge systems and human capital to address development challenges and problems in their country while exploiting economic opportunities in a sustainable way is what South Africa needs to compete with developed nations in the knowledge-based economy.

According to the National Development Plan (NDP) 2030, "science and technology continue to revolutionise the way goods and services are produced and traded" which the former can also "be leveraged to solve some of the biggest challenges in education…" (NPC, 2012: 33). In this way, teaching and learning materials can be delivered electronically to all the areas in South Africa inclusive of remote villages. In 2012, the NPC confirmed that about 17% of South Africa's population have access to the Internet, a significant number that is expected to rise by at least 20% per annum. As a result, the use of digital technologies has transformed mostly the youth who embrace the new media, and this transformation represents a potentially effective intervention of "fostering social inclusion". However, for South Africa to contribute massively to global scientific and technological transformation, the country still needs to develop its "innovative edge" which requires "greater investment in research and development, better use of existing resources, and more nimble institutions that facilitate innovation and enhanced cooperation between public science and technology institutions and the private sector" (NPC, 2012). Although the high cost of broadband Internet connectivity has been identified as a major challenge, all South Africans should be able to "acquire and use knowledge effectively". Therefore, the NPC (2012) recommended that institutional arrangements to manage the ICT environment must be better structured and developed in order to ensure that the country addresses the digital divide among its citizens.

In addition to the NDP 2030, South Africa adopted a National Infrastructure Plan in 2012 with the intension to transform the country's economic landscape by creating a significant number of new jobs and strengthening basic service delivery (Presidential Infrastructure Coordinating Commission (PICC), 2012; James, Wilkinson & Mavuso, 2016). Furthermore, the plan is in support of the integration of African economies for more improved and fast economic growth and development (PICC, 2012). To respond to the country's challenges associated with inequality, poverty and unemployment, the coordination, integration and implementation of plans is important (Bonnett, 2016; James et al., 2016). For this reason, a single common National Infrastructure Plan that monitors and centrally drive development, "identify who is responsible and hold them to account", as well as "develop a 20-year planning framework beyond one administration to avoid a stop-start pattern to the infrastructure roll-out" was developed to "coordinate, integrate and accelerate implementation" (PICC, 2012: 7). The National Infrastructure Plan which identified 18 Strategic Integrated Projects (SIPs), hopes to "promote balanced economic development, unlock economic opportunities, address socio-economic needs and promote job creation", among others (PICC, 2012: 9). The

SIPs include "catalytic projects" that should promote rapid development and growth aligned with key cross-cutting areas such as human settlement planning and skills development. Moreover, these SIPs consist of 5 geographically-focussed, 3 spatial, 3 energy, 3 social infrastructure as well as 2 knowledge, 1 regional integration and 1 water and sanitation SIPs (PICC, 2012; James et al., 2016). Of the 18 SIPs, about 5 are directly related to educational ICT infrastructure. These include generation of electricity to support socioeconomic development; transmission and distribution of electricity for all; national school build programme; infrastructure for higher education; as well as expansion of access to communication technology

To realise the NDP 2030 of a "seamless information infrastructure that by 2030 will underpin a dynamic and connected vibrant information society and a knowledge economy that is more inclusive, equitable and prosperous" (NPC, 2012 cited in Department of Communications, 2014: 3), and that of the NIP of providing "infrastructure development for higher education, focusing on lecture rooms, student accommodation, libraries and laboratories, as well as ICT connectivity" (PICC, 2012: 22), the Green Paper on National Integrated ICT Policy was developed. The Green Paper is guided by a number of objectives and principles which include the planning, development and implementation of an "inclusive, transparent, accessible and technology-neutral" policy making as well as regulated process that should promote a knowledge-based society (Department of Communications, 2014). For South Africa, three major technological advancements, specifically related to Internet and communication, have a great influence on the ICT landscape of the country. These include the Internet Protocol (IP), fibre-optic technologies as well as wireless technologies. Although the implementation of IP has affected the cost of networks, it offers innovative opportunities for improving existing services and the planning of new ones. IP-based technologies allow for distribution of a variety of applications over a single network without having to create separate networks for voice, data, audio and video (Department of Communications, 2014). The deployment of fibre-optic technologies has improved the speed and increased the size of data transmission from one point to the other regardless of the distance between the points of concern with reduced costs (Department of Communications, 2014). Whereas wireless technologies can be used anytime anywhere as they do not rely on cables for connectivity, they suppress the fixed-line connections in the delivery of voice, data, audio and video. Thus, the wireless environment has become the focus point in the development of the broadband market (Department of Communications, 2014).

South Africa's national focus on ICT as a catalyst for participation in the global knowledge economy has provoked the initiation of ICT integration in education. The NDP 2030 vision on education states that the "education, training and innovation system should cater for different needs and produce highly skilled individuals. The graduates of South Africa's universities and colleges should have the skills and knowledge to meet the present and future needs of the economy and society" (NPC, 2012). To practically realise the vision, partnership across the South African education system and internationally accredited institutions should lead to higher levels of innovation, creativity and collaboration. Additional, South Africa's investments will be channelled towards people development through education which will be used as an instrument that will create societies that are better able to respond to the 21st century needs associated with "lifelong learning", "continuous professional development" and "knowledge production" alongside innovation creativity and collaboration which are central to building the capabilities of individuals and the nation as a whole (NPC, 2012). Planning, governance, infrastructure, skills and culture, however, must be considered for a country like South Africa with a medium HDI level. The NDP 2030 asserts that, in planning and governance of the adoption and implementation of e-learning and/or blended learning, the interests of all stakeholders in education should be integrated and aligned to support the goal of achieving effective educational goals that addresses community needs and national development.

Furthermore, educational institutions should be provided with the capacity to implement policy and where it is lacking, the challenge should be addressed urgently. South Africa hopes that by 2030 all schools would meet the minimum standards of ICT infrastructure development. According to the NDP 2030, "high speed broadband should be readily available and incorporated into the design of schools. This will enable greater use of technology in education and enhance the classroom experience for both teachers and students" (NPC, 2012: 303). Moreover, distance education stands a good chance of also being expanded, especially with institutions of higher learning. Distance education is defined by the Department of Higher Education and Training (DHET) of South Africa as "a set of teaching and learning strategies (or educational methods) that can be used to overcome spatial and/or temporal separation between educators and students" (DHET, 2011: 4). Accordingly, the distance education approach adopts a "multi-mode of delivery" which comes with opportunities to remedy the need for skilled human resources through increased and speedy access to educational ICT, options for "retraining and personal enrichment", and the "balancing of inequalities between age groups" (DHET, 2011).

The advancements in educational ICT and upfront investments, especially in human resources are needed in technological and curriculum designs as well as quality assurance and monitoring of such a system. The Department of Higher Education and Training (DHET) in South Africa recently published two papers that guide the use and implementation of blended learning especially in the provision of distance learning, namely: the White Paper for Post School Education and Training (DHET, 2013) and the Policy for the Provision of Distance Education in South African Universities in the Context of an Integrated Post-school System (DHET, 2014). The former estimated that by 2030, South African universities could expect a total enrolment of approximately 1.6 million students, which would be impossible for "traditional campus-based universities" to accommodate such huge numbers; therefore, blended learning should play an important role in the future to assist in realising the educational dreams of the increasing numbers of students (DHET, 2013).

5.2.2. Provincial Planning Approaches

To operationalize the ICT national plans and aspirations, South Africa's nine provincial governments have to develop and implement their own plans. Although the Presidency is leading the ICT revolution in education through its "Operation Phakisa", most provinces are still without educational technology plans. Therefore, for the purpose of this subsection, the provincial ICT planning approaches of the Gauteng and Western Cape Provinces, which decided to take the lead in the implementation of e-learning, are evaluated.

5.2.2.1. Gauteng Province

Informed by the New Growth Path's and NDP 2030's rapid extension of access to and use of ICT for participation in the global knowledge economy, the Gauteng Provincial Government developed the ICT Development Strategy (n.d.). The strategy is driven by a number of objectives inclusive of "the provision of universal access to broadband for citizens, business as well as government institutions; building the network infrastructure and information super-highway to encourage the development of advanced workforce with better ICT skills; increasing ICT skills capacity within the public and the private sectors to create a pool of ICT practitioners and entrepreneurs; and, improving of service delivery by providing high quality ICT services through e-government, among others (Gauteng Department of Economic Development, n.d.). Ultimately, the Gauteng ICT Development Strategy hopes to bridge the digital gap, strengthen economic productivity and competiveness as well as enable government service delivery in areas such as health, education, safety and security and social development, in the province (Gauteng Department of Economic Development, n.d.). The strategy locates the role of ICT within three interrelated goals, namely, "productivity, connectivity networks and lastly, ICT skills capacity" (Gauteng Department of Economic Development, n.d.). Accordingly, the achievement of the three goals should lead the province into experiencing the "development of new businesses", participatory and effective e-governance as well as new ways of educating its society (Gauteng Department of Economic Development, n.d.). To create a knowledge society from citizens, businesses and government, the province aims to exploit the use of the Internet, telecommunications and mobile technologies as well as computer software and applications.

To achieve effective participation in the knowledge economy and to further sustain it, ICT capabilities, skills and appropriate culture need to be developed. Accordingly, the Gauteng ICT Development Strategy identified three levels at which skills should be developed, namely: "skills needed for modern life outside the workplace; skills needed in the work place to respond to changes in business processes and industry structures; and technical skills for the ICT specialists needed in ICT and related industries" (Gauteng Department of Economic Development, n.d.: 41). As a response to the skills needed, the provincial government planned to implement wireless Internet in classrooms in order to connect all teachers and over 1.8 million learners in Gauteng Province (Gauteng Department of Economic Development, n.d.). To supplement school-based ICT development, Internet connection will be taken to households for both teacher and learner use. Investments in ICT education should focus on introducing computers in classrooms, giving schools the flexibility to utilise the Internet for teaching and learning, within budget constraints, as well as encouraging the buying and use of appropriate software, based on institutional requirements (Gauteng Department of Economic Development, n.d.). To develop technical skills for ICT specialists, the government planned to support institutions of higher learning in taking an active role in developing the needed experts in the field of ICT (Gauteng Department of Economic Development, n.d.). This approach will therefore ensure increasing ICT skilled labour at all the three levels that the provincial government identified. Although Gauteng seems not to have a formal educational ICT, it has taken a lead in the implementation of e-learning pedagogies in South Africa.

5.2.2.2. Western Cape Province

The ability to stimulate economic growth, support government functions and public services, and promote the private sector, is more easily achieved with ICT. The availability and accessibility of a strong and reliable ICT infrastructure inclusive of broadband network is central to “efficient” communications and Internet connections which play a key role in achieving the provincial objectives of technology (Palmer & Graham, 2013; Mawson, 2015; Phakathi, 2015; South Africa.Info, 2015b; Western Cape Department of Education, 2015; Mzekandaba, 2016). Thus, infrastructure is considered a requirement to addressing existing backlogs in technological coverage by increasing the “speed and functionality” of current networks and supplying new ICT as it is introduced (Palmer & Graham, 2013). For the Western Cape, ICT is expected to “provide the necessary infrastructure to integrate various government departments and offices and improve public services, such as public safety, disaster management and communications; improve Internet access at a household level; reduce the cost of international bandwidth; improve connection to businesses” and most importantly to promote e-learning (Palmer & Graham, 2013: 61). To respond to the NDP and the provincial goals in relation to ICT, Premier Helen Zille and Education MEC Debbie Schafer in the Western Cape outlined the details of the e-learning project that the Provincial Department of Education is implementing across the province.

According to Schafer “this is a very exciting initiative that has taken years of planning and has the potential to make a major contribution towards improving the quality of teaching and learning in the province" (South Afica. Info, 2015b: n.p.). Among others, the objective of the project is to refresh existing computer laboratories and provide new laboratories as well as technology-rich classrooms which are called “smart classrooms” (Palmer & Graham, 2013; Mawson, 2015; Phakathi, 2015; South Africa.Info, 2015b; Western Cape Department of Education, 2015; Mzekandaba, 2016). The Premier emphasized that "e-learning will assist us in tackling some of the problems we face, including increasing access to quality education in disadvantaged communities, providing support for struggling learners, contributing towards teachers’ training and professional development and improving management and administration at schools. It will also provide learners with the skills to participate in our increasingly technology-based economy in the future" (South Afica. Info, 2015b: n.p.). Even though the Western Cape’s Department of Education does not have an ICT implementation plan for schools, it directly responds to the national planning.

Drawing from the planning experiences of the Gauteng and Western Cape provinces, the country seems to have adopted the policy and analysis planning approach for the implementation of educational technology. The provincial planning approaches in question are derived from the national plans which hope to technologically transform South Africa for national development and participation in the global knowledge economy. However, South Africa is characterised by good plans which are hardly implemented (Bonnett, 2016; James et al., 2016; Wilkinson, 2016). The lack of implementation of plans is apparently mostly due to “capital availability and planning”, especially from the government’s side (James et al., 2016). In other words, South Africa has plans towards the implementation of what it considers effective and sustainable ICT infrastructure for development of skills necessary for the country’s participation in the global knowledge economy, but the challenge remains their implementation.

5.3. Governance Models for Digital Transformation in the Education System

In a knowledge society, “individuals, groups, organizations and government” must work as partners, rather than opponents in the provision of quality life (Department of Arts, Culture, Science and Technology, 1994). Community networking, stakeholders’ collaboration and common purpose and understanding of “healthy competition, openness and accountability” should be the guiding principles for building a sustainable knowledge economy (Department of Arts, Culture, Science and

Technology, 1994). Accordingly, ICT must “build and sustain social, legal and economic structures and processes that support innovation”, collaboration and creativity; be “competitive while sustaining the natural environment and leading to wellbeing for the greatest number of people” (Department of Arts, Culture, Science and Technology, 1994: n.p.). Most importantly, the sustainability of the 21st century skill for participation in the global knowledge economy requires citizens to develop and frequently update their “knowledge, competencies, abilities and skills” that are necessary for the production of innovative products and services. For a country to be able to “envision a desired future, examine its possibilities, select preferred results, and pursue its choices vigorously”, collaboration of various stakeholders in the process of concern is crucial (Department of Arts, Culture, Science and Technology, 1994: n.p.). With the national government leading the processes of ICT implementation in the country as the principal stakeholder, a number of its departments play a crucial role in ensuring that South Africa participates in the knowledge economy, such as the central policy departments, agencies, science, engineering and technology institutions and state corporations. Moreover, the involvement and participation of the private and education sectors as well as the non-government organizations are regarded as equally important (Department of Arts, Culture, Science and Technology, 1994; Bonnett, 2016; James et al., 2016; Wilkinson, 2016).

At a national level, a policy goal is to ensure that ICT infrastructure and systems adequately support the needs of the economy and allow for parties beyond the public sector to participate in the provision processes (NPC, 2012). Over the last decade, the government, private sector, parastatals, and non-governmental organisations have responded positively to the challenge of bridging the digital divide in South Africa (NPC, 2012; Department of Communications, 2014). According to the NPC (2012: 190) “the ecosystem of digital networks, services, applications, content and devices, firmly integrated in the economic and social fabric, will connect public administration and the active citizen; promote economic growth, development and competitiveness; drive the creation of decent work; underpin nation building and strengthen social cohesion; and support local, national and regional integration”. In South Africa, ICT should reduce the spatial exclusions and enable unified participation by the majority of citizens in the global ICT system (Department of Arts, Culture, Science and Technology, 1994; NPC, 2012; Department of Communications, 2014). ICT is an enabler which speeds up delivery, develops intelligence, creates ways to “share, learn and engage” knowledge and thus, an all-inclusive strategy is needed to diffuse it in all areas of society and economy (Department of Arts, Culture, Science and Technology, 1994; NPC, 2012). A single “cohesive strategy” is needed to ensure the distribution of ICTs in all areas of society and the economy. Like energy and transport, ICT is an enabler that can speed up delivery, support analysis, build intelligence and create new ways to share information, learn from each other and globally engage with other parties. Additionally, South Africa’s policies revealed that the “ICT revolution had a major impact on the way in which societies are organised and managed, resulting in fundamental and far-reaching” changes that are key to wealth creation and social and economic development (OECD, 2008: 330 cited in Vandeyar, 2013).

In Gauteng Province, ICT infrastructure is dominated by both the government and private sectors. The former is inclusive of the municipalities and state-owned enterprises; the latter is divided into two categories namely; “fixed line and mobile companies” (Gauteng Department of Economic Development, n.d.). Fixed line companies dominating the province includes Telkom, Neotel and Dark Fibre Africa, among others, while the mobile sector is dominated by MTN, Vodacom and Cell C. These companies, in partnership with the government, have invested in massive ICT infrastructure in Gauteng Province across various institutions (Gauteng Department of Economic Development, n.d.). Although planning of ICT in Gauteng is informed by government objectives, its governance takes into consideration the different stakeholders. The Western Cape provincial government, in partnership with private institutions such as Telkom and Broadband InfraCo, are providing the “fibre optic cabling” for mobile networks and faster, cheaper and more reliable communication networks and Internet connectivity (Palmer & Graham, 2013). The private sector, which has a large financial stake in the system, dominates the provision of ICT through mobile phones and Internet connectivity (Palmer & Graham, 2013).

However, South Africa’s government is mostly misguided by the focus it places on the implementation of the ICT policy in education. Currently, ICT policy and its implementation and management seem to be on provision of hardware and infrastructure, rather than on collective preconditions which are inclusive of planning, governance, skills and culture necessary for the successful integration of these classroom technologies. It appears as if the officials with the decision-making capacity do not have a clear understanding of the link between the provided infrastructure, teachers' and learners' ICT kills and e-culture as well as its use in the development of appropriate skills for the participation in the global knowledge economy and national development. Generally, South Africa faces a demand for economic growth where, in this case, participation in the global knowledge economy is key. Therefore, collaboration between the state and the private sector is important to yield economic growth, especially the Gross Domestic Product (GDP) (James et al., 2016; Wilkinson, 2016). Public-private partnerships wherein the state acts as a bank while private companies that have the necessary skills, expertise and equipment, are tasked with the responsibility to implement the ICT plans on their behalf (Wilkinson, 2016).

5.4. History of Conventional Didactics

In South Africa, historical tradition resulted in increasing "racial and ethnolinguistic separatism and segregation, commitment to different and inferior schooling for the vast majority of children, based primarily, if not solely, on their race" (Reagan, 1989: 5-6). By then, the Apartheid legislation and policies promoted what is currently viewed as an "unequal education system", which was meant to ensure that there are inequalities in opportunities between the Blacks, Coloureds and the Whites (Reagan, 1989; Kallaway, 1995; Motala, 1995; Letseka, 2014). Between the late 1940s and early 1950s, education for Blacks was controlled and operated independently and in isolation by different Christian Missionary Groups administered by provinces (Reagan, 1989). From 1953, the Bantu Education Act transferred the control of Black education from the churches to the government, thereby changing their administration from provincial to national level as part of the Apartheid transformations (Reagan, 1989). The "Bantu education", was meant to provide Black South Africans with educational experiences which emphasized and reinforced ethnic and tribal identity, whereas it offered "effective and vocational skills" determined by the White elites as "appropriate" for Blacks (Reagan, 1989; Kallaway, 1995; Motala, 1995; Letseka, 2014).

Therefore, "Bantu education would play an essential role in the creation and maintenance of the "white utopia," teaching black children their "place" in society, as well as providing them with the limited skills necessary for their future occupations and encouraging an identification with their tribal group through the use of the mother tongue and separate ethnolinguistic schooling facilities where feasible" (Reagan, 1989: 7). However, the implementation of the Bantu Education Act was resisted by Black learners, parents and political leaders as well as many churches that previously were involved in the provision of education for this racial group (Reagan, 1989; Kallaway, 1995; Motala, 1995). Furthermore, the different education systems based on race adopted in South Africa were globally regarded as "sexist, Eurocentric and elitist" (Reagan, 1989). After the dispensation of democracy, South Africa's education was transformed by replacing the Bantu education with "multicultural and multiracial" education (Reagan, 1989; Kallaway, 1995; Letseka, 2014). The current education system hopes to increase the number of well-trained and skills Black professionals who are equally eligible to the Whites to be employed in high-status occupations previously closed for them and also to participate in the knowledge economy (Reagan, 1989). However, there has always been a concern on how the South African education and its related opportunities can be made more equitable and just, especially given the country's pedagogic history in relation to the curriculum content, teaching methods and, most importantly, the learners' role in their own knowledge acquisition (Kallaway, 1995; Motala, 1995; Letseka, 2014).

Curriculum content is mainly concerned with changes in "teaching packages" to those that assist learners to be able to critically analyse, manipulate and evaluate knowledge as well as raise appropriate and factual questions when necessary (Reagan, 1989; Kallaway, 1995; Motala, 1995; Letseka, 2014). Apparently, teaching methods which adopted the "dictation-style" are mostly rejected by learners in favour of interactive approaches wherein both teachers and learners work collectively during knowledge transfer and acquisition (Reagan, 1989; Kallaway, 1995; Motala, 1995; Letseka, 2014). Learners should be actively involved in their own teaching and learning processes in order to ensure that appropriate critical thinking, collaborative and innovative skills are developed (Reagan, 1989; Kallaway, 1995; Motala, 1995; Letseka, 2014). This skills development is in preparation for participation in the global knowledge economy and national development. Currently, there is a need for technological transformation in South Africa's education, especially given its historical context (Kallaway, 1995; Letseka, 2014). The past recommended educational objectives, curriculum development procedures and assessment methods in this democratic country, mostly established during the apartheid era, do not address the current needs associated with the 21st century skills (Kallaway, 1995). Although the past education system placed emphasis on "critical skills and conceptual development", the teaching and learning methodologies and the forms of assessment adopted in schools do not reflect these values and objectives (Kallaway, 1995; Motala, 1995; Letseka, 2014). South Africa’s education system, which was characterised by conventional didactics as the main teaching and learning methodology, adversely affected learners’ critical thinking, and innovative and collaborative skills (Kallaway, 1995; Motala, 1995; Reagan, 1989). Instead, learners were taught to recall and reproduce the vast amounts of factual contents mostly found in textbooks.

South Africa is currently a “liberal democratic state” that asserts that its constitution embraces a variety of rights and freedoms for individuals inclusive of the “right to education” (Letseka, 2014). As such, the country's constitution has been described as “a model liberal democratic constitution” (Jordan, 1996 cited in Letseka, 2014), “a constitution of classic liberalism” (Vilakazi, 2003 cited in Letseka, 2014), and a “state of the art document” (Mattes, 2002 cited in Leseka, 2014), that is “widely hailed as liberal and egalitarian” (Deveaux, 2003 cited in Letseka, 2014) because “it values human dignity and frames human rights at its heart” (Robinson, 2012 cited in Letseka, 2014). Although South Africa’s education system offers free education to the poor, it does not necessarily fulfil the modern aspirations of developing the 21st century skills which are a requirement for participation in the knowledge economy and national development (Letseka, 2014). The heavy reliance on conventional didactics in South Africa is not oriented towards transforming the labour force by developing their 21st century skills associated with technology, however, it is to passively transmit knowledge to learners (du Plessis, Gillies & Carroll, 2014). Instead, most teachers spend time in class using conventional methods of transferring knowledge to learners, even though they remain disconnected form the 21st century generation that they teach. Seemingly, conventional didactics in South Africa results in learners’ boredom and lack of concentration in class, poor performance in assessments, and even dropping out of school.

Consequently, the dropout rate remains high as teachers are either unqualified or under-qualified to use ICT (Letseka, 2014; du Plessis, 2014). Conventional didactics are also not compatible with the development of 21st century skills, which requires modern technology. Generally, conventional didactics do not offer South African learners the level of education that allows them opportunities to participate in the global knowledge economy for national development (Letseka, 2014; du Plessis, 2014). Moreover, a lack of integration of e-learning with conventional didactics compromised the ICT skills development of both teachers and learners, which are now dominant for participation in the knowledge economy (Letseka, 2014; du Plessis, 2014). To fulfil the modern market requirements, there is a need for South Africa to adopt blended pedagogies. Therefore, it was appropriate for South Africa to review its education system so to ensure that the country gains its legitimacy and credibility from the national and international public, as well as the teaching profession itself, by introducing digital technology in order to prepare learners to participate in the global knowledge economy as well as the national development.

5.5. Implementation of e-Learning Pedagogies: Blended Pedagogies versus Replacement

E-learning is a “complex value chain” challenge that:

> “starts with content that has to be digitised, then the ability to put that content onto the web, so we need a portal and the cloud. Then we need the ability to transmit that information to schools and teaching centres – that’s a connectivity issue – as well as the ability to cache it at the school, so it can be accessed when it is needed. Then we need the devices for the teachers and the learners to consume that material. Those are all the technology aspects: the technology needs to be implemented and supported, and people need to be trained to maintain and use it” (National Education Collaboration Trust, n.d.: n.p.).

Most importantly, e-learning’s success depends entirely on “human behaviour” of the uses of ICT, more specifically that of teachers (National Education Collaboration Trust, n.d. .; Areff, 2015; Bothma, 2015). Therefore, teachers must first be trained for them to be able to use the technology effectively but more importantly, they must be convinced that they should use ICT as a “learning tool” (National Education Collaboration Trust, n.d.; Areff, 2015; Bothma, 2015; Fredericks, 2015a; Monama, 2015; Nkosi, 2015; Zille, 2015; Mzekandaba, 2016). However, a “universal blueprint” for the implementation of e-learning would not work for South Africa, which is characterized by a variety of landscape, culture, access to infrastructure and services as well as inequalities, among others (National Education Collaboration Trust, n.d). Rather numerous blueprints, which are influenced by the schools in question's situations based on a number of variables, such as geography, affluence, infrastructure and technological advancement, among others, should serve the intended purpose (National Education Collaboration Trust, n.d). For South Africa, provincial governments have adopted different approaches towards the implementation of education for their schools, although they are left without blueprints that reflect their characteristics. Thus, the implementation of e-learning at school level mostly depends on the provincial governments' plans in this regard. Although the Gauteng and Western Cape provinces are leading in the adoption of educational ICT in South Africa, other provinces have also invested in e-learning.

In the 2000s, "Khanya" and "GautengOnline" Projects were education initiatives of the Western Cape and Gauteng provinces, respectively in pursuit of provincial economic and ICT development (Pasensie, 2010). The Khanya Project was established in 2001 by the Western Cape Department of Education and is one of the first provincial government programmes dedicated and aimed at addressing the "lack of teacher capacity" and the need to deliver school curriculum through ICT (Pasensie, 2010). The project aims to train "all teachers" in the Western Cape to be able to use appropriate and available technology for knowledge transfer to "every learner" by the year 2012. The project hopes to enhance teaching and learning at foundation, primary and secondary school levels by integrating ICT in pedagogy (Pasensie, 2010). Funded by the Western Cape Department of Education, the allocated budget to Khanya Project was channelled towards the provision of ICT infrastructure. However, the funding was not sufficient to achieve all the educational objectives and a public-private partnership unit within Khanya Project was introduced in order to procure funding from donors (Pasensie, 2010). The funding was mostly used for purchasing of interactive whiteboards, data projectors, computers as well as electrical supply, network cabling and security for schools (Pasensie, 2010). The project has managed to provide the 90 percent of the 1 570 government schools in the Western Cape with ICT with a total of 46 120 computers in use. Additionally, over 28 000 teachers have been trained to use technology for curriculum development and delivery with more than 900 000 learners recognised as beneficiaries of the project (Pasensie, 2010).

The GautengOnline Programme is one of the provincial government's first and main ICT projects to support the delivery of "quality basic education" by creating "sustainable e-learning environments" in public schools where learners have a great opportunity to maximise their potential (Pasensie, 2010; Sukazi & Ntshingila, n.d.). For the first time in 2008, the project has introduced thousands of learners and their teachers, specifically in public schools, to computer literacy and an opportunity to access and use the Internet (Pasensie, 2010; Sukazi & Ntshingila, n.d.). As per the plan, the GautengOnline Project built 637 computer labs, bringing the number of labs successfully installed with ICT to 2 199 across the province (Sukazi & Ntshingila, n.d.).

The Gauteng Provincial Government understands and appreciates the opportunities provided to the nation for development purposes by the Internet and the impact that it has on "e-teaching", e-learning and "e-education" (Sukazi & Ntshingila, n.d.). Therefore, training for teachers on the use of computer laboratories for innovation, creativity and collaboration has been provided to all schools with GautengOnline facilities. The provided ICT integration training offered to schools by the Gauteng Department of Education focuses on enhancing teachers' Technological Pedagogical Content Knowledge needed to be able to use the laboratories (Pasensie, 2010; Sukazi & Ntshingila, n.d.). The training initiatives are offered on an ongoing basis because teachers are key role players in the successful implementation of GautengOnline. Although the project is faced with a number of challenges such as computer theft at schools, poor Internet connectivity levels, and mismanagement, there does appear to be some progress in connecting the schools to the Internet (Pasensie, 2010; Sukazi & Ntshingila, n.d.). The Khanya and GautengOnline Projects may be considered as the first provincial "education-centred" initiatives that provide schools with computers in South Africa (Pasensie, 2010; Sukazi & Ntshingila, n.d.). Therefore, the lead taken by the two provinces in the country on the integration of technology in conventional teaching and learning is not a new phenomenon.

South Africa has also gotten onto the band wagon of replacing conventional didactics with e-learning pedagogies. The introduction and implementation of ICT in schools resulted in the need for the governments to revisit the country's national curriculum in order to include the integration of ICT into teaching and learning (Department of

Education, 2004; Department of Basic Education, 2011; Vandeyar, 2013). From the early 2000s, South Africa's revised school curriculum has supported an "inquiry-based approach" to learning that encourages learners to "explore objects, situations and events in their immediate environment, to collect data and record information and draw conclusions accurately" (Department of Education, 2002: 34). Additionally, the Department of Education (2004) set ambitious targets that should have been achieved by 2013 as a response to the need of integrating digital technology in education. The targets included, among others, that by 2013 "all schools will have had access to a networked computer facility for teaching and learning, and to high quality educational resources"; and, "all schools, teachers and learners will have been confident and competent users of ICT, and ICTs will have been integrated into teaching and learning at all schools" (Bialobrzeska & Cohen, 2005: 14).

The new Curriculum and Assessment and Policy Statement (CAPS) hopes to ensure that learners are able to acquire and apply knowledge and skills in ways that are meaningful to their own development within local contexts, while on the other hand it takes into consideration the "global imperatives" (Department of Basic Education, 2011). CAPS therefore guarantees that education will be "equipping learners, irrespective of their socio-economic background, race, gender, physical or intellectual ability, with the knowledge, skills and values necessary for self-fulfilment, and meaningful participation in society as citizens of a free country" (Department of Basic Education, 2011: 4). South Africa's CAPS document states that education must "promote knowledge and skills in scientific inquiry and problem solving; the construction and application of scientific and technological knowledge; an understanding of science and its relationships to technology, society and the environment" (Department of Basic Education, 2011: 8). Consequently, South Africa's education system hopes to develop learners' skills needed to identify and solve problems; make decisions using critical, innovative, creative and collaborative thinking; collect, analyse, organise and critically evaluate information using science and technology effectively (Department of Basic Education, 2011; Ramnarain, 2014).

However, the move towards incorporation of e-learning in South Africa, a developing country, is so ubiquitous that it may seem to be unproblematic given the investments for this development. The investments are driven by the country's National

Development Plan (NDP) 2030 which states that “by 2030, South Africans should have access to education and training of the highest quality, leading to significantly improved learning outcomes” (NPC, 2012: 296). Some of the requirements of this vision are that all schools must have well-functioning libraries, computer and media centres and high speed broadband which is readily available and incorporated into the design of schools to ensure that learners from previously disadvantaged schools have access to necessary educational resources (NPC, 2012). As a response to the aspirations of the NDP 2030, in his 2015 National Budget Speech, Minister of Finance Mr Nhlanhla Nene indicated that R29.6 billion and R1.1 billion were allocated for education infrastructure grants and broadband connectivity in government institutions and schools of South Africa, respectively. The allocated funds were meant to build and improve digital technology infrastructure and produce labour force that meets the requirements of the global knowledge economy through investments in education. Additionally, the 2016 National Budget Speech by Minister of Finance Mr Pravin Gordon indicated that the basic education was allocated a total budget of R204 billion which is expected to increase to R254 billion in the 2018/19 financial year (Gordon, 2016).

5.5.1. Gauteng Province Schools Going “Paperless”

"Technology, the Internet, a multi-skilled workforce, innovation and collaboration” are critical to the knowledge economy which require 21st century skills to be able to adapt to a rapidly changing technological environment (South Africa.Info, 2015a; Wesselink, 2015). Since the inception of the NDP 2030, South Africa’s education seems to be taking the desired direction towards adoption of digital technologies in education, with Gauteng and Western Cape provinces taking the lead. The Gauteng Province started by introducing ICT in June 2013 among “school principals, district cluster and circuit leaders, human resource management officials, and curriculum officials, district and head office officials” for better improved and strengthened communication between these various personnel (Jacobs, 2013a; Gauteng Department of Education, 2014). A total number of 2 600 principals, district cluster and circuit leaders, human resource management officials, and curriculum officials, district and head office officials were given Samsung tablets in addition to 2 200 Blackberry smartphones which were rolled out in 2010 to improve the management and operations of schools in the province (Jacobs, 2013a; Gauteng Department of Education, 2014). The main aim of the project is to ensure that school principals, and district and head office officials are able to exchange information quickly without paperwork, which normally results in lengthy processes, and for improved school management (Jacobs, 2013a).

With the total costs of R15 million for project implementation and operation annually, the tablets and phones are provided with R400 airtime and are configured to use a top-up prepaid system (Jacobs, 2013a; Gauteng Department of Education, 2014). All the mentioned officials have a personal e-mail address, which enables them to access data to facilitate effective communication. They have received training by a technical staff member from the Department of Education on using the devices. These technical staff members are based in district offices for further support (Jacobs, 2013a). In addition to improving communication, the project hopes to monitor daily attendance of teachers and learners so as to intervene when a need arises. The manual taking of the register at schools in collaboration with the technological enriched one which logs onto the central system, should assist in controlling both teachers' and learners' absenteeism (Jacobs, 2013a).

On January 14, 2015 the MEC of Education in Gauteng, Mr Panyaza Lesufi, in collaboration with the Deputy President of the Republic of South Africa, Mr Cyril Ramaphosa, and other government officials, launched the R17 billion "Big Switch On Pilot Project" in seven schools in the province (Maune, 2015; Phakathi, 2015; South Africa.Info, 2015a). The Big Switch On Pilot Project is "a paperless education system which will give learners access to learning materials, workbooks and other subject matter through the use of ICT" (South Africa.Info, 2015a: n.p). The aim of the project is to promote "paperless classrooms" which relies on the use of digital technologies for interactive teaching and learning in all high schools by 2019 in Gauteng (Maune, 2015). The Big Switch On Project is one major first step in realising Gauteng's vision of "building a world-class education system by modernising public education and improving the standard of performance across the entire system" (South Africa.Info, 2015a: n.p.). Gauteng Provincial Government distributed 88 000 tablets to all learners in the seven schools which are preloaded with learning materials, workbooks and lessons as well as interactive whiteboards and laptops for teachers as well as subject advisors (Bothma, 2015; South Africa.Info, 2015a). Accordingly, the schools received "state-of-the-art Internet connections", and interactive LED whiteboards, whereas each learner was provided with a tablet with the hope of turning ordinary schools into "classrooms of the future" (South Africa.Info, 2015a). The project enables teachers and learners to access resources and knowledge that exist beyond the walls of the classrooms and, most importantly, provides them with the necessary e-skills and connects them to the globe (South Africa.Info, 2015a). Learners from one of the seven schools confirmed that the tablets will make their knowledge acquisition more exciting, whereas one Grade 10 learner further indicated that school absenteeism will be avoided at all times and there would not be any reason to fail science or mathematics ever (South Africa. Info, 2015a).

Moving beyond the pilot phase that began in seven schools on January 14, 2015 an additional 375 high schools, mainly in township and rural areas, were part of the Big Switch On Project (Areff, 2015; Bothma, 2015; Monama, 2015; Nkosi, 2015). On July 21, 2015 the MEC of Education in Gauteng, Mr Panyaza Lesufi, officially implemented the Big Switch on Project at the 375 high schools where all Grade 12 learners and teachers were given tablets and laptops, respectively, with unlimited data bundles from 5am to 9pm daily for educational purposes (Areff, 2015; Bothma, 2015; Monama, 2015; Mzekandaba, 2016; Nkosi, 2015). Even though teachers and Grade 12 learners have free unlimited access to the Internet, all social networks such as Facebook, Twitter, and WhatsApp and other irrelevant sites are banned from the tablets and the laptops (Nkosi, 2015). According to Mr Lesufi, “Almost 98% of the teachers in the schools sacrificed their school holidays to be trained” to be able to use technology in knowledge transfer and acquisition (Areff, 2015; Bothma, 2015; Monama, 2015; Mzekandaba, 2016; Nkosi, 2015). He further asserted that “as of tomorrow, my beautiful learners, your teacher will never give you an exercise that you have to write in an exercise book. Pupils’ tablets will come in with textbooks uploaded as e-books.

Chalkboards are becoming a thing of the past in Gauteng. If you want to see a chalkboard and duster you must go to a museum, you must not come to our schools” (Areff, 2015: n.p.; Nkosi, 2015: n.p.). Over 4 000 Grade 12 classrooms were refurbished by replacing ceilings, fitting specialised lights and installing blinds to improve the environment for the 1 800 interactive smartboards, while 17 000 tablets were distributed to Grade 12 learners at the targeted schools (Bothma, 2015; Mzekandaba, 2016). For security reasons, the latest distributed tablets were already installed with tracking devices, whereas all schools were linked to the nearest police station for rapid response in cases of theft (Bothma, 2015). Currently, only Grade 12 learners are taught using ICT in the 375 schools (Areff, 2015; Bothma, 2015; Monama, 2015; Mzekandaba, 2016). To extend the project, the Premier of Gauteng Province Mr David Makhura in his 2015 State of the Province Address, indicated that over R300 million will be invested for ICT infrastructure over the next three years, allowing for the extension of e-learning in all public schools. However, the migration of all Gauteng's schools to the digital education system is estimated to cost R17 billion over the next five years (Monama, 2015; South Africa.Info, 2015a). The MEC of Education confirmed that although R37 billion was invested for educational ICT across the province, only R2 billion has been spent thus far (Nkosi, 2015). To ensure that the tablets are used for the intended purposes, they are programmed for educational purposes only, with pre-loaded lessons and study materials. Moreover, permanent IT specialists are allocated and placed at all the seven schools to assist teachers and learners with the new system (South Africa.Info, 2015a). For security of the provided tablets, there are surveillance cameras and two armed security officers in each school whereas the tablets are also fitted with tracking devices (South Africa.Info, 2015a).

Ideally, blended learning is not just about ensuring that a textbook is available online, replacing chalkboards with interactive smartboards, as well as having access to the Internet as South Africa seem to assume. On the other hand, "e-learning is more than simply providing educational technology to learners, it is about how electronic tools are used to assist the learning process" (van Wyk, 2015: 29). Blended learning involves rich technological content that promotes and supports interactivity, creativity, flexibility and collaboration between learners and teachers in order to bring knowledge shared through conventional didactics to life (Barker, 2015). Therefore, e-learning should not be seen as an alternative knowledge transfer and acquisition method to conventional didactics but the two should be integrated (Barker, 2015; van Wyk, 2015). Learners are now trained to be active in their own knowledge acquisition, instead of being passive recipients of information and relying wholly on conventional didactics, which will likely deliver a boring and "uninspired learning experience", especially in the 21st century. A period where education is characterised by video, gamification, instant gratification, networking and sharing as well as dependence on the Internet. Furthermore, learning is no longer restricted to the classrooms but it happens such that it continuous beyond the end of a textbook lesson and/or after school hours. Therefore, learners in Gauteng should use the provided tablets to explore and investigate issues more in-depth, “at any time” and “any place” and also discuss their findings with fellow teachers and peers.

5.5.2. Smart Schools in Western Cape Province for Participation in the Global Knowledge Economy

To follow in the trend, the Western Cape had also invested in the so called “Smart Schools Project” which was launched in July 2015 to improve the quality of teaching and learning (Mawson, 2015; Phakathi, 2015; South Africa.Info, 2015b; Western Cape Department of Education, 2015; Mzekandaba, 2016). According to the Premier of the province, Helen Zille’s 2015 State of the Province Address, R1.2 billion had been invested between 2015 and 2020 specifically for the establishment of the ICT infrastructure and e-learning in schools. The National Development Plan recognises that there is a need to improve the quality of education outcomes at different grades, especially for mathematics, computer literacy and science, as well as collaborations among different stakeholders working together towards that goal (NPC, 2012). However, Hellen Zille asserted that "given the rate of increase in the Western Cape's pupil numbers, we are never going to be able to afford the number of teachers we need, which means e-learning will have to play an increasingly important complementary role to supplement the teachers in our schools" (Mzekandaba, 2016: n.p.). About 1 250 schools are the beneficiaries of the “Smart Classroom Project” which its implementation is scheduled between 2015 and 2020 (Fredericks, 2015a, 2015b; Mawson, 2015; Zille, 2015; Mzekandaba, 2016).

The Smart Classroom Project provides all classrooms in the Western Cape with Wi-Fi connectivity to broadband, a digital projector, a whiteboard and a teacher computing device which serves as minimum technological resources for the implementation of e-learning (Fredericks, 2015a; Western Cape Department of Education, 2015). The classrooms are provided with mobile trolleys, overhead projectors and laptops, among other gadgets, to assist in teaching and learning while 126 computer laboratories, mostly in poor schools, was completed by the end of April 2015 (Fredericks, 2015a, 2015b; Mawson, 2015; Western Cape Department of Education, 2015; Phakathi, 2015; Zille, 2015). The implementation of e-learning in the province assists in tackling some of the problems faced, including increasing access to quality education in disadvantaged communities, providing support for struggling learners, contributing toward teachers' training and professional development, and improving management and administration at schools (Fredericks, 2015b; Phakathi, 2015; Western Cape Department of Education, 2015). It also provide learners with the skills to participate in our increasingly technology-based economy in the future (Western Cape Department of Education, 2015: n.p.). Furthermore, the project has "the potential to greatly advance the achievement of our main strategic objectives in education, which is improving the level of language and mathematics in schools, increasing the number and quality of passes in the National Senior Certificate and increasing the quality of education provision in poorer communities" (Phakathi, 2015: n.p.).

To achieve its specified goals, the department identified crucial components which are core to: "the linking of schools through a high-speed, real-time Wide Area Network (WAN); provision of Local Area Networks (LANs) in schools; refreshing of existing computer laboratories and the provision of new laboratories and technology rich classrooms; development and expansion of online digital resources that are made available to all learners, parents and teachers; teacher training and development in ICT and the use of e-learning in schools; and private sector and donor funding" (Western Cape Department of Education, 2015: n.p.). The Western Cape Government aimed to connect as many schools as possible to the WAN by the end of 2016. A total number of 1 250 schools should had been connected to high-speed broadband by July 2016 with an additional 366 schools which were connected by June 2015 (Mawson, 2015; Phakathi, 2015; Western Cape Department of Education, 2015; Mzekandaba, 2016). However, only 692 schools of the 1 250 have been connected, with 92 libraries and 169 corporate sites developed. Additionally, the Western Cape government confirmed that it managed to deliver over 3 300 smart classrooms in the 2014/15 financial year (Mzekandaba, 2016).

Necessary ICT equipment is required in schools for them to be connected to and be able to use the WAN and LAN effectively in education. Thus, the Western Cape Department of Education introduced the "Smart School Project" which includes refreshing existing Khanya Project Laboratories and the provision of "Smart Classrooms" to be able to utilise their Internet networks that have been created through the WAN and the LAN for teaching and learning purposes (Mawson, 2015; Phakathi, 2015; Western Cape Department of Education, 2015). Additionally, the Provincial Department of Education has developed and launched an online e-catalogue in late 2015 on its website for easy access of the teaching and learning materials which are aligned with the curriculum (Western Cape Department of Education, 2015). To improve the education outcomes as anticipated, it is important for schools to have access to the latest resources that enhance the implementation of e-learning. The e-catalogue which can be accessed by teachers, learners and parents also serves as a Learning Management System (LMS) with central digital resources repository that has curriculum content of various subjects (Mawson, 2015; Phakathi, 2015; Western Cape Department of Education, 2015).

For easy adoption of the educational technology, the in-service teachers' training would have to pay more attention to the use of technology and its related teaching methods (Zille, 2015). The Smart Classrooms Project will have limited chances of survival if teachers do not have the necessary skills and knowledge for the provided technology thus, teachers' "deep understanding of the nature of e-learning and e-teaching and the role that technology can play" is crucial (Fredericks, 2015a). Teachers and principals are trained on the integration and use of the new technology that is introduced at schools and incorporated into the curriculum (Western Cape Department of Education, 2015). For national development purposes, the Western Cape provincial government also committed itself to ensuring that the broadband project goes beyond educational premises and delivers government services to the most remote areas through the development of over 380 Wi-Fi hotspots which will provide residents with free access, allowing them to use selected services, develop ICT skills and participate in the global knowledge economy (Kilian, 2016; Mzekandaba, 2016). In addition to the educational ICT investments, the government planned to invest R2.89 billion in the provision of broadband connectivity to its residents for personal and business development purposes (Kilian, 2016).

5.5.3. Implementation of E-learning in other Provinces of South Africa: How Far are We?

The pace of integrating ICT in the basic education "since the White Paper on e-Education has been unsatisfactory; hence provinces are at different levels of ICT integration in education” (Motshekga, 2016: n.p.). The more “affluent provinces” such as the Western Cape and Gauteng provinces have made significant investments in the provision of ICT infrastructure in some of their schools. In some provinces, competing priorities within the Provincial Education Departments and lack of adequate resources, have adverse effects on the provision of ICT infrastructure to their schools (Motshekga, 2016). However, Motshekga (2016: n.p.) asserted that “in the Department of Science & Technology, the support of the private sector and NGOs has been commendable in providing ICT infrastructure to schools, however many of their ICT initiatives have been scattered, uncoordinated, unfocused, and unsustainable, hence limiting their impact on education”. Up-to-date, the developments made are mostly due to the partnership between government, private sector, social partners and NGOs which provide schools with ICT infrastructure and required teacher training (Motshekga, 2016). Although the Western Cape and Gauteng provinces have taken the educational technology centre stage, other provinces are also making efforts to introduce ICT in schools. ICT integration experiences from the Eastern Cape, Limpopo and the North West provinces are discussed.

Since November 2014, the partnership between the Department of Education and the Eastern Cape Education Development Trust (ECEDT), managed by the National Business Initiative, has initiated the roll-out of 50 “Telematics Centres” specifically in high schools across the province (National Education Collaboration Trust, n.d.; Education Southern Africa, 2015). The collaborative effort is also supported by the Western Cape and Northern Cape Departments of Education, who provide the content, while the “Telematics Services Division of Stellenbosch installed infrastructure in the centres and is responsible for the technical aspects and broadcasting of the lessons via satellite” (Education Southern Africa, 2015: 22).These centres will provide “live, interactive support lessons” to Grade 10, 11 and 12 learners especially in key subjects that include Mathematics, Physical Science and English. (National Education Collaboration Trust, n.d.; Education Southern Africa, 2015).

During the first phase of the project, 46 schools, with two in each of the 23 school districts, were provided with the necessary infrastructure and training while they were also supported with additional ICT-based content for learners and teachers through the established 10 Telematics Centres which were operational since January 2015

(National Education Collaboration Trust, n.d.; Education Southern Africa, 2015). For the second phase of the project, more centres will be established and be used for teacher professional development as well as “school governing body and leadership training”, among other purposes (National Education Collaboration Trust, n.d.; Education Southern Africa, 2015). Although the initiative is beneficial for the schools that are involved, transport for both teachers and learners to the centres scattered across districts is the main challenge (National education Collaboration Trust, n.d.). Regardless of the challenge, teachers are currently using the systems for other subjects instead of languages, mathematics and science as initially planned. Moreover, Eastern Cape Province teachers were given an opportunity to be members of a global community which share best practices and engage with each other whenever a need arises (National Education Collaboration Trust, n.d.; Education Southern Africa, 2015).

In Limpopo Province, there are five high schools in Mankweng Circuit where the TV White Space Pilot Project is implemented in addition to other e-learning initiatives. The project involves a partnership of the University of Limpopo, Microsoft South Africa, Centre for Scientific and Industrial Research (CSIR) and Multisource. Additionally, there are institutional collaborators that are involved in the project. They are Independent Communications Authority of South Africa (ICASA), South African Broadcasting Corporation (SABC), Departments of Basic Education and Science and Technology (Lysko, Masonta, & Mfupe, 2013; Ramoroka, 2014; Masonta, Ramoroka & Lysko, 2015). This high profile collaboration highlight the significance of digital technology to efforts towards revolutionizing South African education. The increased demand to provide for digital participation, especially in the education system, motivated the exploration of geo-location databases through the so-called TV White Spaces (Carlson, Ntlatlapa, King, Mgwili-Sibanda, Hart & Geerdts, 2013; Lysko et al., 2013; Ramoroka, 2014; Masonta et al., 2015). This digital model exploits vacant channels in the television spectrum to provide wireless Internet connection (Carlson et al., 2013; Lysko et al., 2013; Ramoroka, 2014; Masonta et al., 2015).

Broadly speaking, TV white spaces are the allocated spectrum in the TV and radio bands, either unassigned or assigned to licensee, but are completely or partially unused across all geographic locations, therefore being available for alternative wireless communication services (Carlson et al., 2013: 8; Lysko et al., 2013: 6). This model is invaluable for developing countries such as South Africa in narrowing digital inequalities by providing opportunities for wireless Internet connections for formerly disadvantaged education systems through spectrum sensing of available channels in the geo-locational databases (Carlson et al., 2013; Lysko et al., 2013; Ramoroka, 2014; Masonta et al., 2015). Whereas the TV White Space Model provides low cost wireless Internet connections without interfering with the existing spectrum band usage, its installation involves costly infrastructure resourcing and operations. To be able to use the wireless Internet, the five schools were each provided with 33 tablets and a laptop, a projector as well as a projection screen for teaching and learning purposes (Ramoroka, 2014; Masonta et al., 2015). Additionally, principals, teachers and learners were trained on how to use the technology for knowledge transfer and acquisition before the launch of the project.

The North West Provincial government's first step towards the implementation of blended learning is on teachers' professional development specifically based on the development of ICT skills (Surty, 2014). The provincial government believes that for the quality of our education to improve, classroom teaching must be given priority so that learners can receive "quality knowledge" which is at the "requisite level" (Surty, 2014). Accordingly, ICT has become crucial for the improvement of quality and efficiency of the system from a number of aspects, including administration, e-learning and teacher training. Similarly, to deliver the curriculum effectively, the correct teacher and teaching of appropriate subject in a suitable manner is also central to successful implementation of blended learning (Surty, 2014). To ensure that teachers are equipped with appropriate Technological Pedagogical Content Knowledge, the North West Province has launched a variety of initiatives, including "Teacher Training Centres", "Teacher Development Institutes", "Subject Committees" and "Professional Learning Communities (PLCs)" (Surty, 2014).

The initiatives were platforms wherein teachers are offered opportunities to develop their ICT skills and further share technological experiences with their peers and the Samsung E-Learning Teachers Centre is one of those established for such opportunities. The centre consists of 41 tablets preloaded with electronic content, learning management system software; Samsung educational content as well as teachers training tools (Surty, 2014). In partnership with the private companies such as Samsung and Vodacom, among others, the North West Provincial Government had established about 40 teacher training centres across the province (Surty, 2014). Moreover, the government, together with the United Nations Children's Fund (UNICEF) South Africa and Mxit, had launched “Ukufunda Virtual School” which provides a variety of free and open CAPS aligned teaching and learning resources, tutors, counsellors, mentors, coaches and librarians accessible on more than 8 000 different mobile devices, from entry mobile phones to smartphones and tablets (Surty, 2014). Differently from other provinces, the North West Province had prioritised teachers’ skills development ahead of the implementation of ICT infrastructure for blended pedagogies.

However, South Africa’s investment calls for examining the planning and governance models adopted and the preconditions for the establishment of these educational ICT projects. The costly nature of the investments made by the country, specifically the two provinces in the lead on e-learning pedagogies, regardless of the inconclusive affirmation of even the success of blended pedagogies, cannot be left unquestioned. The transformation towards blended learning in South Africa, however, does not only depend on well-equipped computer and media centres that will ensure that teachers and learners have access to necessary infrastructure, but the planning approaches, governance models, infrastructure as well as the ICT skills and culture of both teachers and learners collectively. Blended learning requires teachers with Technological Pedagogical Content Knowledge and thus, attention should be given to their professional development and the improvement of educational standards (NPC, 2013). The quality of in-service teacher training must be improved and higher calibre pre-service teachers must be recruited. The need to build the national learning institutions for technology, creativity and innovation in order to develop “intellectual capital”, which is necessary to support economic growth and development, must be nurtured by the government (NPC, 2012). The NDP 2030 confirmed that this is a good system provided that it is supported by “effective governance” and funding mechanisms to promote “coordination and collaboration” among various stakeholders (NPC, 2012). Although the NDP 2030 highlights planning, governance, infrastructure and skills, nothing was mentioned about teachers’ and learners’ e-culture.

South Africa’s pedagogic status quo confirms that the country has not as yet achieved its “ambitious” national education development targets and the majority of schools are still without appropriate planning approaches, governance models, educational ICT, well-trained teachers, as well as e-culture. However, there is a lack of a common vision of what integration of ICT with conventional didactics for transformation of learning really means in practice among various stakeholders in South Africa. Educational ICT also presents a major challenge for the professional growth of teachers. In practice, there is a challenge between what policy, legislation and plans prescribe in terms of the provision of educational ICT and what is actually happening in the school classrooms. South Africa’s policy, legislation and plans recommend provision of ICT infrastructure in all schools without a clear description of the strategy and processes to be followed. For example, the documents do not clearly state as to whether schools should replace conventional didactics with e-learning or if ever they should adopt blended learning. Therefore, at the provincial sphere there is replacement of conventional didactics with e-learning, regardless of the benefits of blended pedagogies. Provinces are working tirelessly to ensure that all schools are equipped with ICT infrastructure that could replace conventional didactics. The unspecified implementation of multiple policies and plans into educational experiences in South Africa is challenging, and thus allow for implementers to go with what they regard as appropriate.

5.6. Necessary and Sufficient Preconditions for Blended Pedagogies in a Democratic South Africa

In addition to planning approaches and the governance models, there are three other preconditions that are necessary and collectively sufficient for the successful implementation of blended pedagogies. Collectively, the preconditions for blended pedagogies include planning and governance, infrastructure, and skills and culture which are discussed in the following subsections:

5.6.1. Planning and Governance of Blended Learning

South Africa’s ICT plans demonstrate the country’s ambition and interest towards the implementation and adoption of educational technology. The country accepts and realises that the growth of wealth and level of development in the world’s largest and most successful economies is created by “knowledge-based industries” that rely heavily on human capital that possess the 21st century skills characterised by technological innovation and creativity (Department of Education, 2004; Department of Science & Technology, 2007; NPC, 2012). Therefore, for a country like South Africa, pedagogy is key to the modern technological transformation that is critical for its participation in the global knowledge economy. Guided by the White Paper on e-Education (2004), South Africa’s approach towards the integration of ICT in pedagogy focusses on increasing access to learning opportunities by redressing inequalities, improving the quality of teaching and learning as well as providing personalised and real world learning experiences.

Generally, the country’s educational ICT planning recommends that schools that implement “e-Education” must use technology to improve teaching and knowledge acquisition and transfer, support the curriculum, access information that increases knowledge, inquiry and depth of investigation as well as for planning and management of various school activities (Department of Education, 2004). Although South Africa’s national and ICT plans clearly support educational technology, the problem is whether the country is for blended learning or just e-learning. Drawing from a number of plans and policies, South Africa has little to say about the integration of e-learning with conventional didactics. Rather the focus is on the “implementation of e-learning” in schools (Department of Education, 2004; Department of Science & Technology, 2007; NPC, 2012). The White Paper on e-Education is also not clear on how technology will be part of teaching and learning processes, here as recently the NDP 2030 and the NIP promotes the electronic delivery of teaching and learning materials in all schools in the country. However, the country’s plans and policies seem to suggest the replacement of conventional didactics with e-learning rather than the implementation of blended pedagogies.

For effective participation in the knowledge economy, “individuals, groups, organizations and government” need to work as partners (Department of Arts, Culture, Science and Technology, 1994). Accordingly, ICT must be governed in a manner that guarantees the building and sustaining of social, legal and economic structures and processes that are in support of “innovation, collaboration and creativity” (Department of Arts, Culture, Science and Technology, 1994). Therefore, for South Africa to be able to effectively participate in the knowledge economy, collaboration of various stakeholders in the processes of governing the implementation of educational ICT is crucial (Department of Arts, Culture, Science and Technology, 1994). The national government is the principal stakeholder in the processes of educational ICT implementation, however, it regards the involvement and participation of the private and education sectors as well as the non-government organizations as equally important. South Africa seems to promote the multilevel model of governance in the implementation of educational ICT with the inclusion of various stakeholders at different levels.

5.6.2. Information and Communication Technology Infrastructure for Blending e-Learning with Conventional Didactics

Generally, ICT has lately received attention for its capacity to integrate knowledge production, consumption capabilities and dissemination as well as the expansion of the communication opportunities offered, which were previously hampered by time, geography, social and physical boundaries (Velghe, 2012; Steenkamp & Hyde-Clarke, 2014). Thus, affordable information dissemination and retrieval through the Internet has been made possible to ensure better functioning of the public sphere and participation in the knowledge economy. This transformations have brought new opportunities for South Africans to “engage, discuss and debate” in the real life issues that affect them (Steenkamp & Hyde-Clarke, 2014; Sangari, 2015). ICT provides a platform that facilitates information sharing and participation among the users of the technology in order to create knowledge (Velghe, 2012; Steenkamp & Hyde-Clarke, 2014; Sangari, 2015). Moreover, ICT offers citizens the ability to form an online community for interactivity and also enables conversations, which makes it possible for people to “gather online, share information, knowledge and opinions (Steenkamp & Hyde-Clarke, 2014). If used correctly, ICT could have positive effects on the relationship between national development and the knowledge economy.

The Statistics South Africa Census Survey (2011) revealed that 89% and 35% of the 14.5 million households in South Africa have access to mobile phones and the Internet, respectively (Statistics South Africa, 2011 cited in Department of Communications, 2014), whereas only 40% of people in the country are using the Internet (World Bank, 2013 cited in Salahuddin & Gow, 2016). Mobile phones have become a daily necessity not only for many South Africans, but also for most people all over the world. Accordingly, mobile phone subscriptions, specifically in developing countries, have increased from 53% in 2005 to 73% in 2010 (International Telecommunication Union, 2010 cited in Velghe, 2012). The communication market provides cheap and affordable mobile phones with prepaid plans that people at the lowest income scales can afford to be among the "telecommunication society" (Velghe, 2012). South Africa has the highest use of mobile phone in the whole of Africa with 100 mobile cellular subscriptions per 100 inhabitants (International Telecommunication Union, 2010 cited in Velghe, 2012). This evidence suggests a rapid growth in the use of ICT infrastructure for development purposes at household level, mainly driven by the mobile sector and further shows the existing gaps with regard to access to the Internet.

For educational purposes, most schools rely on the use of computers and lately on tablets for one on one learner-gadget as a solution to improving academic engagement, performance and achievement (Vosloo, 2015; Wittmann, 2015; Collins, 2016). The cost-effectiveness of entry-level Android-based models of tablets, their long battery life, functional ability, simplicity as well as flexibility are enough to help learners to technologically acquire knowledge (Wittmann, 2015). Tablets' "intuitive touchscreen interfaces are easy to use and pose a lower barrier of entry for students who are not yet familiar with computers" (Wittmann, 2015: 8). Moreover, the few components of a tablet makes it more reliable in terms of hardware and possibilities for a learner to make configuration changes that can render the device unusable as compared to a traditional computer (Vosloo, 2015). Today's learners are a "mobile generation" familiar with technology and thus, tablets are perfect gadgets for their lifestyle since they are "personal, light, portable, and offer good battery life on a single charge" (Wittmann, 2015: 8).

To acquire knowledge using ICT, learners no longer need access to computer labs, as they can always have tablets with them. However, an Internet connection is required for learners to keep learning and complete given tasks away from school. Tablets offer learners a variety of applications for knowledge acquisition on one gadget and assist them to engage creatively, innovatively and flexibly with educational content in collaboration with their peers and teachers (Vosloo, 2015; Wittmann, 2015).

According to Wittmann (2015: 8), learners “can record the classroom session for later review, use calculators and other tools, and do so much more on one interface. They may no longer need to, for example, buy a separate scientific calculator, take a separate camera on field trips, or carry a lot of textbooks around”. Furthermore, these gadgets bring educational content to life through videos, audio and gamification. Instead of just simply seeing pictures in textbooks, they can watch video footages of the subject in question (Vosloo, 2015). To add to a rich and effective teaching and learning experience, a dictionary integrated into the e-reader application can be used to get definitions and clarity of the words that seem to be difficult to understand (Wittmann, 2015).

Wireless Internet access is usually available in various public places, especially to students on university campuses, rather than in schools around South Africa. Regardless of its importance, Internet access in schools and universities meant for developing skills needed for knowledge economy only constitute about 5% of connectivity locations in the country (Muller, 2011 cited in Oyedemi, 2014). Thus, to supplement educational institutions’ Internet connectivity, personal and household access should offer both teachers and learners to access the ICT. Apparently, personal and home computers and Internet connections provide a number of advantages to teaching and learning. Oyedemi (2014: 303) identified the advantages as encouraging regular use that allow for flexibility without the constraints of public access which involves taking turns to use computers, avoiding competition among other users and improving on personal computer and Internet skills at one’s own pace, among others. To supplement home and personal connectivity, the Tshwane Metropolitan Municipality in Gauteng is providing free Wi-Fi to its residents accessible at various public spaces, such as the Union Buildings lawns area, Church Square, numerous schools and university campuses and parks in Pretoria City (Maromo, 2015).

Wi-Fi is accessible to more than 600 000 unique users who collectively have had over 12 million Internet sessions with the service and these statistics demonstrate the growing need of the service in the city (Maromo, 2015). As one of the flagship projects in the African Continent, there are plans in the pipeline to extend the demanded free Wi-Fi service to residents across the capital city (Maromo, 2015). Thus, the free Wi-Fi can be used to enhance the limited and/or lack of access to the Internet at home and within most learning institutions. Although Wi-Fi seems to be effective in the provision of public Internet connectivity, for over 100 000 homes in the suburbs around Cape Town and Johannesburg, fibre-optic cables are still regarded as appropriate (Oliveira, 2016). Infrastructure development investment of about R1 billion by Vumatel, a private business, has been dedicated to roll-out Internet connectivity through the fibre-optic cables in various suburbs of Cape Town and Johannesburg. To date, only 20 000 homes across 18 suburbs in the two cities are the beneficiaries of Internet connectivity powered by fibre-optic cables (Oliveira, 2016).

Generally, Wi-Fi and Internet connectivity play an essential role towards infrastructure and socio-economic development (Oyedemi, 2014; James, 2016), especially in areas that are rapidly urbanizing. Thus, W-Fi enabled connectivity is essential to infrastructure development that can transmit information through Wi-Fi-enabled devices and related mobile applications (James, 2016; Kilian, 2016; Mzekandaba, 2016). The development of Wi-Fi infrastructure and networks would enable rural residents the connectivity options that they did not have access to due to high costs and lack of infrastructure associated with other broadband services (James, 2016; Kilian, 2016; Mzekandaba, 2016). South Africa too has prioritised technological infrastructure development, especially by increasing the Internet connectivity as a strategy to close the digital gap, drive socio-economic development and improve its participation in the global knowledge economy. The incorporation of Wi-Fi infrastructure into the building plans of malls and other public multi-use structures as well as public spaces is a recent strategy that the country has adopted to improve and provide Internet connectivity for all (James, 2016). Therefore, South Africa's development and improvement of accessibility to technological infrastructure should elevate the country to a place that would enable its citizens to participate in the national and global knowledge economies.

Limited accessibility to computers and the Internet, both at school and household levels, is problematic for a country like South Africa that aspires to be ‘‘an advanced information society in which information and ICT tools are key drivers of economic and societal development’’ (Oyedemi, 2014: 302). The implementation of ICT in schools is necessary to close the global digital gap and also for effective participation in the global knowledge economy. In most cases, limited access to, or lack of, appropriate infrastructure seem to be the main hindrance to achieving educational ICT objectives even in South Africa. Thus, ICT infrastructure provision in South Africa's schools should be used to address the three levels of digital inequalities (Stern, Adams & Elsasser, 2009). Firstly, inequalities in levels of access to various technologies and the Internet, which include among others, the use of "dial-up, DSL, cable, or wireless modems" for connectivity must be addressed for sustainability and cost effectiveness reasons (Stern et al., 2009; Oyedemi, 2014). Secondly, differences in levels of skills in web usage contributes massively to the digital divide in cases where the users of the technology do not have the required skills and knowledge to utilise the technology (Stern et al., 2009; Oyedemi, 2014; Odendaal, 2016). Lastly, the daily different uses of ICT which do not conform to the specified objectives contributes to digital inequalities (Stern et al., 2009; Oyedemi, 2014). Therefore, digital inequalities are not only perpetuated by infrastructure but by a number of preconditions which include planning and governance of the ICT as well as the skills and culture of both teachers and learners.

Although Internet use amongst learners is relatively higher than amongst the general population, ICT is not easily accessible to most teachers and learners in South Africa (Oyedemi, 2014). Access to computers was therefore a first order barrier towards the adoption and use of ICT in education (Sherman & Howard, 2012). Another qualitative study was conducted on four secondary school teachers, from two schools in the Western Cape Province. The study discovered a number of barriers towards the integration of e-learning with conventional didactics in schools. One of the barriers was that most teachers who have to implement blended learning, did not understand the value of technology in education (Sherman & Howard, 2012). Additionally, Chigona, Chigona, Kausa & Kayongo (2010), conducted in-depth interviews with three principals and nine teachers, from three different schools located in disadvantaged communities in the Western Cape. The findings of the study revealed that teachers were hesitant to use technology in their teaching because they were never certain of its outcomes, thus it was used for personal reasons. As Rogers' Diffusion of Innovation Theory states, the starting point of the introduction of blended learning should be provision of the necessary information to explain to teacher all that they need to know in terms of ICT: its benefits, how and when it will be used as well as the needed infrastructure, skills and culture for implementation. However, the use of ICT is a part of most leaners' daily routine because of the fact that they have grown up with computers, mobile phones and the Internet as part of their communication habits (Oyedemi, 2014).

Gauteng Province is characterized by low levels of ICT adoption and implementation and thus, more investments are required to provide universal access to technology in the province (Gauteng Department of Economic Development, n.d.). A partnership between the City of Johannesburg and Ericsson has provided broadband infrastructure in the area covered by the municipality. The network connects areas such as Midrand, Alexandra, Randburg, Linasia, Sandton, Diepsloot, Diepkloof and Protea Glen, among many others. However, similar partnerships between the government and the private sector are still needed to provide all citizens with more accessible and affordable ICT infrastructure in Gauteng especially to disadvantaged communities. By using the broadband and Internet connectivity, the province is already connected to a number of international institutions for business purposes and participation in the knowledge economy. Broadband infrastructure is central to efficient communications and Internet services and thus, can play an important role in ensuring that ICT objectives are achieved (Gauteng Department of Economic Development, n.d.). For the past ten years, the Western Cape has witnessed increasing levels in the use of mobile communication although access to Internet connectivity has been stagnant (Palmer & Graham, 2013). Respectively, 89% of the total population and 44% of households in the province have access to mobile telephones and Internet connectivity (Palmer & Graham, 2013). The province has massively invested in "fibre optic cabling" which serves as the backbone for mobile networks as well as an enabler for faster, cheaper and more reliable Internet connectivity and communication networks (Palmer & Graham, 2013).

South Africa's higher education is currently under amassed stress to ensure socio-economic transformation, while struggling to produce the much needed skills necessary to address the desired changes (Jaffer, Ng'ambi & Czerniewicz, 2007; Mtshali, Maistry & Govender, 2015). However, there are threats towards higher education, which include the uneven distribution as well as lack of and/or limited ICT resources in the secondary education sector, which mostly feeds higher learning institutions with learners who are not ready for the challenging task that students entering university face (Moloi, Mkwanazi & Bojabotseha, 2014; Mtshali et al., 2015). Moreover, higher education experiences low number of learners who complete their studies and graduate in record time due to the implementation of blended learning. At this level of learning, the use of ICT requires appropriate skills, which most of the new students do not have (Machika, Troskie-de Bruin & Albertyn, 2014; Mtshali et al., 2015). The "multitude of students gaining entry into universities, give rise to the challenge of how to conduct teaching and learning in overcrowded contexts without losing efficiency" (Machika et al., 2014 cited in Mtshali, 2015: 1). In such cases, the use of ICT and/or e-learning can be in the form of an online learning management system (LMS) to enable effective learning in classes of a large size (Jaffer et al., 2007; Machika et al., 2014; Mtshali et al., 2015; Moloi et al., 2015). In South Africa, the University of KwaZulu-Natal (UKZN), established in 2005 in Durban, has also been experiencing growth in student numbers due to government policy on access to higher education promoted by the Higher Education Act 101 of 1997 (Mtshali et al., 2015). In order to deal with the massive number of students mostly without ICT skills, UKZN adopted the Moodle LMS to improve student-lecturer as well as student-student interactions and consultations (Mtshali et al., 2015). The use of LMS in the university converted the mode of delivery from face-to-face to a blended mode that integrates the online environment with conventional didactics (Mtshali et al., 2015).

The online environment of learning requires students to access course material, consult with the lecturer, engage in online learning, chats and discussion forums, receive announcements, and complete and submit assignments online (Mtshali et al., 2015). Students' participation on online charts was a requirement for most courses where case studies related to the content were analysed and discussed in order to develop creativity, innovation, collaboration and flexibility among the participants. Marttunen & Laurinen (2007 cited in Mtshali et al., 2015: 2) noted that "through online chats, students acquire knowledge from each other by offering and obtaining help, noticing conflicts between their own and other students' views, pursuing new insight to reconcile these conflicting views, and forming new meaning from them". Generally, blended learning in UKZN allows students to learn how to articulate, support and assess the views posted by their peers through constructive, creative and innovative debates conducted via the online environment, especially when content related cases are studied with or without the interventions of the lecturers. The UKZN case confirmed that blended teaching and learning in higher education institutions are likely to improve “student engagement with learning”, “students’ academic performance” as well as “reduction of drop-out rates”, and “provide more learning opportunities for students with diverse characteristics” (Mtshali et al., 2015). Moreover, blended learning that took place on online environments, enables students to cope with “shy personalities”, take advantage of knowledge repositories that enhance their knowledge acquisition and revision (Mtshali et al., 2015) and also engage with interactive, constructive, innovative and flexible learning.

5.6.3. Teachers’ and Learners’ Skills and Culture for Blended Pedagogies

Without proper training on how to best integrate educational ICT with conventional didactics in the classroom, South Africa is faced with the risk of teachers becoming “mediators” who will simply instruct learners to use certain applications on a tablet to complete a given task (Hamid, 2015; Sangari, 2015). Therefore, schools must first invest in developing innovative teachers before the provision of ICT. According to Collins (2016: 24) “educating is, essentially, still a personal activity, people engaging with other people”. For successful implementation of blended learning, South Africa’s teachers must be able to use educational ICT effectively, they need to be capacitated with the necessary skills and knowledge. The Policy for Teacher Training and Professional Development in ICT and Training (2007) identifies “ICT knowledge, skills, values and attitudes” required from teachers to be able to implement the national curriculum effectively. At national level, the e-Education Policy (2004) prescribes that the Department of Basic Education should develop a national framework for ICT competencies for teachers, school principals as well as administrators. The national Department of Basic Education was also delegated “to revise the norms and standards for teachers, review in-service and pre-service training programmes as an enabling factor for teachers to use ICT, create appropriate teacher accreditation with an ICT focus and allocate a dedicated ICT trained teacher to support teaching and learning” (Vandeyar, 2013: 249). Furthermore, the e-Education Policy mandates provinces and districts to provide teachers, school principals and administrators with both professional and technical support from schools in their areas of jurisdiction. At institution level, the policy recommends that school managers and administrators take the responsibility to promote the use of ICT as a ‘transformative tool’ for education (Department of Education, 2007; Vandeyar, 2013).

Most importantly, teachers’ Technological Pedagogical Content Knowledge is one of the crucial preconditions for the transformation of pedagogy, and thus the White Paper on e-Education (2004) and Guidelines for Teacher Training and Professional Development in ICT (2007) outline the ICT development levels for the implementation of e-learning. Accordingly, ICT development consists of five levels, namely: entry, adoption, adaptation, appropriation and innovation levels. At the “entry level”, teachers are required to be computer literate and be able to generally use computers. “Frustrations, insecurities and lack of confidence” are common during the introduction of ICT, especially among the in-service teachers who show no interest in technology (Department of Education, 2004; 2007). During the “adoption level”, teachers are able to use various ICT, including computers, to support “traditional management, administration, teaching and learning” as well as to teach learners how to use ICT (Department of Education, 2004; 2007). Teachers’ abilities to use ICT in order to support everyday classroom activities at an appropriate “National Curriculum Statement level” by assessing the learning that occurs and ensuring progression is experienced at the “adaptation level”. At this level productivity increases wherein teachers are able to recognise and reflect critically on how ICT transforms the teaching and learning processes and use the technological systems for management and administration purposes. (Department of Education, 2004; 2007).

The “appropriation level” requires teachers to have a holistic understanding of the various ways in which ICT effectively contributes to pedagogy. Moreover, they should have an understanding of how ICT developed and an awareness on how it is integral to the transformation of teaching and learning as stated in the various plans and policy documents. At this level, teachers have the experience and the confidence to be able to reflect on how ICT can influence teaching and learning strategies and methods as well as their application (Department of Education, 2004; 2007). In the course of the “innovation level”, teachers are able to independently develop exclusively new teaching and learning environments that employ ICT as a flexible tool for collaboration, innovation, creativity and interaction between themselves and their learners. Classroom environments are redefined by creating learning experiences that demonstrates the power of integrating technology in education (Department of Education, 2004; 2007). Generally, the discussed ICT development levels define the various stages and processes towards the adoption and implementation of e-learning in order to realise its creativity, innovation and collaborative effects on teaching and learning. For successful integration of e-learning with conventional didactics, three essential knowledge and skills levels are recognized, namely: “basic, integrative and specialised ICT knowledge and skills” (Department of Education, 2007).

The “basic ICT knowledge and skills” are required at the first levels and thus are appropriate at the entry and adoption levels of the ICT development levels, whereas the “integrative ICT knowledge and skills” are necessary to integrate ICT into the design and practice of teaching and learning during the adaptation and appropriation levels. The focus of the “specialised ICT knowledge and skills” is on the transformational use of the educational technology to redefine the roles and responsibilities of teachers in classroom environments (Department of Education, 2007). Teachers’ Technological Pedagogical Content Knowledge has been labelled as one of the key preconditions in the implementation of blended learning in South Africa (Ramnarain, 2014; Botha & Herselman, 2015; Hamid, 2015; van Wyk, 2015). Responsibility for the achievement of blended learning heavily relies on teachers as they are central decision-makers of ways in which a blended approach is adopted and implemented in the classroom. As such, teachers’ content knowledge, pedagogical content knowledge, theoretical knowledge and, technological knowledge as well as e-culture must be well developed before teachers can implement blended learning (Vandeyar, 2013; Ramnarain, 2014; van Wyk, 2015). As a result, teachers have been receiving prescribed training and workshop of many hours in order to develop their skills in preparation for the implementation of blended learning specifically in the last couple of years (Botha & Herselman, 2015).

However, it has been reported that the provided training seem not to be adding value in the processes of blended learning implementation because the majority of the trained teachers still cannot integrate e-learning with conventional didactics (Ramnarain, 2014; Botha & Herselman, 2015; Greef, 2015; Hamid, 2015; van Wyk, 2015). Instead, teachers tend to use the technology for their personal communication and in some cases for sharing information with their learners instead of the intended purposes. For South Africa to realise the benefits of blended learning, a number of practitioners recommended learning from and the adoption of “best practices” in this regard (Holland, 2014). Accordingly, in any field of expertise, inclusive of blended learning, the expectations are that some teachers are implementing the same strategies and evidently they are doing it even better (Holland, 2014). Therefore, if South African teachers wish to do better, they need to benchmark their conceptions and applications of blended learning to that of teachers who are doing well somewhere else. Holland (2014) asserts that the purpose behind best practices is give teachers a way to identify programmes and activities that have been repeatedly used and tested by fellow teachers especially from schools with similar characteristics and have been proven to deliver expected results. With regard to blended learning, best practices are associated with experiences that were effective, efficient and appropriate for pedagogical transformation through the use of technology which resulted in the implementation of various delivery modes and curriculum design. Successful strategies can be recorded and then shared with other colleagues for replication if there is such a need, especially in similar situations (Holland, 2014). In addition to ICT teacher training and workshops, South Africa can learn from best practices, particularly in countries with the same HDI level and similar characteristics, especially in relation to the preconditions of blended learning.

In KwaZulu-Natal Province of South Africa, Govender & Govender (2009) surveyed one thousand two hundred and thirty seven teachers across ninety three schools on educational technology perceptions and attitudes. The study revealed that teachers’ perceptions of relative advantage and compatibility of educational technology was positively correlated to their attitudes towards computers (Govender & Govender, 2009). However, evidence revealed that there was a very strong uncertainty as to whether this technology conforms to curriculum goals (Govender & Govender, 2009). The evidence confirmed that teachers did not believe that educational technology can assist them to reach their pedagogic goals, therefore, there was little opportunity that they could develop positive attitudes towards ITC. Furthermore, Govender & Govender (2009) found that 68.1% of teachers lacked core technological competence, which resulted in only 15% of teachers using the computers for teaching, even though they had unlimited access to them. The results from this study confirms that teachers’ perceptions and attitudes towards blended learning are perpetuated by their values specifically beliefs in this case, of the technology to bring the expected educational transformations.

To date, the e-Education Policy has made substantial advancements in developing and supporting ICT administrative systems in schools, but could not achieve the main strategic objective of transforming conventional classroom practice. Disappointingly, the policy's goals that by 2013 every learner will be ICT capable; all teachers will be skilled and knowledgeable to enhance teaching and learning through technology; and schools will become "e-schools", promoting socio-economic growth and preparing for participation in the knowledge economy are far from being realised (Vandeyar, 2013). Seemingly, for South Africa's schools, the integration of ICT with conventional didactics as a modern teaching strategy was introduced in many institutions without them being prepared to be able to exploit technology's usefulness for transformation of teaching and learning (Sangari, 2015).

5.7. Appropriateness of South Africa's Planning Approaches, Governance Models, Infrastructure, Culture and Skills, for Blended Pedagogies

Today's generation of learners access and absorb knowledge in a whole new way, which is distinctly digital (Howie, 2010; Hart & Laher, 2015; Nashua, 2015; Sangari, 2015; van Wyk, 2015). In South Africa, some of the provincial government and independent initiatives provide learners with tablets in order to transform their knowledge acquisition experiences and develop ICT related skills necessary for national development (Hart & Laher, 2015; Nashua, 2015; Sangari, 2015; van Wyk, 2015). Through training, teachers' skills have also been developed and upgraded to accommodate the new educational ICT environment. However, these advancements related to digital teaching and learning cannot replace the need for conventional didactics (Nashua, 2015; van Wyk, 2015). Although the use of technology "strengthens information processing in the brain, offers opportunities to interact with video, images and other resources, has proven to improve maths skills and special education, creates flexibility of schedules and adaptation of work according to the learner's unique needs and allow for self-paced learning which builds self-discipline and independence", conventional didactics are still important for effective knowledge acquisition (Nashua, 2015: n.p.). Nevertheless, both e-learning and conventional didactics can be equally meaningless if teachers and learners do not have the knowledge and skills to use them for knowledge transfer and acquisition.

In a study that compared the ICT policies of South Africa and Chile, Howe (2010) discovered that Chile's integration was more successful. One of the identified reasons for this integration was that schools in Chile had to voluntarily indicate to the relevant authorities if they wanted to use educational ICT (Howie, 2010). The school would then be required to submit a detailed proposal on how they plan to use the technology if they were to be provided with it (Howie, 2010). Whereas schools in South Africa are just given the technology, whether they requested it or not (Howie, 2010), a phenomenon which in most cases proved to be ineffective. For South African teachers who value their roles as "face classroom controllers" are more reluctant to adopt educational technology which is the main barrier against the use of ICT for teaching and learning (Chigona et al., 2010; Sherman & Howard, 2012). Therefore, South Africa's planning towards successful implementation of e-learning must be revised such that teachers and, more importantly, learners are put at the forefront of the processes.

ICT culture is considered as one of the major preconditions of the successful implementation of e-learning and/or blended learning, especially at institutional level, which has the ability to influence individual cultures. In their study, Czerniewicz & Brown (2009) established the importance of institutional culture in the implementation of e-learning and/or blended learning. The study drew data from a 2007 Statistics South Africa survey of ICT access and use conducted in six diverse South African universities, which are located in five provinces (Czerniewicz & Brown, 2009). The data collected was used to demonstrate and argue the use of ICT in support of academic activities in South African higher education and thus determining the level of institutional culture in this universities (Czerniewicz & Brown, 2009). The findings of the study revealed that the majority of the selected universities have adopted the corporate organizational culture which is associated with top down change management systems and processes for integration of e-learning into the existing curriculum (Czerniewicz & Brown, 2009). The major challenges of this type of culture towards the planning and governance of e-learning are that they are usually not consultative and inclusive enough. As such, e-culture has the possibility of being resented or resisted. In those universities, some academic staff members claim that they were forced to integrate ICT in their teaching (Czerniewicz & Brown, 2009). This finding suggests that teachers' and learners' level of e-culture does not support the implementation of e-learning because of their dissatisfaction with the institutional culture. Therefore, for a developing country such as South Africa which is so ambitious about educational ICT, institutional culture is critical to encourage and influence teachers' and learners' e-culture in order to ensure that they effectively implement e-learning in their institutions.

A study, which was conducted in Johannesburg, wherein a total number of 117 teachers from twelve schools were conveniently sampled, explored teachers' attitudes towards educational technology (Hart & Laher, 2015). The findings of the study uncovered that the majority of teachers have access to ICT both at home and at school, however, the technology is hardly used in classrooms (Hart & Laher, 2015). Therefore, access to the technology was not a sufficient condition for the implementation of blended learning in these schools. The study further assessed teachers' perceived usefulness of blended learning by using perceptions about the value of e-learning over conventional didactics, the integration of technology with face-to-face methods, and, the management of complexity as well as tangible results that comes with the transformation (Hart & Laher, 2015). As per the findings of this study, most teachers' perceptions on the usefulness of integrating e-learning with conventional didactics were high and this suggests that the prospects for adoption and implementation of technology at these schools is promising (Hart & Laher, 2015). However, focus needs to be on the "culture and social norms" of both teachers and learners in order to achieve effective and sustainable change, brought by the implementation of blended learning in these South African schools. The low levels of e-culture and social norms with regard to ICT could be a major hindrance to the integration of e-learning and conventional didactics. Generally, South Africa is "putting the cart before the horse" in its implementation of digital learning. The provision of tablets to all the learners is desirable, however, this should have been the final step in the adoption of e-learning. Although all the preconditions of blended learning are equally necessary, their order of priority determines the success of digital technologies in education. The country should have first focussed on providing teachers with training on how to integrate education ICT in their work and also encouraging the appropriate e-culture among users instead of prioritising infrastructure before any other thing.

Drawing from the experiences from the Gauteng and Western Cape provinces, the massive investments made for e-learning in a democratic South Africa are questionable. For both provinces, the appropriateness of their adopted planning approaches, governance models, infrastructure, skills and culture need to be evaluated. Although the government seems to be at the forefront of the governance of the educational transformation, both the Gauteng and Western Cape provinces' Big Switch On and the Smart Schools Projects do not have plans which explain how they will unfold. Seemingly, the implementation of the projects happened very suddenly without any plans and it relies on the prescription made by the ICT related policies and plans for blended learning. However, the two provinces seem to be replacing conventional didactics with e-learning instead of the implementation of blended pedagogies, a phenomenon which creates confusion with regard to the country's educational ICT vision. The link between institutional planning, governance and culture is significant for the successful and sustainable implementation of the schools' ICT initiatives. In this regard, school management and concerned teachers should play a major role in the identification of the level of ICT relevant for teaching and learning in their schools in collaboration with the provincial government rather than being driven by the latter.

To effectively implement the national ICT policies and plans, teacher professionalism is crucial for the integration of e-learning with conventional didactics. In practice, however, the integration of ICT in education does not give professional development of teachers a priority. Instead, for most policy makers the expectation is that the modern transformation of the teaching and learning environment through the implementation of technology should unfold naturally, whereas e-culture of both teachers and learners is also ignored. Although some ICT policies prescribes teachers' professional development for the implementation of the technology, little support is usually provided for them and learners during the actual implementation stage, which results in an insignificant effect on pedagogy. Like many other countries, South Africa's educational ICT infrastructure seems to be appropriate, but its planning approaches, governance models, teachers' and learners' skills and e-culture's appropriateness should be questioned for successful implementation of blended learning.

5.8. Blended Pedagogies in South Africa: Prospects and Challenges

Blended pedagogies in South Africa's schools are attached to a number of prospects because ICT has become an integral part of most learners' lives. Thus, it is an essential tool appropriate for modern transformation and development of the 21st century skills within the classroom and beyond (Bidarian et al., 2011; Hamid, 2015; van Wyk, 2015). To ensure that learning is presented in an interesting and engaging manner, schools need to take advantage and capitalise on the integration of ICT for knowledge transfer and acquisition (van Wyk, 2015). ICT further encourages learners in "finding, evaluating, analysing and synthesising information to create knowledge and build skills" (Van Wyk, 2015: 30). Educational technology makes subjects like mathematics and science, among others, very exciting and interesting for learners. Generally, ICT assists in the development of learners' reading skills (Bidarian et al., 2011; Hamid, 2015; van Wyk, 2015). Learning how to read on a tablet enables users to play audio for words that they want to know how to read and pronounce and ultimately developing their speaking skills (Hamid, 2015). Blended pedagogies encourages collaboration and interaction between learners for knowledge and information sharing on subjects that they are working on (Hamid, 2015; van Wyk, 2015). Through technology, most learners find it easy to exchange knowledge with their peers for innovation, creativity and flexibility in their learning processes.

Apparently, blended pedagogies support and promote availability of up-to-date quality teaching and learning materials, inclusive of rich multimedia (Bidarian et al., 2011; Barker, 2015; Greef, 2015; van Wyk, 2015; Vosloo, 2015). Both teachers and learners have access to updated knowledge material at their fingertips without having to travel long distances or incurring any costs. One immediate benefit is that there will be no excuse for interrupted learning due to undelivered textbooks that delay education when content can easily be downloaded and updated immediately using ICT (Bidarian et al., 2011; Barker, 2015). Furthermore, teachers and learners are able to share materials, which include lecture and class notes, while learners can communicate with their other peers who are experiencing similar problems and collectively search for solutions beyond the classroom (Barker, 2015; Greef, 2015; van Wyk, 2015). For schools' administrative purposes, teachers, principals and administrators are provided with easy, fast and efficient ways to report on the learning progress and any other important issues to both government parents. Moreover, ICT strengthens and simplifies communication between various stakeholders, thus resulting in non-delayed responses (Bidarian et al., 2011; Barker, 2015; Greef, 2015; van Wyk, 2015). The implementation of e-learning through learners' access to ICT infrastructure such as tablets and other electronic devices, as well as the Internet, is a remedy for poor education outcomes and, most importantly, for development of the 21st century skills (Vosloo, 2015; Wesselink, 2015). Learners' access to educational technology enhances and develops their "digital savvy" and computer literacy vital for entering the national labour force participating in the knowledge economy (Wesselink, 2015).

Despite the prospects of blended pedagogies, there are challenges that are faced, especially in developing countries such as South Africa. One of such challenges is a lack of ICT infrastructure in rural communities and schools, which widens the digital gap between them and those in urban areas (Ramoroka, 2014; Masonta et al., 2015; James et al., 2016). ICT infrastructure, which include both the devices (such as computers and tablets) and the telecommunications infrastructure, which brings Internet connectivity, should be provided to most disadvantaged schools. In order to address the digital gap, there is a need to find reliable and cost-effective solutions to provide ICT infrastructure to rural schools (Ramoroka, 2014; Masonta et al., 2015). However, South Africa faces a shortage of necessary skills to implement its plans in this regard (James et al., 2016). The shortage of well trained, experienced and capable engineers and ICT specialists in the government and private sector, respectively, "where projects need to be planned and committed to, and where delivery needs to be executed" (James et al., 2016: 51). Therefore, South Africa needs to collaborate with neighbouring countries to better position its public and private sectors with regard to access of the required skills (James et al., 2016) for the implementation of infrastructural plans for blended pedagogies. The other challenge is with the national in-service training programmes for e-learning and blended pedagogies which are often prescribed and sometimes enforced by the departments of authority onto teachers, instead of being planned with them (Czerniewicz & Brown, 2009; Makgato, 2014; Ramoroka & Tsheola, 2015; Ramoroka & Tsheola, 2016). As a results, these training programmes, which were supposed to be needs driven, end up not providing teachers with the skills they require for the implementation of e-learning and blended learning. Moreover, training was also uniform for all teachers from various schools, regardless of the different school contexts that these teachers are based (Czerniewicz & Brown, 2009; Makgato, 2014; Ramoroka & Tsheola, 2015; Ramoroka & Tsheola, 2016). All teachers are expected to benefit from the same type of in-service training. However, the majority of the trained teachers criticized the training as “irrelevant” to their teaching environments as they are not supported during and after the implementation of e-learning.

Most teachers have a problem in transmitting the technology content knowledge using skills learnt during workshops (Czerniewicz & Brown, 2009; Makgato, 2014; Ramoroka & Tsheola, 2015; Ramoroka & Tsheola, 2016). Teachers are the ones who have to take the blame whenever their ICT inability to prepare their learners with the knowledge and skills cannot keep up with the changing technological world (Czerniewicz & Brown, 2009; Makgato, 2014; Ramoroka & Tsheola, 2015; Ramoroka & Tsheola, 2016). Because teachers are considered as the key to good education, the same remains true for poor education and as such the training they receive is in most cases ignored when making such judgement. Reddy et al, in Gumbo and Makgato (2008), argue that technology could be better taught and learnt if teachers have an understanding of what should be taught and learnt. Teachers should also have a thorough understanding of how teaching and learning occurs in technology. Accordingly, “technology is no help if teachers aren’t competent in their subjects. They also must be trained to properly use education technology” (The Economist, 2015: n.p.). It is similarly significant for teachers to develop and possess a practical understanding of educational ICT for them to be able to protect learners from the dangers it carries, such as access to “pornography”, “sexting” and “cyber bullying” (van Wyk, 2015).

In May 2015, the distributed tablets meant to promote “paperless classrooms” in the Gauteng Province, have been temporarily withdrawn after 3 000 of them were reported as stolen from beneficiary schools (Bothma, 2015; du Toit, 2015; Maune, 2015; Rand Daily Mail, 2015). As thieves target the tablets issued to learners, several schools experienced vandalism, theft and robberies wherein windows were broken and learners' scripts and textbooks set alight, among other things, due to the targeted tablets (Maune, 2015; Phakath, 2015; Writer, 2015). As a result of the vandalism and theft, teachers were struggling to prepare for ICT-centred lessons, whereas learners were left with cold classrooms in the winter of 2015 due to vandalised school property (Maune, 2015). According to the MEC of Education in Gauteng, Mr Panyaza Lesufi, the recalled tablets and laptops will be installed with additional safety features to track them, should there be any cases of theft and/or robberies (South African Government News Agency, 2015; Maune, 2015; Phakath, 2015; Writer, 2015). Although vandalism and theft has not deterred the Department of Education's dream to pursue technology-driven education (Maune, 2015; Writer, 2015), the question for now is: how did teaching and learning continue without the tablets? Did teachers have to depend on the abandoned conventional didactics? How does this back and forth teaching advancements affect teaching and learning? Clearly, the Gauteng Department of Education's ICT transformation is a reflection of inappropriate planning approaches and governance models adopted in this regard.

Notwithstanding tightening of security measures for the second phase of the Big Switch On Project by installing tracking software on the tablets and burglar bars and surveillance cameras in classrooms, the devices keep getting stolen. Within a week of the launch of the second phase of the "paperless classrooms" initiative, one school in Soweto, where tablets, laptops and smartboards were distributed, was a target of a break-in over the weekend (Mzekandaba, 2016). Phafogang Secondary School in Rockville, Soweto has experienced a break-in wherein a number of tablets, laptops and smartboards were stolen (Fripp, 2015; Mzekandaba, 2016). The break-in and theft at Phafogang Secondary School is a clear indication that the schools that have and will still receive smart devices, need better security. In September 2015, a shipment of 1 600 tablets was stolen from the supplier's Johannesburg offices (The Economist, 2015). Learners have been mugged, and schools robbed of their tablets, computers and interactive "smartboards" meant to develop the 21st century skills (Fripp, 2015; Mzekandaba, 2016; The Economist, 2015). "The department is extremely concerned that valuable resources, which are meant to enhance the delivery of quality education to learners, are seen by some as an opportunity to feed their criminal deeds and rob our learners of their right to quality basic education" (Fripp, 2015: n.p.; Mzekandaba, 2016: n.p.).

The Gauteng Department of Education categorically stated that "it remains committed and determined to realise its vision… to build a world-class education system by modernising public education and improving the standard of performance of the entire system. No amount of thuggery will deter our efforts in attaining this vision" (Fripp, 2015: n.p.). The second phase of the Big Switch On Project in Gauteng, targeting Grade 12 learners only, was not well received by learners in other grades in various high schools. Two days after the launch of the phase, learners in lower grades from schools in the province protested against the provision of tablets to Grade 12 learners only (Kubheka, 2015; Moatshe & Monama, 2015). The learners demanded that they all be given tablets regardless of the grade they are in, as the provincial Department of Education has promised two years ago (Kubheka, 2015; Moatshe & Monama, 2015). In the same protest to the provincial Department of Education, learners complained about the dreadful condition of their toilets, demanded healthy food provided for lunch, tightening of security at schools, opportunity for parents to participate in their children's education and the distribution of condoms at schools (Kubheka, 2015; Moatshe & Monama, 2015).

While some schools are being vandalised for tablets and learners demanding more devices, many others still lack basic infrastructure such as toilets, classrooms and furniture, among others (Dipa, 2015; Greef, 2015; The Economist, 2015; Quintal, 2015). An audit by the advocacy group, Equal Education, revealed that the conditions of toilets at some Gauteng township schools are worse than those in South Africa's overcrowded prisons, whereas in 2012, learners in Limpopo Province were not provided with textbooks (Dipa, 2015; The Economist, 2015). In the West Rand of Gauteng, there are still schools with a sanitation crisis, overcrowding and shortage of furniture, regardless of the province's lead in the implementation of educational ICT (Dipa, 2015; The Economist, 2015). Teachers and learners at Tsakani Primary School in Kagiso have to daily face challenges associated with limited infrastructure, as well as a shortage of furniture and learning materials (Dipa, 2015). Learners rely on legless chairs, rickety desks and buckets for sitting and writing on while for some the only available resort is the floor (Dipa, 2015). However, the same helpless learners are blamed for the poor conditions and lack of furniture. Some teachers claim that the majority of the learners at the school are from informal settlements and as a result they are “not used to the nice furniture”. Instead, the leaners dismantle the furniture and use it as toys at the playing grounds (Dipa, 2015).

At Itireleng School for the severely mentally handicapped, many learners occupy a single class due to a shortage of classrooms. Additionally, the school does not have access to basic services such as water, toilets and electricity (Dipa, 2015). Megatong Primary School, situated in Soweto, is also faced with basic infrastructure challenges, while not far from it, one school has been provided with tablets (Quintal, 2015). Ironically, at Megatong Primary School, which is in the same province that took the lead in the implementation of e-learning, there are broken windows, falling light fixtures, gaping holes in the walls and limited dysfunctional toilets, hand basins and taps (Quintal, 2015).In the school with 130 learners, only four teachers and three volunteers has not been allocated any budget since 2011(Quintal, 2015). To address the shortage of the basic infrastructure, the 2016 budget speech revealed that “by 2018 510 inappropriate and unsafe schools will be rebuilt, 1 120 schools will be supplied with water and 916 schools with electricity” (Gordon, 2016: 22). Hopefully for schools with inadequate basic infrastructure, South Africa will find it necessary to prioritise their “urgent needs” over educational ICT as it has been happening.

In some cases, the introduced educational technology adversely affect learners’ ability to think for themselves, remember and study to understand content (Kwet, 2015; Liebenberg, 2015; Sackstein, Spark & Jennkins, 2015; Sangari, 2015). Therefore, tablets are believed to pose a danger because the “autonomous devices”, performing mental tasks on behalf of learners, which eventually deprive them of developing their mental capabilities and problem solving skills, among others (Kwet, 2015; Liebenberg, 2015; Sangari, 2015). “Tablets derive their power (or lack thereof) not through something inherent in them but from the way that they are utilised” (Liebenberg, 2015: 24) and the question for South Africa is: are the tablets used effectively by both teachers and learners for educational purposes? For example, there are schools that believe that by using the preloaded teaching and learning materials, inclusive of e-books, it represents the implementation of e-learning. Then the question is: how then is the replacement of paper with electronic materials going to encourage creativity, innovation, flexibility and collaboration in teaching and learning? In practice, changing of the content medium from paper to electronic accessed through the tablet screen does not translate into the expected modern educational transformation, and thus teaching and learning will hardly change (Kwet, 2015; Liebenberg, 2015; Sackstein et al., 2015). ICT can only add value in education if they are integrated with conventional didactics, not as the only strategy that is capable of addressing the learning needs in South Africa.

According to Via Afrika Educational Report (cited in Greef, 2015), the Department of Basic Education declared that in 2014, less than 6 000 schools out of a total number of 25 870 in South Africa were ready to adopt educational ICT. Thus, only 24% of the schools are ready to integrate implement digital technology whereas only 32% of the country's teachers had received basic computer skills training (Greef, 2015). Therefore, South Africa's massive investments in educational ICT remains questionable. Internationally, evidence confirms that the blending of e-learning pedagogies with conventional didactics is not as unproblematic as South Africa assumes. The main challenge remains the replacement of traditional didactics with modern ones, instead of adopting blended didactics, which remains the case in South Africa. The challenge is mostly a result of inappropriate planning and governance models, lack of time allocated for lessons and their preparations and teachers' and students' limited ICT experience, among other factors. Therefore, a lack of conclusive affirmation of the success of blending e-learning pedagogies with conventional didactics in other countries should be of concern to South Africa. The effective adoption and usage of digital technologies for modern teaching and learning relies on a number of determinants, which at the core include planning and governance. These determinants require serious changes in the current infrastructure developments, teachers' pedagogic technological informatics and students' technology informatics, transformation in culture in schools and households, among other factors, in order to successfully implement blended pedagogies.

5.9. Conclusion

To achieve its educational technology goals, South Africa needs a well-coordinated, enabling ICT strategy and plan which is able to "stimulate sector growth" and innovation by driving public and private ICT investment. The country's investments should largely be focussed on teachers' training, infrastructure especially for network upgrades and expansion as well as the development of applications and local content. Clearly, South Africa's readiness for e-learning is hampered by a lack of appropriate planning and governance, teachers' Technological Pedagogical Content Knowledge and e-culture among the users and the community at large. Thus, the replacement of conventional didactics should be avoided and instead blended learning must be adopted to ensure that learning occurs regardless of the circumstances. Nevertheless, the end goal should be effective and sustainable blended learning that is provided by technologically competent teachers who are able to use modern types of education content creatively, innovatively and in an engaging and interactive manner. The next chapter presents an analysis and interpretation of the PCA results of the 28 variables by 15 observation matrix.

CHAPTER 6

Level of Development and Preconditions for Blended Pedagogies in South Africa

6.1. Introduction

The adoption of blended learning which is assumed to promote active knowledge acquisition that is necessary for participation in the knowledge economy is becoming more popular in pedagogy world-wide. Therefore, this study has used various countries' human development which is measured by the Human Development Index (HDI) at different levels to juxtapose South Africa's readiness of adopting digital technology for teaching and learning with that of other countries. Countries with a high HDI seem to perform effectively in the adoption and implementation of educational technologies more so than those with a lower one. However, some of the same countries with a high HDI characterised by state-of-the-art infrastructure still struggle to integrate conventional didactics with e-learning. This means that infrastructure alone is not a sufficient condition to perpetuate blended learning but that a number of precondition inclusive of planning, governance, skills and culture play a vital role. As already noted, the planning approaches and governance models adopted, availability and access of infrastructure as well as teachers' and learners' ICT skills and culture are central to successful adoption and implementation of blending learning. What is unknown is if ever the different HDI levels have an effect on the successful implementation of blended learning.

Theoretical evidence suggests that high HDI level countries are assumed to be the leaders of blended learning given that they have the required advanced technology which was invented by them and the population possess the culture and some of the skills that are necessary for the implementation of e-learning. If there are no differences between countries at different HDI levels in the use and implementation of educational digital technology, then diffusion of this technology has equalised the world and therefore planning, governance, infrastructure, skills and culture do not matter for blended learning. However, the equalization of the world is not improbable and can be expected especially given that countries have their unique human cultures and HDI. This study investigated the preconditions of such e-transformation to determine South Africa's readiness, relative to other states in the world that have trotted out with blended pedagogies, both in developed and developing countries. The evaluation of South Africa's relative readiness and appropriateness of planning, governance, infrastructure, culture and skills for blended pedagogies used the human development for judgements and conclusions. The study focussed on the interrelationship of twenty-eight variables to evaluate the correlation between HDI of a country and the preconditions of blended learning and/or adoption of digital technologies (appendix A). The variables were used to determine the planning, governance, infrastructure, skills and culture of various selected countries necessary for the successful implementation of blended learning. Knowing the preconditions for successful blended learning enabled the study to make recommendations that should assist countries that do not perform well in this regard.

The identification of levels of human development as a condition of spatially recordable variation requires specific criteria capable of measurement (Gu et al., 2015; Kavanoz et al., 2015; Kearney et al., 2015; Orr & Kukner, 2015; Oyedemi, 2015; Oz et al., 2015; Valtonen et al., 2015; Wang et al., 2015; Webster & Son, 2015; Wilson et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Salminen et al., 2016; Siddiq et al., 2016). It should be recognized that the absence of a generally accepted social theory that sets out the precise preconditions for blended learning handicaps its adoption and implementation in many countries (Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Salminen et al., 2016; Siddiq et al., 2016). Human development indicators might be determined by a direct survey of people's views in relation to quality of life. However, this method has not as yet reached a stage at t it could form the basis for definitive lists of criteria except for restricted populations (Orr & Kukner, 2015; Oyedemi, 2015; Oz et al., 2015; Valtonen et al., 2015). An alternative approach uses the judgement of the "experts", "scientists" or "public representatives" to determine the indicators of human development (Hung, 2016; Park et al., 2016; Salminen et al., 2016; Siddiq et al., 2016). The disadvantage of the latter approach is that the experts, scientists or public representatives do not always have a true representation of people's views of their quality of life (Hung, 2016; Park et al., 2016; Salminen et al., 2016; Siddiq et al., 2016). With deficiencies that comes with every approach, the choice of human development indicators should be flexible and broad enough to incorporate most of the studied population's welfare concerns.

A significant number of research studies have compiled and used lists of human development variables to study the concept of blended learning. Some have studied preconditions for blended learning such as planning, governance, infrastructure, skills and culture among human development indicators using multivariate, factor or component analysis techniques (Gu et al., 2015; Kavanoz et al., 2015; Kearney et al., 2015; Orr & Kukner, 2015; Oyedemi, 2015; Oz et al., 2015; Valtonen et al., 2015; Wang et al., 2015; Webster & Son, 2015; Wilson et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Salminen et al., 2016; Siddiq et al., 2016). This approach of studying the preconditions for blended learning confirms that individually specific human development indicators are not definitive of the concept of blended learning (Orr & Kukner, 2015; Domingo & Garganté, 2016; Park et al., 2016; Salminen et al., 2016). Therefore, the complexity of the process of assigning geographic units to places along the HDI levels requires the analysis of interrelationships among variables that allow the use of a multivariate technique. It is worth noting that one would always come across a variety of terms used in different studies such as “learning mobile technology”, “online learning”, “Technological Pedagogical Content Knowledge”, “computer-supported collaborative learning, “Web Pedagogical Content Knowledge”, “Web-based instruction” as well as “Internet self-efficacy”, among others which mostly are used to refer to blended learning (Gu et al., 2015; Kavanoz et al., 2015; Kearney et al., 2015; Orr & Kukner, 2015; Oyedemi, 2015; Oz et al., 2015; Valtonen et al., 2015; Wang et al., 2015; Webster & Son, 2015; Wilson et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Salminen et al., 2016; Siddiq et al., 2016).

For this study the concept of blended learning and its preconditions were used to avoid confusion that may be caused by interchangeably using all of the mentioned and other related concepts. However, most of these concepts were used in chapters one, two and three construed in different contexts of blended learning. Regardless of the differences in the concepts used in such studies inclusive of this one, there is always a common goal, which is to measure the level of human development by using education as per geographic spaces. Therefore, there are some variables that are common to the majority of this study’s geographic human development indicators and reference is made to them. This chapter consists of four sections including this introduction and the conclusion. The second section discusses the principal component analysis results while the third section presents a summary of the key findings of the study.

6.2. Principal Component Analysis Results

This section is presented in 7 subsections which are namely: overview of the correlation matrix, analysis of the correlation coefficients, communalities and variance accounted for in the PCA, principal components and eigenvalues, principal component loadings analysis, global PCA and surrogate cause-effect relationships of PCs, as well as, countries principal components scores, respectively.

6.2.1. Overview of the Correlation Matrix

Correlation matrix is a “parametric statistic that provides a more accurate measure of coefficient of determination most widely used in spatially-oriented research” (Tsheola, 2012: 1059). Furthermore, it could be used as a descriptive measure of the degree (strength and direction) of a correlation and as a measure of the linear relationship between variables or “the dispersion of points about the straight line” on the basis of the assumption that the form of the relationship is linear (Edbon, 1985: 97 cited in Tsheola, 2012). The correlation matrix, therefore, describes the relationship between pairs of variables. Additionally, the correlation matrix is “symmetric” wherein “the correlation between two variables X and Y necessarily equals the correlation between variables Y and X”, whilst the top-left to bottom-right diagonal values record correlations of 1.00 for the relationship of each observation with itself (Barber, 1988: 373 cited in Tsheola, 2012). Given that the raw data consisted of 15 observations by 28 variables, a 28 by 28 variables correlation matrix was constructed (table 6.1; appendix C). That is, each of the 28 variables is correlated with the twenty-seven as well as itself.

Hence, the matrix consists of a diagonal line ranging from top left to bottom right of perfect direct correlations of 1.00. That diagonal set of correlations describes relationships of each variable with itself. To this extent, each side of the diagonal line is a reflection of the other. However, in this study the relationship between Y and X is similar to that between X and Y, without insinuating a cause-effect relationship. Therefore, the analysis of the correlation matrix will be based on only one side of the diagonal line.

Table 6.1: Correlation Matrix of 15 Selected Countries

	HDI	HDIRC	AAHDIG	IAHDIV	CHI	IE	IAEI	II	IIGC	PEE	GDP	GFCF	TGGFCE	AAGGCE	RDE	FFPES	RSPES	TER	RER	EPR	LFPR	LFTE	YU	YNSE	IUC	MPSC	QE	SL
HDI	1.00																											
HDIRC	-0.27	1.00																										
AAHDIG	-0.44	0.10	1.00																									
IAHDIV	0.96	-0.27	-0.35	1.00																								
CHI	-0.84	0.22	0.19	-0.95	1.00																							
IE	-0.74	0.09	0.38	-0.82	0.86	1.00																						
IAEI	0.93	-0.22	-0.48	0.94	-0.87	-0.90	1.00																					
II	-0.42	0.27	-0.07	-0.63	0.77	0.46	-0.45	1.00																				
IIGC	-0.45	0.31	-0.03	-0.66	0.81	0.56	-0.50	0.94	1.00																			
PEE	-0.13	-0.46	-0.04	-0.31	0.45	0.39	-0.29	0.54	0.43	1.00																		
GDP	0.83	-0.48	-0.39	0.83	-0.70	-0.64	0.84	-0.45	-0.48	0.02	1.00																	
GFCF	0.43	-0.08	-0.14	0.38	-0.33	-0.23	0.28	-0.15	-0.15	0.02	0.23	1.00																
TGGFCE	0.17	0.03	-0.15	0.09	0.04	-0.23	0.30	0.32	0.36	0.13	0.38	-0.15	1.00															
AAGGCE	-0.51	0.28	0.85	-0.41	0.23	0.26	-0.45	0.02	0.07	-0.05	-0.42	-0.02	0.00	1.00														
RDE	0.50	-0.59	-0.09	0.47	-0.39	-0.20	0.42	-0.36	-0.18	0.15	0.55	0.22	0.14	-0.19	1.00													
FFPES	0.56	-0.06	-0.05	0.50	-0.45	-0.58	0.61	-0.01	-0.05	0.06	0.41	0.25	0.34	0.05	0.39	1.00												
RSPES	-0.52	0.05	0.03	-0.44	0.37	0.51	-0.54	-0.08	-0.04	-0.13	-0.35	-0.30	-0.35	-0.08	-0.35	-0.99	1.00											
TER	0.84	0.06	-0.28	0.80	-0.72	-0.63	0.74	-0.30	-0.37	-0.19	0.54	0.23	-0.07	-0.40	0.25	0.56	-0.51	1.00										
RER	0.84	0.02	-0.16	0.83	-0.79	-0.67	0.76	-0.39	-0.46	-0.26	0.57	0.18	-0.05	-0.31	0.30	0.57	-0.51	0.98	1.00									
EPR	-0.05	-0.26	0.60	0.02	-0.13	0.03	-0.16	-0.25	-0.33	0.12	0.01	0.39	-0.21	0.46	0.10	-0.03	0.02	-0.08	0.01	1.00								
LFPR	-0.23	-0.26	0.60	-0.22	0.14	0.18	-0.32	0.07	-0.02	0.33	-0.12	0.34	-0.01	0.55	0.00	-0.01	-0.04	-0.30	-0.25	0.92	1.00							
LFTE	0.43	-0.83	-0.06	0.51	-0.49	-0.30	0.41	-0.59	-0.67	0.24	0.68	0.14	-0.02	-0.20	0.48	0.10	-0.06	0.11	0.17	0.36	0.24	1.00						
YU	-0.17	0.39	-0.42	-0.34	0.50	0.19	-0.12	0.74	0.78	0.14	-0.20	0.06	0.33	-0.16	-0.26	0.01	-0.07	-0.15	-0.28	-0.56	-0.30	-0.64	1.00					
YNSE	-0.26	0.28	-0.13	-0.44	0.54	0.25	-0.26	0.74	0.75	0.32	-0.29	-0.34	0.36	-0.11	-0.09	0.16	-0.17	-0.05	-0.13	-0.33	-0.15	-0.60	0.60	1.00				
IUC	0.80	-0.51	-0.54	0.78	-0.68	-0.59	0.76	-0.48	-0.49	-0.04	0.80	0.11	0.05	-0.69	0.65	0.30	-0.22	0.65	0.65	-0.10	-0.31	0.54	-0.24	-0.09	1.00			
MPSC	0.60	0.03	-0.41	0.45	-0.33	-0.44	0.48	0.19	0.04	0.19	0.25	0.44	0.01	-0.38	-0.02	0.55	-0.58	0.72	0.60	-0.06	-0.06	-0.07	0.23	0.22	0.36	1.00		
QE	0.18	0.15	0.03	0.26	-0.35	-0.46	0.31	-0.07	-0.25	-0.12	0.14	-0.09	-0.12	0.14	-0.25	0.20	-0.16	0.34	0.38	-0.06	-0.13	-0.01	-0.06	-0.24	-0.03	0.12	1.00	
SL	0.72	-0.23	-0.09	0.80	-0.83	-0.74	0.73	-0.55	-0.66	-0.19	0.66	-0.02	0.04	-0.22	0.33	0.42	-0.33	0.75	0.83	0.19	-0.05	0.49	-0.55	-0.34	0.66	0.31	0.49	1.00

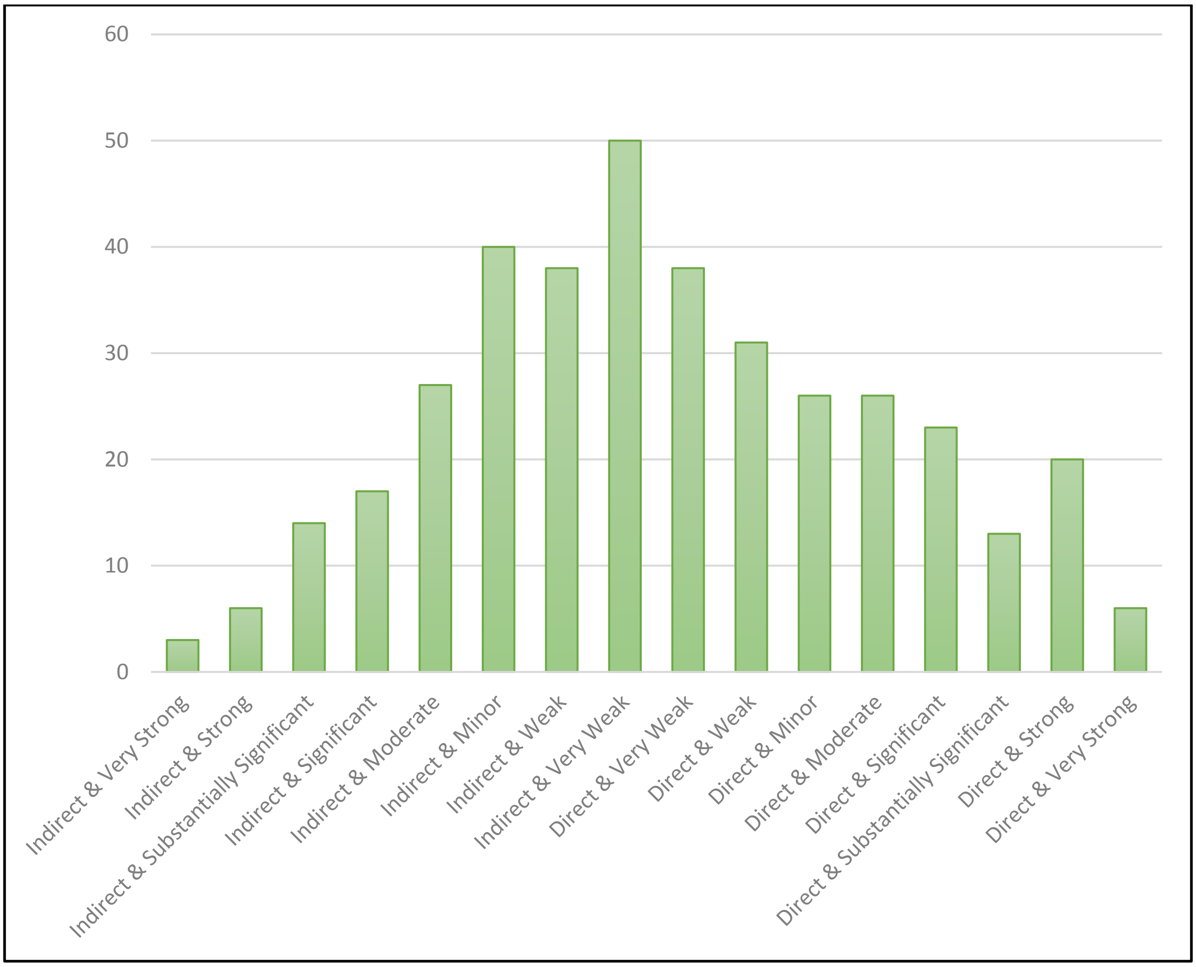
For this reason, it means there are 378 number of relations that are useful for interpretation in this study (table 6.1, appendix C). Although correlation matrix requires data that has been measured on an interval scale and further assumes that all variables are drawn from normally distributed populations, it has proved valid and reliable especially in geographic analyses where most data rarely satisfies this assumption (Tsheola, 2012).

Table 6.2: Correlation Matrix Interpretation Tool

Direction: Indirect or Inverse	Magnitude	Direction: Direct or Positive
0.00 to -0.12	Very weak	0.00 to 0.12
-0.13 to -0.24	Weak	0.13 to 0.24
-0.25 to -0.37	Minor	0.25 to 0.37
-0.38 to -0.49	Moderate	0.38 to 0.49
-0.50 to -0.62	Significant	0.50 to 0.62
-0.63 to -0.74	Substantially significant	0.63 to 0.74
-0.75 to -0.87	Strong	0.75 to 0.87
-0.88 to -1.00	Very strong	0.88 to 1.00

The correlations in the matrix ranges from -1.00 to 1.00 with both extremes describing very strong relationships while 0.00 denotes neutrality or no correlation. The 0.00 to 1.00 denotes a direct of positive relationship whereas the 0.00 to -1.00 describes an indirect or inverse correlation. The correlations in this range have been conceptualised for the purposes of interpretation of the results in this study using very weak, weak, minor, moderate, significant, substantially significant, strong and very strong (table 6.2). The analytical tool (table 6.2) describes associations between pairs of variables. This association means that a change in 1 is related to a change in another and that is described in terms of the direction of the correlation (table 6.2). Where the correlation is direct or positive it means that an increase in one variable is associated with an increase in another and vice versa. Similarly, it would mean that a decrease in one variable is associated with a decrease in another and vice versa. The likelihood that such an association would hold is described in the magnitude of the correlations (table 6.2). The likelihood is high where the magnitude is closer to 1.00 and -1.00 and lower when it is closer to 0.00.

Figure 6.1: Correlation Matrix Direction and Magnitude



Therefore, the correlation matrix serves two important purposes: it determines if there is a relationship and describes the direction thereof; and, it provides an accurate numerical statement of the strength of the association and the chances that such a relationship would hold. Of the 378 relationships, 183 (48.41%) are direct and 195 (51.59%) are indirect (figure 6.1 and table 6.3). Eighty-eight (88) of these correlations, both direct and indirect are negligible and inconsequential because they lie in the range of -0.12 and 0.12. Also, 69 of them have magnitudes ranging from -0.13 to -0.24 and 0.13 and 0.24; and, these relationships too are weak.

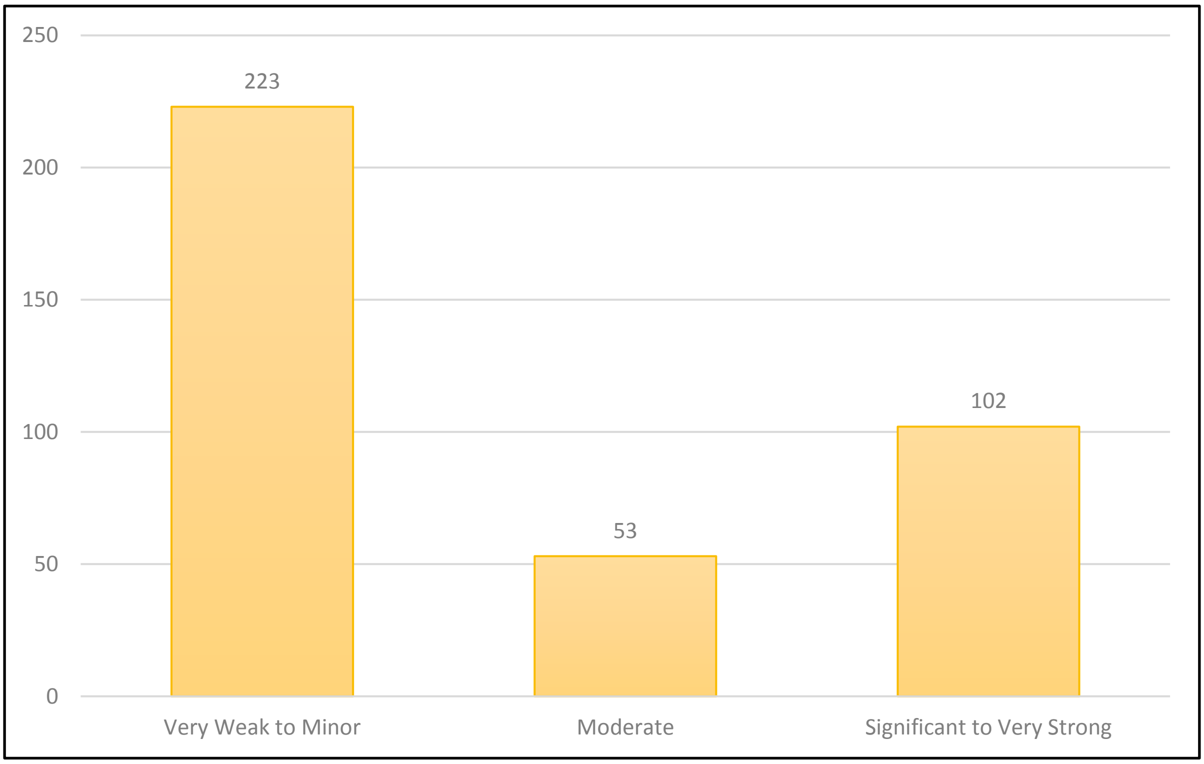
Table 6.3: Number of Correlations per Magnitude and Direction

Magnitude and Direction	Number of Correlations	Magnitude and Direction	Number of Correlations
0.00 to -0.12	50	0.00 to 0.12	38
-0.13 to -0.24	38	0.13 to 0.24	31
-0.25 to -0.37	40	0.25 to 0.37	26
-0.38 to -0.49	27	0.38 to 0.49	26
-0.50 to -0.62	17	0.50 to 0.62	23
-0.63 to -0.74	14	0.63 to 0.74	13
-0.75 to -0.87	6	0.75 to 0.87	20
-0.88 to -1.00	3	0.88 to 1.00	6
Totals	**195**		**183**

Sixty-six (66) of the associations have magnitudes ranging from -0.25 to -0.37 and 0.25 to 0.37. Statistically, these correlations too are minor (figure 6.1 and table 6.3). Also, the correlations with magnitudes ranging from -0.38 to -0.49 and 0.38 to 0.49 are relatively weak. However, they would be used in case they add value to insight. Twenty-seven (27) and 26 of the 53 are indirect and direct correlations, respectively (figure 6.2). That is, 223 of the 378 relationships are negligible, which is 59.00% of the total correlation frequencies (figure 6.2). One hundred and twenty-eight (128) and ninety-five (95) of the 223 are indirect and direct relationships, respectively (figure 6.1 and table 6.3). Only 102 of the 378 correlations are strong and significant enough to deserve closer examination (figure 6.2).

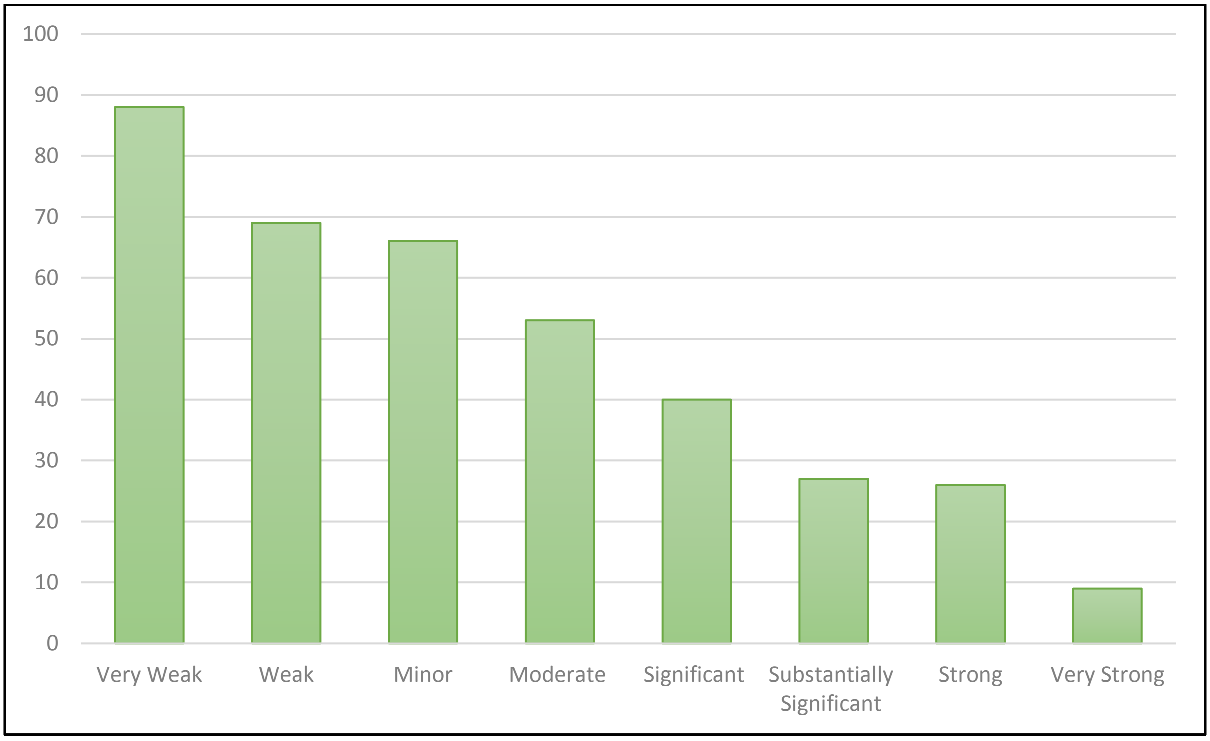
Of the 102 significant correlations, 40 are indirect and 62 are direct. Forty correlations in the 102 range from -0.50 to -0.62 and 0.50 to 0.62 (figure 6.1 and table 6.3), which are denoted significant.

Figure 6.2: Generalised Magnitude Categories and Correlation Frequencies



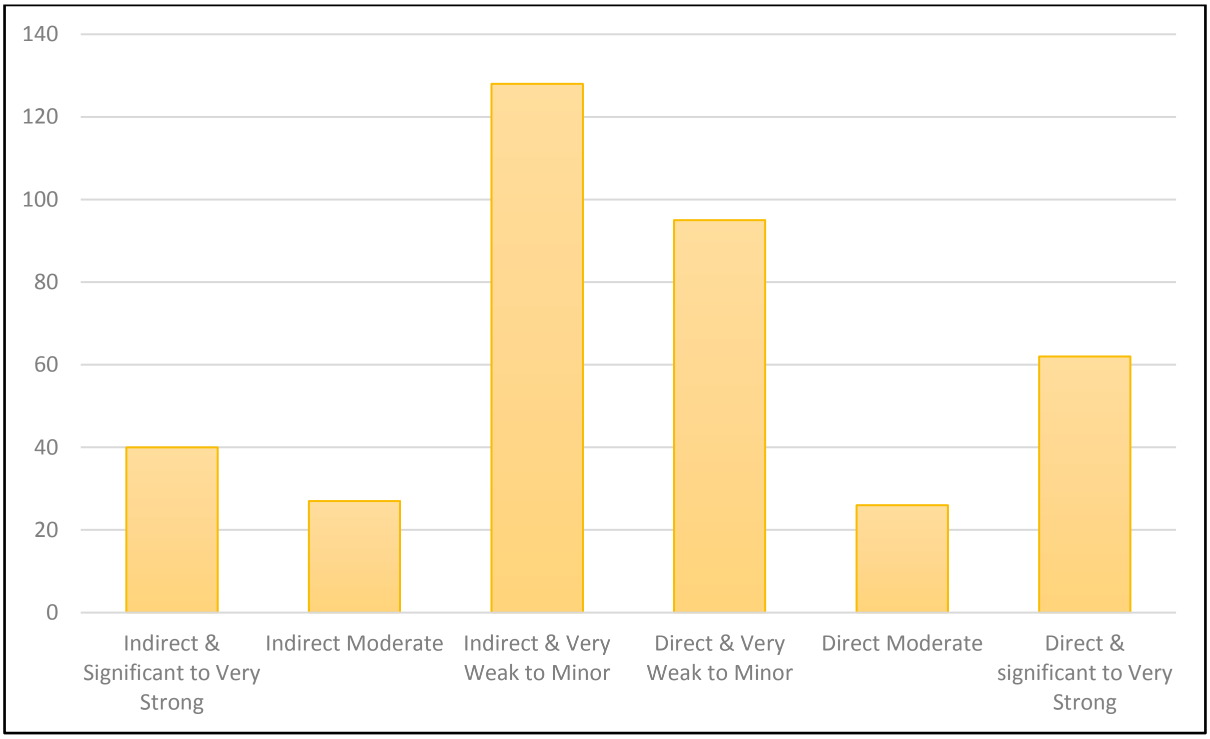
Additionally, 27 and 26 of the 102 correlations, respectively, range between -0.63 to -0.74 and 0.63 to 0.74 as well as -0.75 to -0.87 and 0.75 to 0.87. Finally, 9 of the 102 correlations are in the range -0.88 to -1.00 and 0.88 to 1.00. In the forty ranging between -0.50 to -0.62 and 0.50 and 0.62, 23 (57.5%) are direct and 17 (42.5%) are indirect relationships (figure 6.1 and table 6.3). Of the 27 that range between -0.63 to -0.74 and 0.63 to 0.74, 13 (48.15%) are direct and 14 (51.85%) are indirect correlations. Also 20 (76.92%) of the 26 correlations are direct whilst 6 (23.08%) are indirect. Finally, 9 of the correlations with magnitudes ranging from -0.00 to -1.00 and 0.00 to 1.00 consists of 6 (66.67%) direct and 3 (33.33%) indirect relationships (figure 6.1 and table 6.3).

Figure 6.3: Correlation Frequencies by Magnitude



For both the directions, the weaker the magnitude the more the correlation frequencies and the stronger the magnitude the fewer the correlation frequencies (figure 6.3). Generally, there are more weak relationships as compared to strong ones both direct and indirect.

Figure 6.4: Generalised Magnitude Categories, Direction and Correlation Frequencies



The weaker the magnitude, the more the correlation frequencies. The correlation frequencies of the direct and significant to very strong are more than those of the indirect and significant to very strong. This means that there are more correlations that are strong and positive than those that are strong and negative. However, the correlation frequencies of the indirect and very weak to minor are more than those of direct and very weak to minor. That is, there are more weak relationships that are indirect than those that are direct (figure 6.4).

6.2.2. Analysis of the Correlation Coefficients

For the purpose of this study, correlations frequencies are grouped per variable from very strong to significant as described in the analytical tool. Then their relationship, direction and magnitude are discussed in relation to blended pedagogies. All the 28 variables are correlated against the 27 variables for the analysis as follows:

Human Development Index (HDI) correlates with a total number of 14 variables namely: Inequality Adjusted HDI Value, Inequality-adjusted Education Index, Gross Domestic Products (GDP), Total Electrification Rate, Rural Electrification Rate, Internet Users Communication, Coefficient of Human Inequality, Standard of Living, Inequality in Education, Research and Development Expenditure, fossil fuels primary energy supply, mobile phone subscription communication, Average Annual Growth of General Government Final Consumption Expenditure and Renewable Sources Primary Energy Supply. From the 14 relationships, there are two that are very strong and direct, HDI and Inequality Adjusted HDI Value with 0.96 as well as HDI and Inequality-adjusted Education Index with 0.93. Specifically, the correlation between HDI and Inequality Adjusted HDI Value means that average achievement in a long and healthy life, knowledge and a decent standard of living is directly and strongly related to the adjusted value for inequalities in the three basic dimensions of human development. In contrast, the relationship between HDI and Inequality-adjusted Education Index signifies a direct and strong correlation of the three dimensions of human development and adjusted inequality in the years distrusted for schooling. That is, these strong and direct correlations confirm that an increase in HDI, means an increase Inequality Adjusted HDI Value and Inequality-adjusted Education Index and vice versa. Secondly, correlations between HDI and GDP, HDI and Total Electrification Rate, HDI and Rural Electrification Rate, HDI and Internet Users Communication as well as HDI and Coefficient of Human Inequality are strong in magnitude. The analysis revealed that four of this correlations are direct with only one presenting an indirect relationship. Precisely, strong and direct correlations of 0.83, 0.84, 0.84 and 0.80 are between HDI and GDP, HDI and Total Electrification Rate, HDI and Rural Electrification Rate as well as HDI and Internet Users Communication, respectively.

Whereas the strong and indirect correlation between HDI and Coefficient of Human Inequality is measured at -0.84. For HDI and GDP, the three dimensions of human development are directly and strongly related to the gross value of the domestic products produced by all residents in the economy. Therefore, the more people are able to achieve a long and healthy life, knowledge and a decent standard of living the more the generation of the GDP value. The 0.84 correlations between HDI and Total Electrification Rate as well as HDI and Rural Electrification Rate, respectively, denote that the relationship between the 3 dimensions of human development and the total population's electrification rate as well as the achievement of a long and healthy life, knowledge and a decent standard of living with rural electrification rate. Thus, an increase in the HDI means an increase in the Total and Rural Electrification Rates. The strong and direct correlation between HDI and Internet Users communication suggests that long and healthy life, knowledge and a decent standard of living are collectively related to the levels of communication between Internet users through the worldwide network. That is, the higher the HDI the more people will have access to Internet communication. The -0.84 correlation between HDI and Coefficient of Human Inequality indicates that long and healthy life, knowledge and a decent standard of living is strongly but indirectly related to the average inequality in the 3 basic dimensions of human development. This means that an increase in HDI results in a decrease in Coefficient of Human Inequality and vice versa.

Thirdly, 2 of the total correlations between the HDI and other variables are substantially significant. The substantially significant and direct relationship between HDI and Standard of Living is estimated to be 0.72 while the substantially significant and indirect correlation between HDI and Inequality in Education is -0.74. Specifically, the correlation between HDI and Standard of Living means that an increase in the level of the 3 dimensions of human development will result in an increase in standard of living. Whereas the relationship between HDI and Inequality in Education of -0.74 suggests that an increase in a long and healthy life, knowledge and a decent standard of living means a decrease in the inequality of education and vice versa. Finally, 5 correlations from 14 of the variables that are related to HDI are significantly correlated, with 3 and 2 of them having direct and indirect relationships, respectively. HDI and Research and Development Expenditure, HDI and Fossil Fuel Primary Energy Supply as well as HDI and Mobile Phone Subscription Communication, significantly and directly relate to each other at 0.50, 0.56 and 0.60, respectively. That is, the correlation between HDI and Research and Development Expenditure means that a decrease on increase in human development will result in a decrease in increase in current and capital expenditures on systematic creative work aimed at increasing knowledge and its use for new applications. HDI and Fossil Fuel Primary Energy Supply's significant and direct relationship revealed that an increase in the 3 dimensions of human development guarantees an increase in the percentage of energy generated from natural resources. The significant and indirect relationship between HDI and Average Annual Growth of General Government Final Consumption Expenditure as well as HDI and Renewable Resources Primary Energy Supply is –0.51 and -0.52, respectively. When HDI increases, the Average Annual Growth of General Government Final Consumption Expenditure decreases. Moreover, when HDI decreases the percentage of energy supply generated from replenished natural processes increases and vice versa.

Another variable which has a number of relationships with other variables is the Human Development Index Rank Change of between 2009 and 2014. A total number of 3 correlations were identified which reveals that there is a strong and indirect relationship between Human Development Index Rank Change and Labour Force with Tertiary Education at -0.83 and 2 significant and indirect relationships between Human Development Index Rank Change and Research and Development Expenditure as well as Human Development Index Rank Change and Internet Users Communication of -0.59 and -0.51, respectively. The correlation between Human Development Index Rank Change and Labour Force with Tertiary Education means that when the changes of the HDI in three basic dimensions of human development between 2009 and 2014 increase, the labour force with tertiary education also increases and vice versa. The significant and indirect relationship between Human Development Index Rank Change and Research and Development Expenditure signifies that when the changes between 2009 and 2014 in long and healthy life, knowledge and a decent standard of living increases, the research development expenditure decreases and vice versa. Additionally, an increase in the HDI change between 2009 and 2014 results in a decrease in communication of Internet users and vice versa.

Average Annual HDI Growth has a strong and direct correlation of 0.85 with Average Annual Growth of General Government Final Consumption Expenditure. This correlation means an increase in the growth of the HDI on an annual basis results in an increase in all government's annual expenditures for purchases of goods and services expressed as a percentage of GDP and vice versa. Average Annual HDI Growth significantly correlates with Internet Users Communication, Employment to Population Ration and Labour Force Participation Rate. There are two significant and direct relationships of equal magnitude of 0.60 between Average Annual HDI Growth and Employment to Population Ratio as well as Average Annual HDI Growth and Labour Force Participation Rate. The significant and direct correlation between Average Annual HDI Growth and Employment to population Ratio suggests that an increase in the annual growth of the HDI results in an increase in the percentage of the population ages 15 and older that is employed, and vice versa. However, the existing significant and indirect correlation of -0.54 between Average Annual HDI Growth and Internet Users Communication asserts that an increase in the annual growth of the HDI results in a decrease in communication of Internet users and vice versa.

Inequality-adjusted HDI Value correlates with a total number of 12 variables ranging from significant to very strong magnitude. Of the 14 relationships, 2 are very strong, one with a direct and the other with an indirect correlation. Inequality-adjusted HDI Value and CHI have a very strong and indirect correlation of -0.95 whereas Inequality-adjusted HDI Value is very strongly and directly related to Inequality-adjusted Education Index at 0.94. The correlation between Inequality-adjusted HDI Value and Coefficient of Human Inequality suggests that a decrease in HDI value adjusted for inequalities in the three basic dimensions of human development causes an increase in average inequality in long and healthy life, knowledge and a decent standard of living and vice versa. The very strong and direct correction of 0.94 between Inequality-adjusted HDI Value and Inequality-adjusted Education index discloses that an increase in inequality-adjusted HDI value results in an increase in HDI education index adjusted for inequality in distribution of years of schooling per household and vice versa. Moreover, there are a total of 6 strong relationships between Inequality-adjusted HDI Value and Inequality in Education, Inequality-adjusted HDI Value and GDP, Inequality-adjusted HDI Value and Total Electrification Rate, Inequality-adjusted HDI Value and Rural Electrification Rate, Inequality-adjusted HDI Value and Standard of Living as well as Inequality-adjusted HDI Value and Internet Users Communication. From the relationships, only Inequality-adjusted HDI Value and Inequality in Education have a strong and indirect correlation of -0.82 while the other 5 are direct. The strong and indirect correlation between Inequality-adjusted HDI Value and Inequality in Education symbolises that an increase in the Inequality-adjusted HDI Value perpetuates a decrease in inequality in education and vice versa.

The 5 strong and direct correlations of 0.83, 0.80, 0.83, 0.80 and 0.78 are, respectively, between Inequality-adjusted HDI Value and GDP, Inequality-adjusted HDI Value and Total Electrification Rate, Inequality-adjusted HDI Value and Rural Electrification Rate, Inequality-adjusted HDI Value and Standard of Living as well as Inequality-adjusted HDI Value and Internet Users Communication. The strong and direct relationship between Inequality-adjusted HDI Value and GDP implies that an increase in Inequality-adjusted HDI Value equals to an increase in GDP and vice versa. The 0.80 correlation between Inequality-adjusted HDI Value and Total Electrification Rate means that an increase in the former results in an increase in the latter and vice versa. Whereas, an increase in Inequality-adjusted HDI Value means as increase in Rural Electrification Rate, and vice versa. The strong and direct relationship between Inequality-adjusted HDI Value and Standard of Living suggest that a decrease in Inequality-adjusted HDI Value results in a decrease in people's satisfaction of life and vice versa. Moreover, the correlation between Inequality-adjusted HDI Value and Internet Users Communication implies that an increase in inequality-adjusted HDI value results in an increase in communication between Internet users. For substantially significant and significant, there are a total of 4 correlations with 2 in each category of magnitude. In the former magnitude category, Inequality-adjusted HDI Value and Income Inequality as well as Inequality-adjusted HDI Value and Gini Coefficient of Income Inequality are substantially significant and indirectly correlated with -0.63 and -0.66, respectively. Thus, when Inequality-adjusted HDI Value increases, Income Inequality and Gini Coefficient of Income Inequality also increase and vice versa. Whereas the latter category of magnitude consists of significant and direct correlations of 0.50 and 0.51 between Inequality-adjusted HDI Value and Fossil Fuels Primary Energy Supply as well as Inequality-adjusted HDI Value and Labour Force with Tertiary Education, respectively. That is, when there is a decrease in Inequality-adjusted HDI Value there will also be a decrease in Fossil Fuels Primary Energy Supply and Labour Force with Tertiary Education and vice versa.

There are 5, 4 and 2 correlations that are strong, substantially significant and significant, respectively between Coefficient of Human Inequality and other 11 variables. The strong and direct correlations are between Coefficient of Human Inequality and Education Inequality (0.86), Coefficient of Human Inequality and Income Inequality (0.77) as well as Coefficient of Human Inequality and Coefficient of Human Inequality (0.81). Thus, whenever there is an increase in average inequality in three basic dimensions of human development there will be an increase in the inequality in the distribution of years for schooling and vice versa. Additionally, the strong and direct correlation between Coefficient of Human Inequality and Income Inequality means that a decrease in the former will result in a decrease in the latter and vice versa. Lastly, for the strong and direct magnitude, when there is an increase in Coefficient of Human Inequality there will be an increase in Gini Coefficient of Income Inequality and vice versa. Correlations that are strong and indirect were statistically discovered between Coefficient of Human Inequality and Inequality-adjusted Education Index as well as Coefficient of Human Inequality and Rural Electrification Rate and are measured at -0.87 and -0.79, respectively. That is, an increase in Coefficient of Human Inequality will definitely results in an increase in Inequality-adjusted Education Index as well as Rural Electrification Rate and vice versa.

All the 4 substantially significant correlations with Coefficient of Human Inequality and other variables are indirectly related. The correlations between Coefficient of Human Inequality and GDP, Coefficient of Human Inequality and Total Electrification Rate, Coefficient of Human Inequality and Internet Users Communication as well as Coefficient of Human Inequality and Standard of Living are -0.70, -0.72, -0.68 and -0.74, respectively. The relationship between Coefficient of Human Inequality and GDP means that an increase in the average inequality in three basic dimensions of human development will result in an increase in sum of gross value added by all resident producers in the economy and vice versa. Between Coefficient of Human Inequality and Total Electrification Rate, an increase in Coefficient of Human Inequality means an increase in the total electrification rate and vice versa. The relationship between Coefficient of Human Inequality and Internet Users Communication suggests that an increase in the average in long and healthy life, knowledge and a decent standard of living perpetuates an increase in communication between Internet users. Lastly in the substantially significant magnitude, the relationship between Coefficient of Human Inequality and Standard of Living denotes that a decrease in Coefficient of Human Inequality results in an increase in the standard of living. Coefficient of Human Inequality and Youth Unemployment as well as Coefficient of Human Inequality and Youth not in School or Employment are the only two sets of variables with significant and direct correlations of 0.54 and 0.50, respectively. The relationship between Coefficient of Human Inequality and Youth Unemployment implies that a decrease in Coefficient of Human Inequality would mean a decrease in the percentage of the labour force population between the ages of 15 and 24 who are not in paid employment or self-employed but are available for work and are making efforts to get paid employment or engage in self-employment and vice versa. Whereas, the 0.50 correlation between Coefficient of Human Inequality and Youth not in School or Employment signifies that when there is an increase in the 3 dimensions of human development there would be an increase in the percentage of young people aged between 15 and 24 who are not in any form of employment, education or training and vice versa.

Inequality in Education has 9 correlations that range from magnitudes that are very strong to significant with other variables selected for the purposes of this study. The only very strong correlation between Inequality in Education and Inequality-adjusted Education Index is -0.90, which is indirect. This relationship implies that when there is a decrease in the inequality in distribution of years of schooling there would be an increase in HDI education index that is adjusted for inequalities related to the distribution of years of schooling and vice versa. Whereas, all the 4 substantially significant correlations are indirect in direction. The correlations between Inequality in Education and GDP, Inequality in Education and Total Electrification Rate, Inequality in Education and Rural Electrification Rate as well as Inequality in Education and Standard of Living accounts for -0.64, -0.63, -0.67 and -0.74, respectively. That is, an increase in Inequality in Education would result in a decrease in GDP and when Inequality in Education decreases Total Electrification Rate would also decrease and vice versa. Additionally, an increase in Inequality in Education would mean a decrease in Rural Electrification Rate however, when Inequality in Education increases, Standard of Living would also increase and vice versa. In total, there are 4 correlations with a significant magnitude, with 2 having indirect and 2 with direct relationships. The significant and direct relationships are between Inequality in Education and Gini coefficient of Income Inequality with 0.56 and Inequality in Education and Renewable Sources Primary Energy Supply with 0.51. The correlation between Inequality in Education and Gini coefficient of Income Inequality suggests that an increase in the inequality in distribution of years of schooling would results in increasing Gini coefficient of income inequality and vice versa. Whereas, a decrease in Inequality in Education would result in a decrease in the primary energy supply specifically of renewable resources and vice versa. The remaining 2 pairs of significant and indirect correlations are -0.58 and -0.59 between Inequality in Education and Fossil Fuel Primary Energy Supply as well as Inequality in Education and Internet Users

Communication, respectively. Therefore, an increase in Inequality in Education would result in a decrease in primary energy sources provided through fossil fuels while a decrease in Inequality in Education would mean an increase in Fossil Fuel Primary Energy Supply. Moreover, if there is an increase in Inequality in Education, there will be a decrease in Internet Users Communication and vice versa.

All correlations between Inequality-adjusted Education Index and other 5 variables are direct with magnitudes ranging from strong to substantially significant. Firstly, there is only 1 strong and direct relationship of 0.84 which is between Inequality-adjusted Education Index and GDP. That is, an increase in HDI education index adjusted inequalities in number of years allocated for schooling would results in an increase in GDP and vice versa. Substantially significant and direct correlations between Inequality-adjusted Education Index and Total Electrification Rate, Inequality-adjusted Education Index and Rural Electrification Rate, Inequality-adjusted Education Index and Internet Users Communication as well as Inequality-adjusted Education Index and Standard of Living are measured as 0.74, 0.76, 0.76 and 0.73, respectively. Therefore, the relationships between these variables suggest that when there is an increase in any of the two variables, there would be an increase in the other and vice versa. An increase in Inequality-adjusted Education Index would result in an increase in the total rate of electrification and vice versa. Additionally, when there is a decrease in Inequality-adjusted Education Index, a decrease would also be experienced for the electrification rate in rural areas and vice versa. The 0.76 correlation between Inequality-adjusted Education Index and Internet Users Communication implies that an increase in HDI education index adjusted inequalities in number of years allocated for schooling would results in an increase in the communication rate among Internet users and vice versa. Between Inequality-adjusted Education Index and Standard of Living, the relationship indicates that when the adjusted inequality education index decrease, the standard of living is also expected to decrease.

Secondly, there are 3 correlations that are significant in magnitude with 2 indirect and 1 direct relationships. Inequality-adjusted Education Index and Gini coefficient of Income Inequality as well as Inequality-adjusted Education Index and Renewable Sources Primary Energy Supply significantly and indirectly correlates, respectively, with -0.50 and -0.54 whereas, Inequality-adjusted Education Index and Fossil Fuel

Primary Energy Supply have a significant and direct relationship of 0.61. The correlation between Inequality-adjusted Education Index and Gini Coefficient of Income Inequality suggests that when there is an increase in the former variable, there would be a decrease in Gini coefficient of income inequality and vice versa. Additionally, the significant and indirect correlations between Inequality-adjusted Education Index and Renewable Sources Primary Energy Supply means that a decrease in education index adjusted inequalities in number of years allocated for schooling would results in an increase in primary energy supply of renewable resources. However, a significant and direct correlation between Inequality-adjusted Education Index and Fossil Fuel Primary Energy Supply infers that an increase in the former variable would result in an increase in the use of fossil fuels as the primary energy source.

The variable Income Inequality has relationships with other 6 selected variables that range from very strong to significant. The very strong and direct correlation is only between Income Inequality and Gini coefficient of Income Inequality which is 0.94 while the substantially significant and direct correlations are between Income Inequality and Youth Unemployment as well as Income Inequality and Youth not in School or Employment at 0.74 and 0.74, respectively. Therefore, increasing income inequalities will definitely result in the Gini coefficient of income inequalities both measured per household and vice versa. For substantial and direct relationships, a 0.94 correlation between Income Inequality and Gini coefficient of Income Inequality implies that a decrease in household income inequalities will result in a decrease in the number of unemployed youth and vice versa. Moreover, if Income Inequality increases, the rate of unemployed youth who are not in school or training would also increase. The significant magnitude consists of 1 direct and 2 indirect relationships that exist between Income Inequality and Public Expenditure on Education (0.54) as well as Income Inequality and Labour Force with Tertiary Education (-0.59) and Income Inequality and Standard of Living (-0.55), respectively. The significant and direct correlation between Income Inequality and Public Expenditure on Education suggests that an increase in income inequalities would result in an increase on the public expenditure in education and vice versa. However, a significant and indirect correlation between Income Inequality and Labour Force with Tertiary Education suggests that an increase in Income Inequality will results in a decrease in the percentage of the labour force that has attained the tertiary level of education and vice versa. Furthermore, the -0.55 relationship between Income Inequality and Standard of Living signifies that a decrease in Income Inequality would results in an increase in Standard of Living and vice versa.

Gini coefficient of Income Inequality has 4 relationships which are equally distributed between the strong and substantially significant magnitudes. The 2 strong and direct correlations of 0.78 and 0.75 are respectively, between Gini coefficient of Income Inequality and Youth Unemployment as well as Gini coefficient of Income Inequality and Youth not in School or Employment while the 2 substantially significant and indirect relationships are between Gini coefficient of Income Inequality and Labour Force with Tertiary Education as well as Gini coefficient of Income Inequality and Standard of Living of -0.67 and -0.66, respectively. The correlation between Gini coefficient of Income Inequality and Youth Unemployment implies that when there is an increase in the measure of the deviation of distribution of income among individuals or households within a country from a perfectly equal distribution there would also be an increase in the number of unemployed youth and vice versa. Moreover, the 0.75 relationship between Gini coefficient of Income Inequality and Youth not in School or Employment means that a decrease in the Gini coefficient of income inequality would result in a decrease in the total number of unemployed youth who are not in school or training and vice versa. However, the significant and indirect correlation between Gini coefficient of Income Inequality and Labour Force with Tertiary Education suggests that when there is an increase in Gini coefficient of Income Inequality, there would be a decrease in the number of labour force in possession of tertiary education and vice versa. Additionally, an increase in Gini coefficient of Income Inequality Gini coefficient of Income Inequality would result in a decrease in the standard of living of people and vice versa.

All the pairs of relationships between GDP and 6 other variables ranging from strong to significant are direct. The direct correlation of 0.80 between GDP and Internet Users Communication is strong. This correlation implies that when there is an increase in the sum of gross value added by all resident producers in the economy there would be an increase in the communication among internet users and vice versa. For substantially significant magnitude, GDP and Labour Force with Tertiary Education as well as GDP and Standard of Living, respectively, directly correlates at 0.68 and 0.66. The relationship between GDP and Labour Force with Tertiary Education signifies that an increase in GDP would result in an increase in the total number of the labour force who are in possession of tertiary education and vice versa. The correlation between GDP and Standard of Living denotes that an increase in the total services and goods produced by the residents would results in an increase in the standard of living and vice versa. The correlations between GDP and Research and Development Expenditure, GDP and Total Electrification Rate as well as GDP and Rural Electrification Rate are significant and direct measured at 0.55, 0.54 and 0.57, respectively. Between GDP and Research and Development Expenditure, the relationship means that an increase in the sum of gross value added by all resident producers in the economy would result in an increase in expenditure on research and development and vice versa. For GDP and Total Electrification Rate as well as GDP and Rural Electrification Rate, an increase in GDP suggests an increase in the total number of people with electricity as well as the percentages of people with access to electricity specifically in rural areas and vice versa.

Average Annual Growth in Government Consumption Expenditure has only 2 relationships with other variables that are substantially significant and direct as well as significant and direct. A direct and substantially significant correlation of 0.69 exists between Average Annual Growth in Government Consumption Expenditure and Internet Users Communication. This correlation means that an increase in all government current expenditures for purchases of goods and services expressed as a percentage of GDP would result in an increase in Internet Users Communication and vice versa. There is a 0.55 significant and direct correlation between Average Annual Growth in Government Consumption Expenditure and Labour Force Participation Rate. That is, a decrease in Average Annual Growth in Government Consumption Expenditure would mean a decrease in the percentage of a country's working-age population and vice versa.

For Research and Development Expenditure, there is only one correlation of 0.65 that is substantially significant and direct between Research and Development Expenditure and Internet Users Communication. That is, an increase in expenditure associated with research development will result in an increase in communication among the Internet users and vice versa. The Fossil Fuel Primary Energy Supply variable has 4 relationships, 1 of very high and 3 of significant magnitudes. The very high correlation between Fossil Fuel Primary Energy Supply and Renewable Sources Primary Energy Supply is -0.99 and thus indirect. This relationship signifies that when the primary energy source of fossil fuels increases, the primary energy source of renewable sources decreases and vice versa. All the 3 significant relationships of 0.56, 0.57 and 0.55 are direct and are, respectively, between Fossil Fuel Primary Energy Supply and Total Electrification Rate, Fossil Fuel Primary Energy Supply and Rural Electrification Rate as well as Fossil Fuel Primary Energy Supply and Mobile Phone Subscription Communication. The correlations between Fossil Fuel Primary Energy Supply and Total Electrification Rate as well as Fossil Fuel Primary Energy Supply and Rural Electrification Rate suggest that an increase in the use of fossil fuels as the primary source of energy would result in an increase in the total electrification of the population as well as rural electrification rate and vice versa. The relationship between Fossil Fuel Primary Energy Supply and Mobile Phone Subscription Communication implies that a decrease in Fossil Fuel Primary Energy Supply is a decrease in communication among mobile subscribers and vice versa.

There are 3 pairs of correlations between Renewable Sources Primary Energy Supply and Total Electrification Rate (-0.51), Renewable Sources Primary Energy Supply and Rural Electrification Rate (-0.51) as well as Renewable Sources Primary Energy Supply and Mobile Phone Subscription Communication (-0.58) that are all significant and indirect. Firstly, the relationship between Renewable Sources Primary Energy Supply and Total Electrification Rate suggest that an increase in percentage of total energy supply that comes from constantly replenished natural processes would result in a decrease in the electrification rate of the total population and vice versa. Secondly, the -0.51 correlation between Renewable Sources Primary Energy Supply and Rural Electrification Rate implies that a decrease in energy supply from renewable sources in an increase in the electrification rate in rural areas and vice versa. Lastly, the correlation of Renewable Sources Primary Energy Supply and Mobile Phone Subscription Communication means that when Renewable Sources Primary Energy Supply increases, the communication among mobile subscribers tends to decrease and vice versa. The correlation between Total Electrification Rate and Rural Electrification Rate of 0.98 is very strong and direct whereas there is another one between Total Electrification Rate and Standard of Living that is strong and also direct. This indicate that, an increase in the electrification rate of the total population is associated with an increase in electrification rates in rural areas as well as the standard of living and vice versa. The substantially significant magnitude also consists of two direct correlations of 0.65 and 0.72 that, respectively, exists between Total Electrification Rate and Internet Users Communication as well as Total Electrification Rate and Mobile Phone Subscription Communication. Therefore, when the electrification rate of the total population increases, communication among internet users and mobile phone subscriptions also increase and vice versa.

Rural Electrification Rate has 3 correlations, which include 1 relationship per magnitude which ranges from strong to significant. There is a strong and indirect correlation of -0.83 between Rural Electrification Rate and Standard of Living. The relationship means that when the rural electrification rate increases, the standard of living decreases and vice versa. The substantially significant and direct as well as significant and direct correlations of 0.65 and 0.60, are between Rural Electrification Rate and Internet Users Communication as well as Rural Electrification Rate and Mobile Phone Subscription Communication, respectively. That is, an increase in Rural Electrification Rate is an increase in communication of Internet users and vice versa. Moreover, a decrease in Rural Electrification Rate would result in a decrease in communication among mobile phone subscribers and vice versa. Employment to Population Ratio and Labour Force Participation Rate correlates very strongly and directly at 0.92 whereas Employment to Population Ratio and Youth Unemployment have a significant and indirect relationship of -0.56. The strong and direct correlation between Employment to Population Ratio and Labour Force Participation Rate signifies that an increase in percentage of employed population of ages 15 and older would results in an increase in the total participation rate of the labour force. Whereas, the correlation between Employment to Population Ratio and Youth Unemployment suggests that when a decrease is experienced in percentage of employed population of ages 15 and older there would be an increase in youth unemployment and vice versa.

Labour Force with Tertiary Education has 2 and 1 relationships in the substantially significant and significant magnitude categories, respectively. Both the relationships in the substantially significant category of -0.64 and -0.60 are indirect, respectively between Labour Force with Tertiary Education and Youth Unemployment as well as Labour Force with Tertiary Education and Youth not in School or Employment. Therefore, the relationship between Labour Force with Tertiary Education and Youth Unemployment suggests that when the labour force with tertiary education increases, youth unemployment would decrease and vice versa. Moreover, the correlation between Labour Force with Tertiary Education and Youth not in School or Employment implies that an increase in the percentage of labour force with tertiary education would result in a decrease in the percentage of youth not in school and unemployed and vice versa. The only significant and direct relationship of 0.54 is between Labour Force with Tertiary Education and Internet Users Communication which signifies that an increase in Labour Force with Tertiary Education would result in an increase in Internet Users Communication and vice versa. There are only two significant correlations both direct and indirect between Youth Unemployment and Youth Unemployment SE as well as Youth Unemployment and Standard of Living of 0.60 and -0.55, respectively. The significant and direct correlation between Youth Unemployment and Youth not in School or Employment implies that an increase in youth unemployment would results in an increase in youth who are not employed and not at school and vice versa. Whereas, a decrease in unemployed youth would result in an increase in the standard of living and vice versa. Internet Users Communication and Standard of Living have a substantially significant and direct relationship of 0.66. That is, if there is an increase in communication among internet users then there would be an increase in the standard of living and vice versa.

6.2.3. Communalities and Variance Accounted for in the PCA

The interrelationships in the 28 variables, as captured in the 378 correlations (table 6.1) account for high and significantly high percentage variations in each of the variables. A high percentage variance is described as a 0.80 to 0.89, which is 80 to 89 percent; whereas a significantly high percentage variance is described as 0.90 and above, which is 90% and above. Of the 28 variables, percentage variance of 18 variables are characterised as significantly high; whereas percentage variance of 10 are denoted as high percentage (table 6.4; appendix D). Therefore, the interrelationships described in the correlation matrix should provide confidence that variation in each of the variables is adequately accounted for in this analysis.

Table 6.4: Values of Variance Explained

Significantly High Percentage Variance Explained: 0.90 and above		High Percentage Variance Explained: 0.80 to 0.89	
Variable	***Value***	***Variable***	***Value***
Coefficient of Human Inequality	0.99	Inequality in Education	0.89
Inequality-adjusted Education Index	0.99	Per Capita GDP	0.89
Inequality-adjusted HDI 2014 Value	0.98	Change in HDI Rank between 2009 and 2014	0.88
Inequality in Income	0.97	Primary Energy Supply in Fossil Fuels	0.88
Total Electrification Rate	0.97	Renewable Sources of Primary Energy Supply	0.87
2014 Human Development Index	0.96	Employment to Population Ratio	0.87
Rural Electrification Rate	0.96	Youth not in School or Employment	0.85
Gross Fixed Capital Formation	0.95	Quality of Education	0.83
Labour Force with Tertiary Education	0.95	Total General Government Final Consumption Expenditure	0.83
Internet Users Communication	0.95	Research and Development Expenditure	0.82
Income Inequality Gini Coefficient	0.94		
Standard of Living	0.93		
Average Annual HDI Growth between 1990 and 2014	0.93		
Public Expenditure on Education	0.92		
Average Annual Growth in General Government Final Consumption Expenditure	0.92		
Mobile Phone Subscriptions Communication	0.92		
Labour Force Participation Rate	0.90		
Youth Unemployment	0.90		

The high and the significantly high percentage variance explained in these interrelationships provides confidence that such correlations may not have occurred by chance. The interpretations based on these correlations should be valid and reliable. Given that the total percentage variance in Coefficient of Human Inequality accounted for is 99% (table 6.4; appendix D). This variable has 11 relationships with itself and other variable that are significant, substantially significant and strong as in the above discussion. Therefore, the correlations between these variables and all others discussed above would not have occurred by chance. The Inequality-adjusted Education Index has a 99% variance between itself and other 27 variables (table 6.1). Altogether, Inequality-adjusted Education Index has relationships with 8 other variables ranging from significant, substantially significant and strong. Therefore, the existence of these correlations between the inequality-adjusted index and the above discussed variables would not have occurred by chance. The 2014 Inequality-adjusted HDI Value has a total percentage variance of 98% explained by the correlation matrix (table 6.1) between itself and other variables as already discussed. This variable has a total of 12 correlations with 2 that are very strong, 6 strong, 2 substantially significant and the last 2 being significant. Therefore, the correlations observed between these variables are valid and reliable and can be used to make judgements. The percentage variance in Inequality in Income accounted for is 97% explained by the interrelationships in the correlation matrix (table 6.1). The discussion of the correlations above of Inequality in Income and other variables confirmed that there are 6 relationships that exist between itself and 28 others used in this study for analysis. The correlation ranges from significant to very strong which means that the above discussed correlations between Inequality in Income and other variables did not occur by chance. Therefore, for the purposes of making judgements, the relationships between Inequality in Income and other variables are practically assumed to be valid and reliable.

Based on the percentage variance of the Total Electrification Rate which is 97% as explained in the correlation matrix (table 6.1), the interrelationships between itself and the above discussed did not occur by chance. This variable has 4 relationships with the 27 others; with the highest being 0.98 and while the lowest is 0.65 ranging from very strong to substantially significant. Therefore, the correlations between these variables are valid and can be relied upon for making judgements. The 2014 Human Development Index has a percentage variance of 96% which is explained by the interrelationships in the correlation matrix (table 6.1). The correlations between this variable and 27 others ranges from weak to very strong. That is, the correlations between these variables and the above discussed variables did not happen by chance and are valid and reliable. The percentage variance in Rural Electrification Rate accounted for is 96% as per the correlation matrix (table 6.4), which means that the interrelationships between rural electrification rate and the above discussed variables ranging from very high (0.98) to very weak (0.02) did not occur by chance. Therefore, the correlations are valid and reliable and did not occur by chance. It means that the 96% variance in Renewable Sources of Primary Energy Supply is accounted for through the correlations with 9 other variables out of the 28. That is, 5, 1 and 3 of the variables have strong, substantially significant and significant correlations, respectively. Therefore, there has to be confidence that these statistical correlations are reliable and they would have not occurred by chance.

Given that the total percentage variance in Gross Fixed Capital Formation accounted for is 95% (table 6.4), it means that the correlations between this variable and all others discussed above would not have occurred by chance. The highest correlation is 0.43 with other relationships ranging from very weak to minor. However, the relationships are practically considered to be valid and reliable. Labour Force with Tertiary Education has a percentage variance of 95% as per the correlation matrix (table 6.4; appendix D). Accordingly, this variable consists of 3 correlations, with 1 and 2 categorised as significant and substantially significant, respectively. That is, the interrelationships between itself and the above discussed variables could have not occurred by chance and therefore, the correlations are valid and reliable. The percentage variance in Communication of Internet Users explained accounts for 95% as exposed by the interrelationships among the 28 variables (table 6.1). Although this variable has 1 substantially significant correlation, the correlation between itself and the above discussed variable did not occur by chance. Therefore, the correlations are valid and reliable to make judgements. Income Inequality Gini Coefficient has a percentage variance of 94% which is explained by the interrelationships in the correlation matrix (table 6.1). This variable has 4 relationships with itself and four other variables as discussed above. That is, there are two substantially significant and 2 strong correlations and these relationships could not have happened by chance. As a result, these interrelationships can be used to make reliable judgements.

The percentage variance in Standard of Living explained by the interrelationships in the correlation matrix accounts for 93% (table 6.4; appendix D). Whereas this percentage variance explained is high, there is a 7% change in this variable which is unaccounted for in this analysis. However, the likelihood that there would be a single or a pair of variables outside this analysis that would account for the 7% variance, which is unaccounted for, cannot be discounted. This means there is a realistic chance that there may be another variable outside this analysis that may explain the 7% variance. However, that would not create a problem of reliability and validity of the statistical results because 93% remains a fairly high percentage variance although the correlations are in the categories very weak, weak, minor as well as moderate. Therefore, it can be realistically assumed that the correlations between standard of living and other variables would not have occurred by chance. The percentage variance in change in Average Annual HDI Growth between 1990 and 2014 explained by the interrelationships in the correlation matrix is 93% (table 6.1). That is, the interrelationships between change in Average Annual HDI Growth from 1990 to 2014 and the above discussed variables did not occur by chance. The 96% variance in change in the Average Annual HDI Growth between 1990 and 2014 is accounted for through the correlations with 4 other variables out of the 28. That is, 3 and 1 correlations in the categories are significant and strong, respectively. Therefore, there has to be confidence that these statistical results are reliable and they would have not occurred by chance.

The interrelationships described in the correlation matrix (table 6.1) account for 92% of variance in Average Annual Growth in General Government Final Consumption Expenditure (table 6.4). The likelihood that there could be a single or pairs of variables outside this analysis that would explain the 8% variance cannot be discounted. There are only two relationships that account for percentage variance of 92% in categories substantially significant and significant as already discussed; that is, the 8% variance would not create a problem of reliability and validity of the statistical results. The percentage variance in Communication and Mobile phone subscriptions explained accounts for 92% as exposed by the interrelationships among the 28 variables (table 6.1). The possibility that there could be a single or pairs of variables outside this analysis that would explain the 8% variance cannot be discounted. The variables in this analysis that account for a percentage variance of 92% are spread across the categories very weak, weak, minor and moderate. However, the 10% variance would not create a problem of reliability and validity of the statistical results because 92% remains a fairly high percentage variance.

Ninety percent (90%) of the variance in Labour Force Participation Rate 90% is accounted for by the interrelationships among the 28 variables (table 6.1). The possibility that there could be a single or pairs of variables outside this analysis that would explain the 10% variance cannot be discounted. The probability that this variable would have a moderate, significant, substantially significant, strong and very strong correlations with other variables is virtually zero. However, the 10% variance would not create a problem of reliability and validity of the statistical results because 90% remains a fairly high percentage variance. The percentage variance in change in Youth not in School or Employment explained by the interrelationships in the correlation matrix is 90% (table 6.1). The likelihood that there could be a single or pairs of variables outside this analysis that would explain the 10% variance cannot be discounted. There are two significant correlations that this variable has with the 26 other variables which are 0.60 and -0.55. That is, the probability of any correlation occurring in the categories very weak, weak, moderate, substantially significant and very strong would be negligible. Therefore, there has to be confidence that these statistical results are reliable and they would have not occurred by chance.

The interrelationships described in the correlation matrix (table 6.1) account for 89% of variance in Inequality in Education (table 6.4; appendix D). Whereas this percentage variance explained is high, there is 11% change in this variable which is unaccounted for in this analysis. However, the probability that there would be a single or a pair of variables outside this analysis that would account for the 11% variance, which is unaccounted for, cannot be discounted. This indicates that the 89% variance in Inequality in Education is accounted for through the correlations with 9 other variables out of the 28; that is, there is 1 correlation that is very strong, 4 substantially significant and the last 4 that are significant. Therefore, there has to be confidence that this statistical findings are reliable and they would have not occurred by chance. Eighty-eight percent (89%) of the variance in GDP Per Capita is accounted for by the interrelationships among the 28 variables (table 6.1). The possibility that there could be a single or pairs of variables outside this analysis that would explain the 11%

variance cannot be discounted. The highest correlation that this variable has with the 27 variables is 0.80 with other 3 and 2 relationships occurring in significant and substantially significant, respectively. That is, the probability of any correlation occurring in the categories very weak, weak, moderate and strong would be negligible. Therefore, there has to be confidence that these statistical results are reliable and they would have not occurred by chance.

The percentage variance in change in HDI Rank between 2009 and 2014 explained by the interrelationships in the correlation matrix is 88% (table 6.1). The likelihood that there could be a single or pairs of variables outside this analysis that would explain the 12% variance cannot be discounted. The highest correlation that this variable has with the 27 other variables is -0.83 and there are also 2 significant relationships. That is, the probability of any correlation occurring in the categories very weak, weak, moderate, substantially significant and very strong would be negligible. Therefore, there has to be confidence that this statistical regards are reliable and they would have not occurred by chance. The percentage variance in Primary Energy Supply in Fossil Fuels explained by the interrelationships in the correlation matrix is 88% (table 6.1). The probability that there could be a single or pairs of variables outside this analysis that would explain the 12% variance cannot be discounted. The highest correlation that this variable has with the 27 other variables is 0.61 which is significant among the 4 of the same magnitude, with other correlations occurring in the categories minor and very weak would be negligible. That is, if 88% variance in the Primary Energy Supply in Fossil Fuels could be explained by a myriad variables ranging from very weak to significant, it would be unrealistic to expect another variable that could provide a substantial account for the change in this variable. Therefore, there has to be confidence that these statistical regards are reliable and they would have not occurred by chance.

The interrelationships described in the correlation matrix (table 6.1) account for 87% of variance in renewable sources of primary energy supply (table 6.4; appendix D). While this percentage variance explained is high, there is a 13% change in this variable which is unaccounted for in this analysis. However, the probability that there would be a single or a pair of variables outside this analysis that would account for the 13% variance, which is unaccounted for, cannot be discounted. It means that the 87%

variance in renewable sources of primary energy supply is accounted for through the correlations with 4 other variables out of the 28. That is, there is 1 correlation that is very strong and 3 that are significant. Therefore, there has to be confidence that these statistical regards are reliable and they would have not occurred by chance. Eighty-seven percent (87%) of the variance in employment to population ratio is accounted for by the interrelationships among the 28 variables (table 6.1). The possibility that there could be a single or pairs of variables outside this analysis that would explain the 13% variance cannot be discounted. The highest correlation that this variable has with the 27 variables is 0.60. That is, the probability that this variable would have a substantially significant, strong and very strong correlation with other variables is practically non-existent. Apparently, this variable is intrinsically weakly associated with many other variables because it depends on the level of knowledge mostly expressed in the form of qualifications and also the availability of jobs. Therefore, the fact that its correlations with the 27 accounts for 87% variance suggests that the relationships as described in the correlation matrix would not have occurred.

The interrelationships described in the correlation matrix (table 6.1) account for 85% of variance in youth not in school or employment (table 6.4; appendix D). The probability that there could be a single or pairs of variables outside this analysis that would explain the 15% variance cannot be discounted. The highest correlation that this variable has with the 27 other variables is 0.75 which is very strong, with other correlations occurring in the categories strong, substantially significant, significant, weak and very weak would be negligible. That is, if 85% variance in the youth not in school or employment could be explained by this myriad variables ranging from very weak to very strong, it would be unrealistic to expect another variable that could provide a significant account for the change in this variable. Therefore, there has to be confidence that these statistical regards are reliable and they would have not occurred by chance. The percentage variance in quality of education explained by the interrelationships in the correlation matrix is 83% (table 6.1). The likelihood that there could be a single or pairs of variables outside this analysis that would explain the 17% variance cannot be discounted. The highest correlation that this variable has with the 27 other variables is -0.46 and the next highest is -0.35, implying that the probability of any correlation occurring in the categories significant, substantially significant, strong and very strong would be negligible. That is, if 83% variance in the quality of education could be explained by this myriad variables ranging from very weak to moderate, it would be unrealistic to expect another variable that could provide a significant account for the change in this variable. Therefore, there has to be confidence that these statistical regards are reliable and they would have not occurred by chance.

Eighty-three percent (83%) of the variance in total general government final consumption expenditure is accounted for by the interrelationships among the 28 variables (table 6.1). The probability that there could be a single or pairs of variables outside this analysis that would explain the 17% variance cannot be discounted. The highest correlation that this variable has with the 27 variables is 0.38. That is, the probability that this variable would have a moderate, significant, substantially significant, strong and very strong correlations with other variables is virtually zero. Apparently, this variable is inherently weakly associated with many other variables because it depends on government decision that may involve political sentiments. Therefore, the fact that its correlations with the 27 accounts for 83% variance suggests that the relationships as described in the correlation matrix would not have occurred. The interrelationships described in the correlation matrix (table 6.1) account for 82% of variance in Research and Development Expenditure (table 6.4; appendix D). Whereas this percentage variance explained is high, there is an 18% change in this variable which is unaccounted for in this analysis. However, the likelihood that there would be a single or a pair of variables outside this analysis that would account for the 18% variance, which is unaccounted for, cannot be discounted. It means that the 82% variance in Research and Development Expenditure is accounted for through the correlations with only 4 variables out of the 28.

Whereas three of the variables have a significant correlation with Research and Development Expenditure, one produces a substantially significant correlation. All things being equal, it could be realistically assumed that each of the 4 accounts for almost 20% of the variance in research in development expenditure. That is, there is a realistic chance that there may be another variable outside this analysis that may explain the 18% variance. However, that would not create a problem of reliability and validity of the statistical results because 82% remains a fairly high percentage variance, especially because almost 24 correlations with other variables are significantly negligible. Logically, Research and Development Expenditure could have been expected to have stronger correlations with variables such as HDI, public expenditure in education and total general government final consumption expenditure, among others. It is in this respect that a deduction may be drawn to suggest that there would be no other significant variable accounting for the 18% variance. Therefore, it can be realistically assumed that the correlations between Research and Development Expenditure and other four variables would not have occurred by chance.

6.2.4. Principal Components and the Eigenvalues

PCA extracted a total of 15 Principal Components (PC); and, the first seven account for the cumulative percentage variance of 92% in the interrelationships. Respectively, the first six PCs account for 39%, 17%, 11%, 10%, 6% and 5% variance, which provide for a cumulative total percentage of 88% variance in the data (table 6.5 and appendix E).

Table 6.5: Principal Components and the Eigenvalues

Principal Components	Eigenvalue	Proportion (%)	Cumulative Value (%)
1	10.96	39%	39%
2	4.78	17%	56%
3	2.96	11%	67%
4	2.86	10%	77%
5	1.64	6%	83%
6	1.31	5%	88%

Evidently, a substantially significant proportion of percentage variation to the value of 77% which is three quarters in the data is accounted for by the first four PCs. In fact, the first three PCs account for 67% variation in the data, which is significant.

6.2.5. Principal Component Loadings Analysis

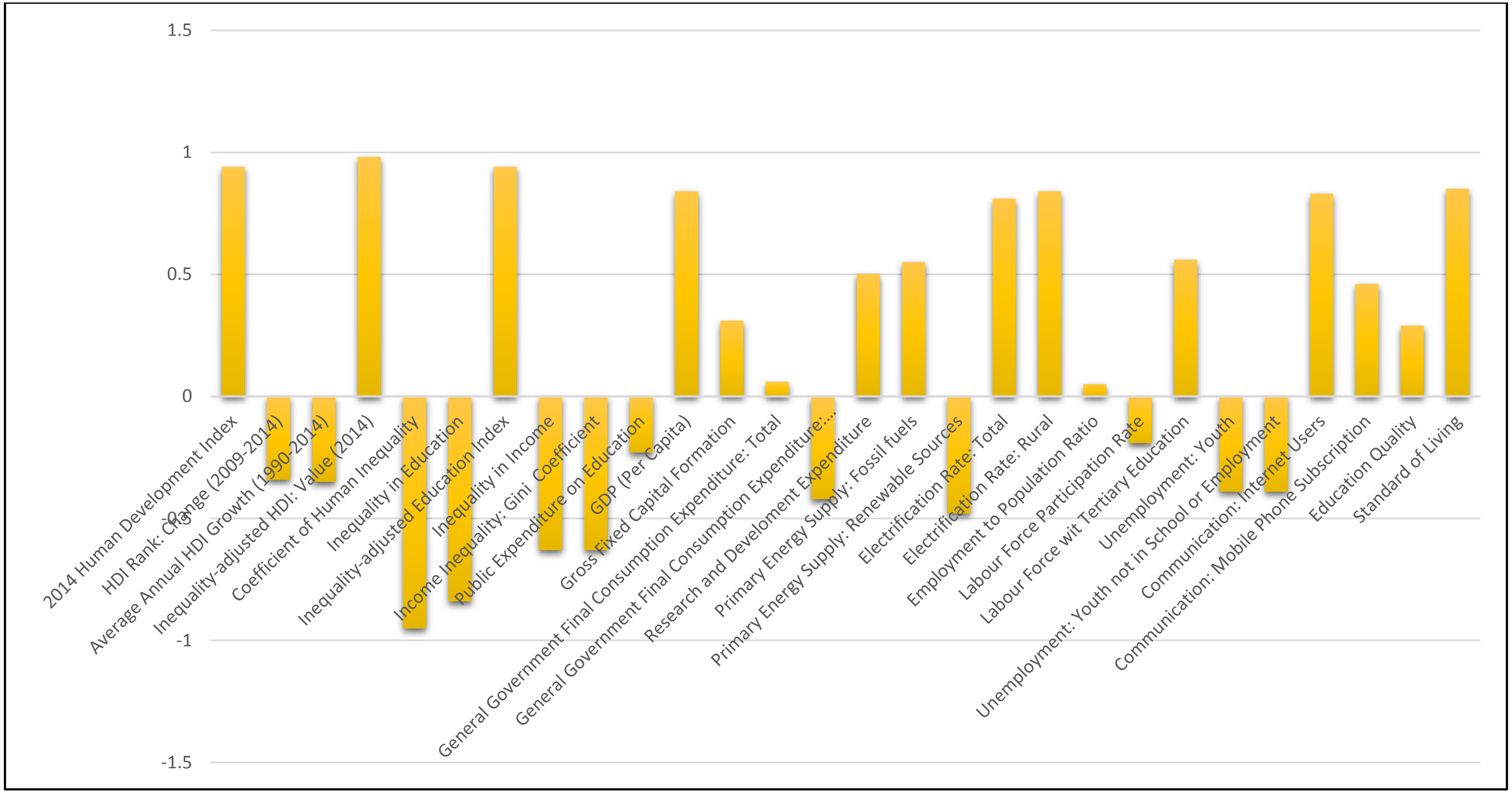
The analysis of component loadings of the fifteen countries generated on each of the 7 principal components is provided in this subsection. The 7 principal components included in this analysis from 1 to 7 are named as Modernized, Planning, Governance, Infrastructure, Skills and Culture; Frustrated Development; Unsustainable State Intervention and Societal Inequalities; Effective State Interventions and Limiting e-infrastructure; Contingent Potential for Progress with e-skills Constraint; Muted Development Potential & Non-existent e-culture; as well as, Quality Basic Education, respectively.

6.2.5.1. Principal component 1: Modernized, planning, governance, infrastructure, skills and culture

Twelve (12) of the 28 variables have strong positive loadings on PC 1; and, stated in descending order, they are: Inequality-adjusted HDI (0.98), Inequality-adjusted Education Index (0.94), HDI (0.94), Standard of Living (0.85), per capita GDP (0.84), Rural Electrification Rate (0.84), Internet Users Communication (0.83), Total Electrification Rate (0.81), Mobile Phone Subscription Communication (0.46), Research and Development Expenditure (0.50), Fossil Fuels Primary Energy Supply (0.55), Labour Force with Tertiary Education (0.56). But the strongest positive loadings relate to only three variables, which are Inequality-adjusted HDI (0.98), Inequality-adjusted Education Index (0.94) and HDI (0.94) (figure 6.5; appendix H). The second category of the strongest positive loadings are in the range 0.80-0.85; and, they include five variables as follows: Standard of Living (0.85), per capita GDP (0.84), Rural Electrification Rate (0.84), Internet Users Communication (0.83) and Total Electrification Rate (0.81). The next strongest positive loadings involve four variables in the range 0.46-0.56, which are: Mobile Phone Subscription Communication (0.46), Research and Development Expenditure (0.50), Fossil Fuels Primary Energy Supply (0.55) and Labour Force with Tertiary Education (0.56). However, Mobile Phone Subscription Communication also loads positively and is relatively strongly on PC 2 (0.54) and PC 5 (0.50) (figure 6.5; appendix H).

Collectively, these positive loadings on PC 1, especially the strongest ones, imply that this PC describes multifaceted development, which transcends the usual modernization philosophy to encapsulate societal equality and equitable access to national resources. Furthermore, there is evidence of social development as denoted in the strong positive loadings of variables related to education, standard of living and human development.

Figure 6.5: Modernized, Planning, Governance, Infrastructure, Skills and Culture



The social development observation is supported by the pattern of four negative loadings that are strong on PC 1, which include: Human Inequality Coefficient (-0.95), Inequality in Education (-0.84), Income Inequality Gini-coefficient (-0.68) and Inequality in Income (-0.63) (figure 6.5; appendix H). That is, PC 1 is strongly and directly associated with progressive qualities of equitable multifaceted societal development as well as inversely and strongly correlated with variables that denote an antithesis of the three values of development, which are standard of living, high self-esteem and freedom of choice, especially due to the significance of Labour force with tertiary education, as well as relatively low levels of societal inequality in education, income and access to basic resources. The strong positive loading of Internet use for communication (0.83), together with the virtually universal access to electricity, inclusive of rurality, should suggest that connectivity through modern infrastructure and technologies are at a relatively advanced state.

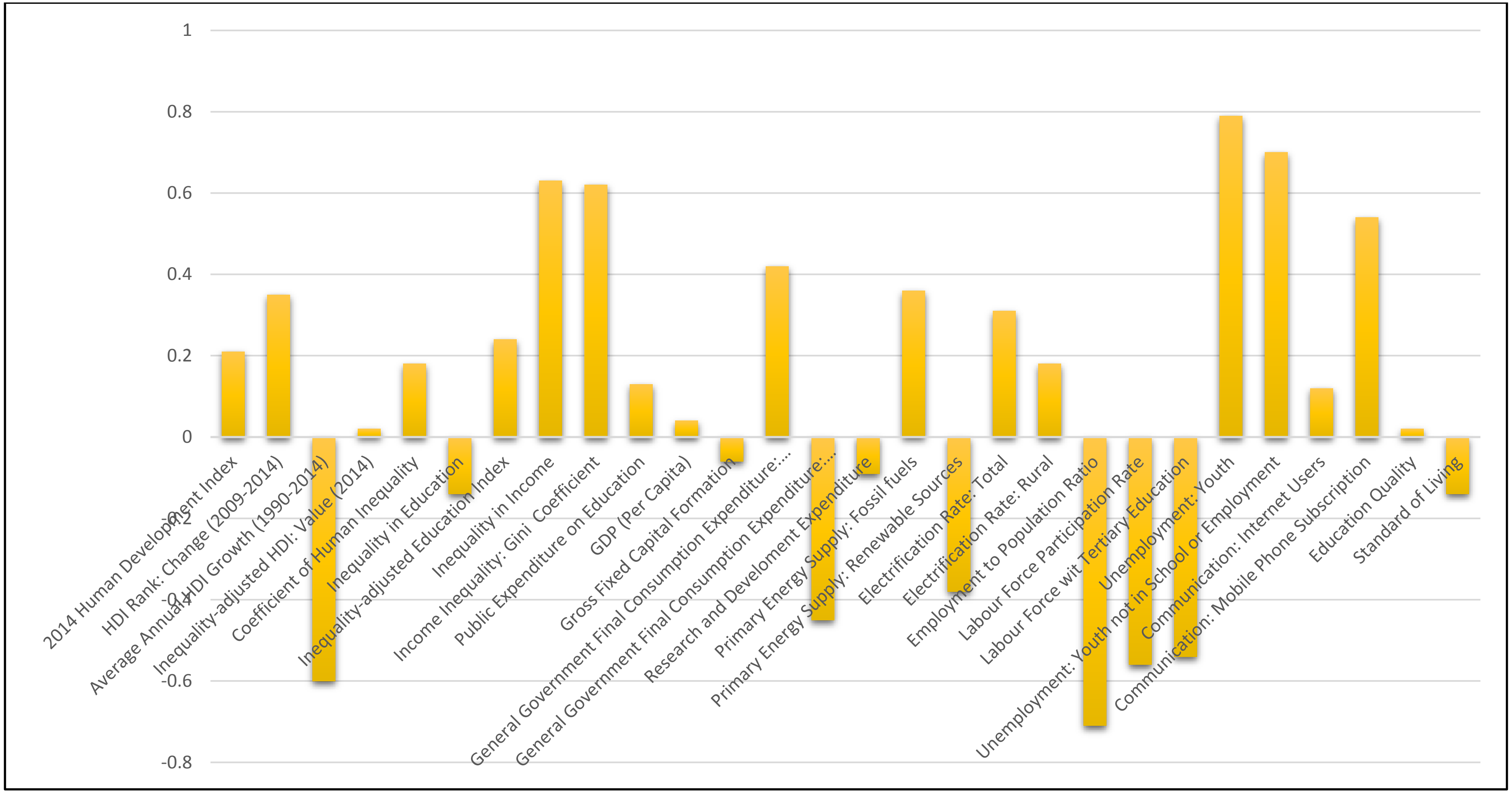
Therefore, it would not be farfetched to denote PC 1 as a representation of modern development with first world infrastructure, education, culture, skills and expertise, economic performance and governance that serve to regulate societal ills and inequality downward by providing equitable access and opportunity to societal progress. These development qualities and eventualities are evidence of advanced planning and management. To this extent, and given the significance and strength of the loadings of variables relating to communication, countries that score positively and highly on PC 1 should signify the presence of enabling environments for e-infrastructure, e-governance, e-culture and e-skills for the planning, implementation and operationalization of blended pedagogies. A relatively low and negative score would imply that the country in question is scarcely prepared to adopt strategies for blended pedagogies, which ultimately leads to replacement behaviours.

6.2.5.2. Principal component 2: Frustrated development

On its part, PC 2 is characterized by two relatively strongest positive loadings of Youth Unemployment (0.79) and Unemployment among Youth who are not in School (0.70). Additionally, the PC is associated with two strong positive loadings of Income Inequality (0.63) and Income Inequality Gini-coefficient (0.62) (figure 6.6; appendix H). Together, these strong and relatively strongest positive loadings of on PC 2 signal as antithesis to shared societal modernization and development. A society in conditions as described in this PC should be far less prepared for blended pedagogies; and, an unrelenting push for e-infrastructure, e-governance, e-skills and e-culture will be a mere attempt at imposition of e-learning and therefore a replacement behaviour rather than integration of conventional didactics with digital technologies. Hence, the use of mobile phones for communication loads relatively strongly and positively (0.54) on PC 2, simultaneously with relatively strong negative loadings of Employment as Ratio of Population (-0.71), HDI Annual Growth (-0.60), Labour Force Participation Rate (-0.56) and Labour Force with Tertiary Education (-0.54) (figure 6.6; appendix H). This combination of loadings indicates that PC 2 involves the antitheses of development, which include societal inequality, slow annual growth in HDI (if not stagnation), negligible access to resources as attested to by total and rural electrification (0.31 and 0.18, respectively) as well as supplies of fossil fuels and renewable energy (0.36 and -0.38, respectively).

This PC can be justifiably denoted as Frustrated Development, where the struggle for modernization has exacerbated societal inequities. Amidst these indications of frustrated development, Annual Average Growth in Government Consumption Expenditure is negatively loaded (-0.45) on PC 2, implying that the state is struggling for resources mobilization and wealth generation because the reasonable positive loading of Total Government Consumption Expenditure (0.42) suggests that there is political and administrative will to promote shared societal progress. The fact that loadings of crucial modernization-bearing and development-related variables such as Public Expenditure on Education (0.13), Internet Communication (0.12), Quality of Education (0.02), per capita GDP (0.04), Gross Fixed Capital Formation (-0.06), Research and Development Expenditure (-009) and Standard of Living (-0.14) are virtually neutral or critically weak, would imply that the national societal state of affairs is severely limiting (figure 6.6; appendix H). That is, it would be unrealistic for such a society to hope to superimpose digital technologies for e-learning over such gross societal deficiencies and inequities. Instead of delivering blended learning models, superimposition of digital technologies in education in such a society would most probably reproduce and exacerbate societal inequalities and frustrated development.

Figure 6.6: Frustrated Development

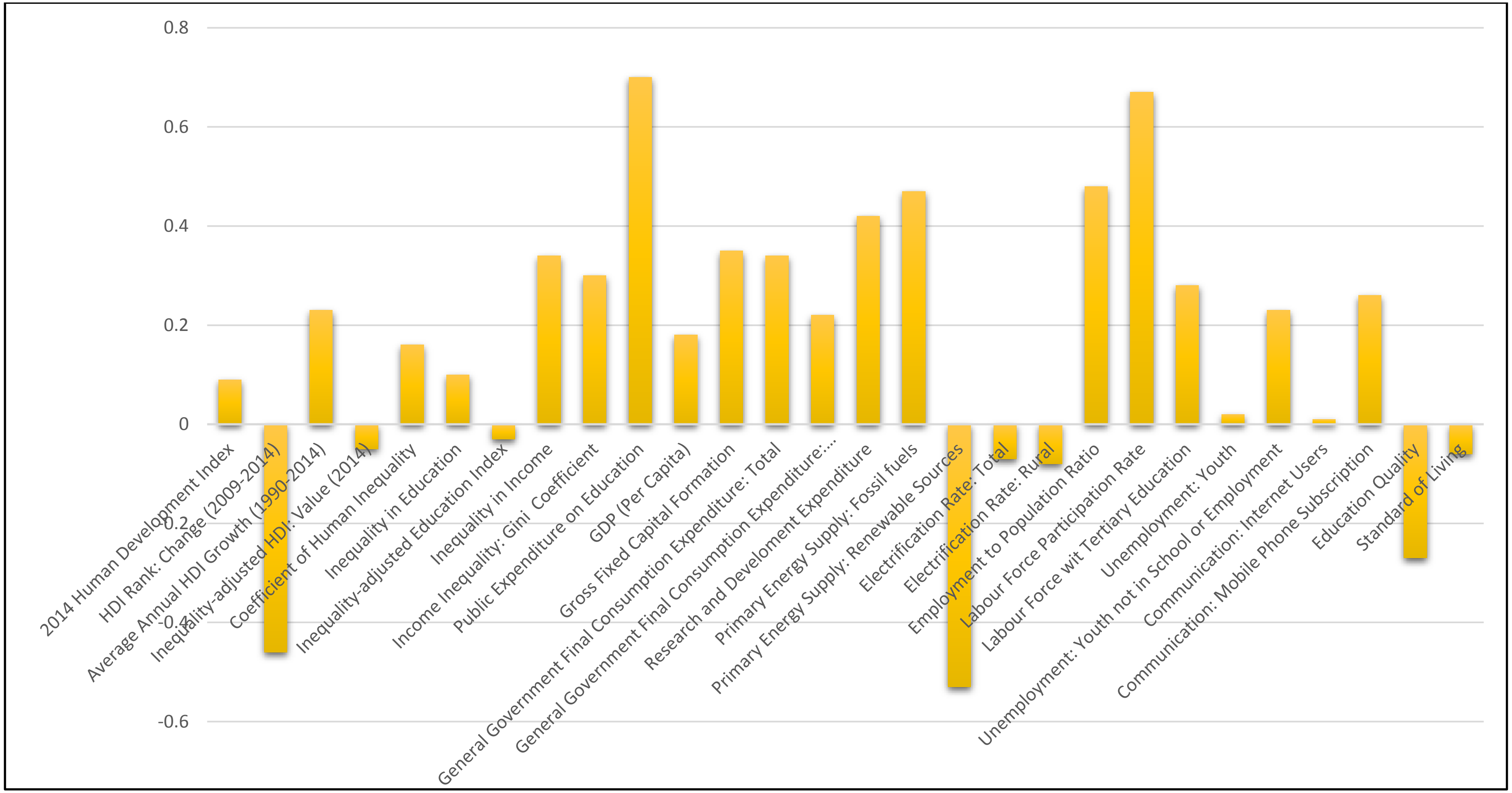


Therefore, a country that scores positively and highly on PC 2 would imply the absence of an enabling environment for the implementation and operationalization of blended pedagogies. That is, the status of governance, infrastructure, skills and culture would remain less optimal for the adoption of blended pedagogies.

6.2.5.3. Principal component 3: Unsustainable state intervention and societal inequities

PC 3 is characterized by significant positive loadings of Public Expenditure on Education (0.70) and Labour Force Participation Rate (0.67) (figure 6.7; appendix H). Apparently, this PC captures the essence of state interventions in Education and Labour market that are designed to promote societal wellbeing. Whereas relatively less significant, the positive loadings of Employment to Population Ration (0.48), Supplies of Fossil Fuels (0.47) and Research and Development Expenditure (0.42) lend credence to the idea that PC 3 involves deliberate state effort to transform the societal conditions; hence, whereas loadings of the Total Government Consumption Expenditure (0.34) and its annual growth (0.22) are negligible, loadings of Income Inequality (0.34) and Gini-coefficient (0.30) show that societal inequality remains muted at less significant levels (figure 6.7; appendix H). However, this situation describes an unsustainable state of interventions because sharing of the economy as represented in the per capita GDP (0.18) as well as access to Electricity (-0.07), Quality of Education (-0.27) and Standard of Living (-0.96) have remained indifferent. That is, the Public Expenditure on Education interventions have not generated strategic outcomes to propel sustainable progressive change in societal conditions. This observation is supported by the negative and relatively significant loadings of Supplies of Renewable Energy (-0.53) and regressive change in the HDI Rank (-0.46) during 2009-2014, on PC 3.

Figure 6.7: Unsustainable State Intervention and Societal Inequities



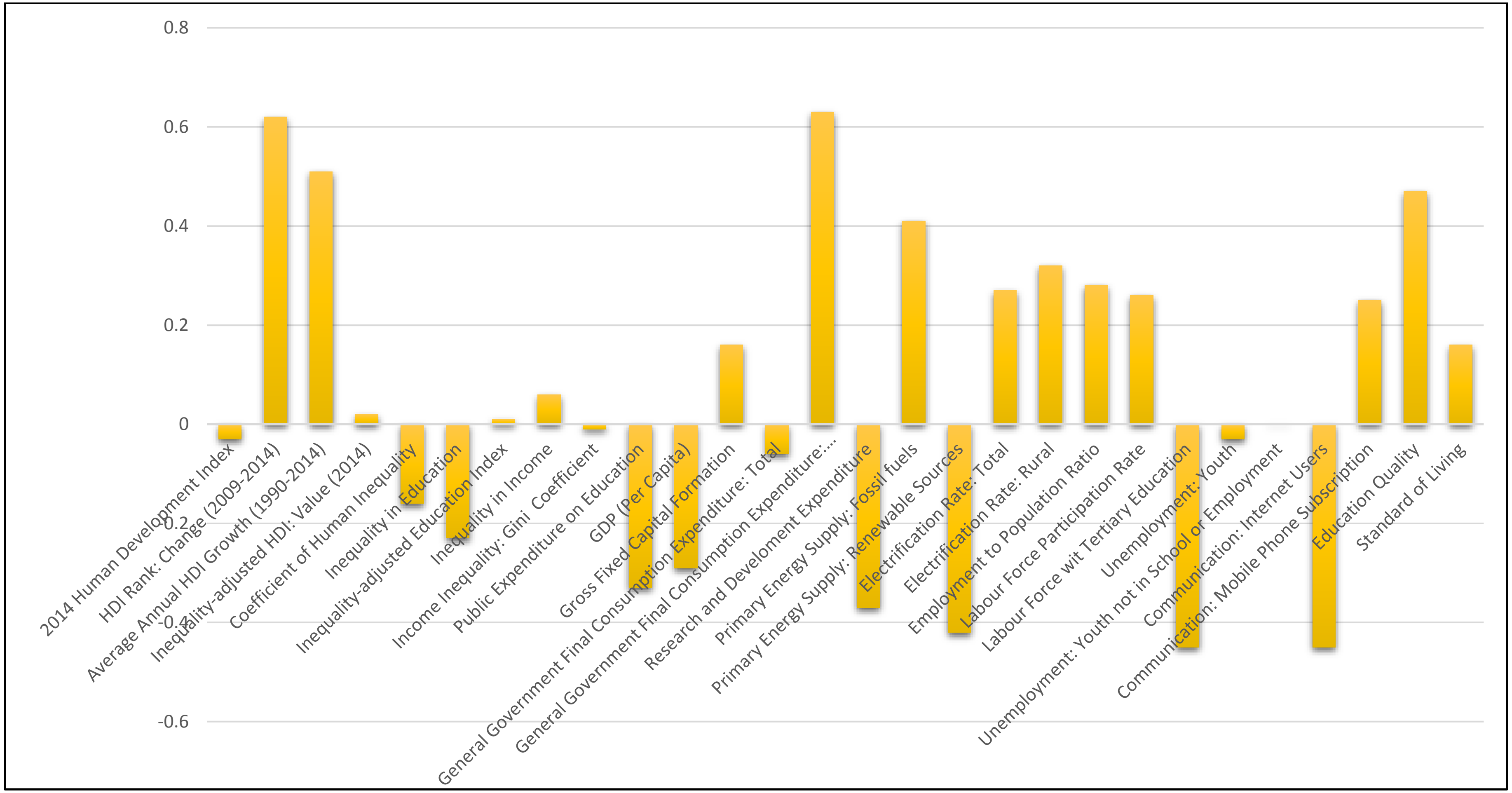
That is, countries that score positively on this PC would be characterized by Unsustainable State Interventions in Public Education and Labour Force Participation, which have however failed to engender improvements in the Quality of Education and Standards of Living. It could as well be insinuated that such state interventions are a dead-end exercise.

6.2.5.4. Principal component 4: Effective state interventions and limiting e-infrastructure

Principal Component 4 is characterized by at least three relatively strong positive loadings of Average Annual Growth in Government Consumption Expenditure (0.63), Change in HDI Rank during 2009-2014 (0.62) and Average Annual HDI Growth during 1990-2014 (0.51) (figure 6.8; appendix H). Whereas Total Government Consumption Expenditure (-0.06) is virtually neutral to non-existent, together the three positive loadings signal state intervention that is effective as demonstrated by the relatively significant loading of Education Quality (0.47); whereas positive, Labour Force Participation Rate (0.26) and Employment to Population Ratio (0.28) loadings are significantly low, pointing to the backwardness of the economy relative to the global knowledge economy. This observation is attested to by the relatively significant negative loading of Internet Use for Communication (-0.45) amidst significantly low usage of mobile phones (0.25) (figure 6.8; appendix H).

Together with negative loading of Public Expenditure on Education (-0.33), per capita GDP (-0.29), Research and Development Expenditure (-0.37) and Supply of Renewable Energy (-0.42), the positive yet weak loadings of Total and Rural Electrification (0.27 and 0.32, respectively) insinuates that the political-economy remains far backward compared to the global knowledge economy, especially given the relatively significant negative loading of Labour Force with Tertiary Education (-0.45) and the indifference of the Standard of Living (0.16) (figure 6.8; appendix H). To this extent, the PC describes conditions wherein State Interventions are effective in sustaining a positive quality of education and progressive change in HDI, as well as suppressing societal ills of Human and Education Inequality (-0.16 and -0.23, respectively).

Figure 6.8: Effective State Interventions and Limiting e-Infrastructure

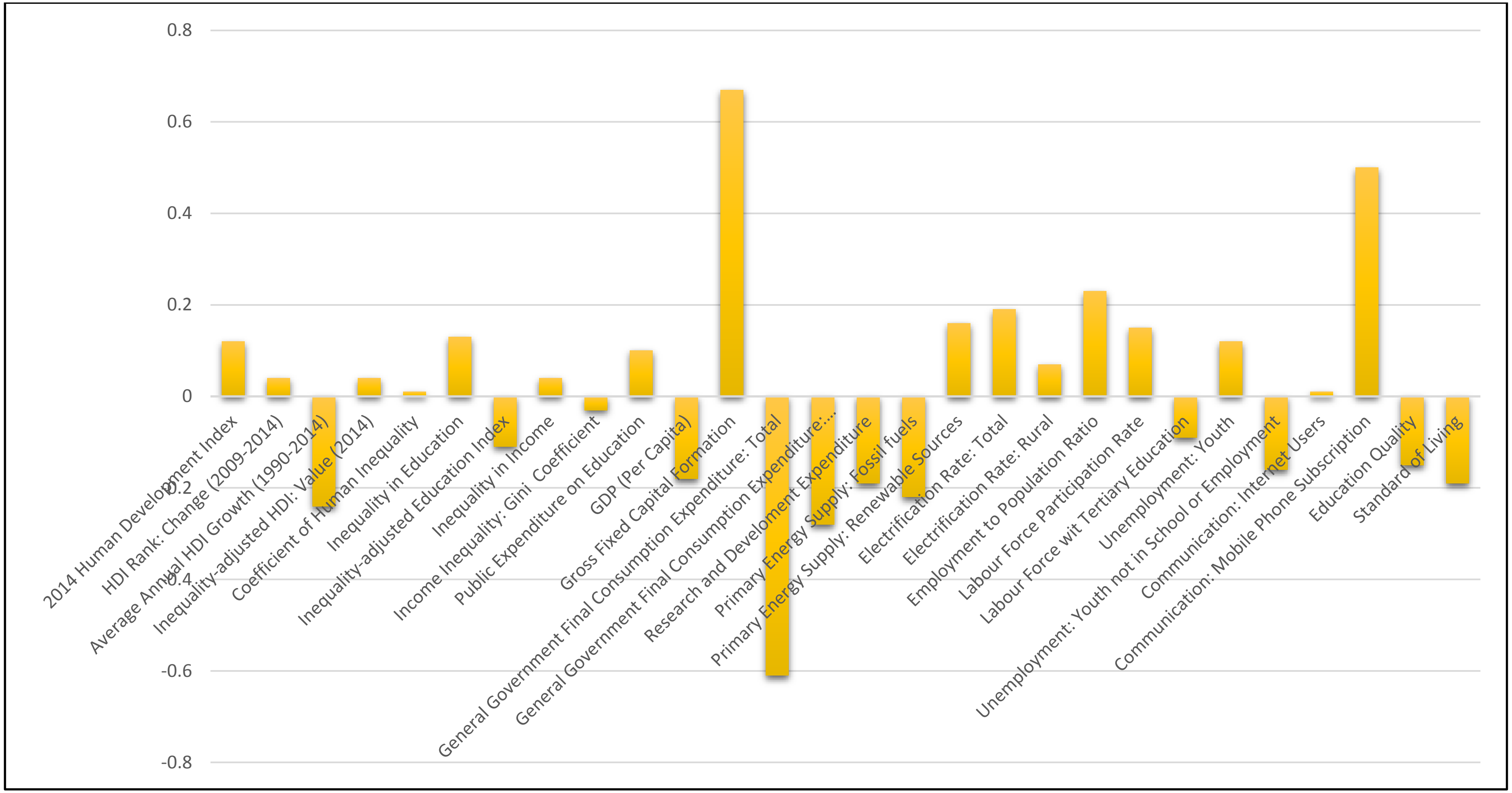


Countries characterized by conditions of this PC would most definitely have effective state interventions with poorly developed capacity for participation in the modern global knowledge economy. For such countries, investing heavily in blended pedagogies without first creating the requisite conditions for engagement in the global knowledge economy would imply that they would have sought to exploit non-existent capacity in governance, infrastructure, skills and culture. Such a national drive would create vulnerability to destruction of the scarce or inadequate capacity for integration of digital technologies. Hence, the PC shows that the existence of quality education (0.47) has not dented the backlog of a Labour Force with Tertiary Education (-0.45), which could be signalling a historic fact that could only be redressed in multiple decades rather than attempts at manual repairs. The indifference in the loading of Gross Fixed Capital Formation (0.16) may as well signal infrastructure limitations, especially that which relates to the access to Internet (-0.45) and smart mobile devices (0.25) (figure 6.8; appendix H). However, the limitations in e-infrastructure would not necessarily entail direct state investment therein because it is contextual in terms of a variety of other national development imperatives and factors.

6.2.5.5. Principal component 5: Contingent potential for progress with e-skills constraint

The relatively significant loading of Gross Fixed Capital Formation (0.67) and the heightened use of Mobile Phones for Communication (0.50) suggest that PC 5 encapsulates potential (figure 6.9; appendix H). However, such potential would be contingent upon a variety of factors because the same PC is characterized by significant negative loading of Total Government Consumption Expenditure (-0.61) and low Ratio of Employment to Population (0.23) amidst indifference in Standard of Living (-0.19), per capita GDP (-0.18), Quality of Education (-0.15), Internet Use for Communication (0.01), Labour Force with Tertiary Education (-0.09), Total and Rural Electrification (0.19 and 0.07, respectively), Public Expenditure on Education (0.10) and HDI (0.12) as well the negative growth thereof (-0.24) (figure 6.9; appendix H).

Figure 6.9: Contingent Potential for Progress with e-Skills Constraint

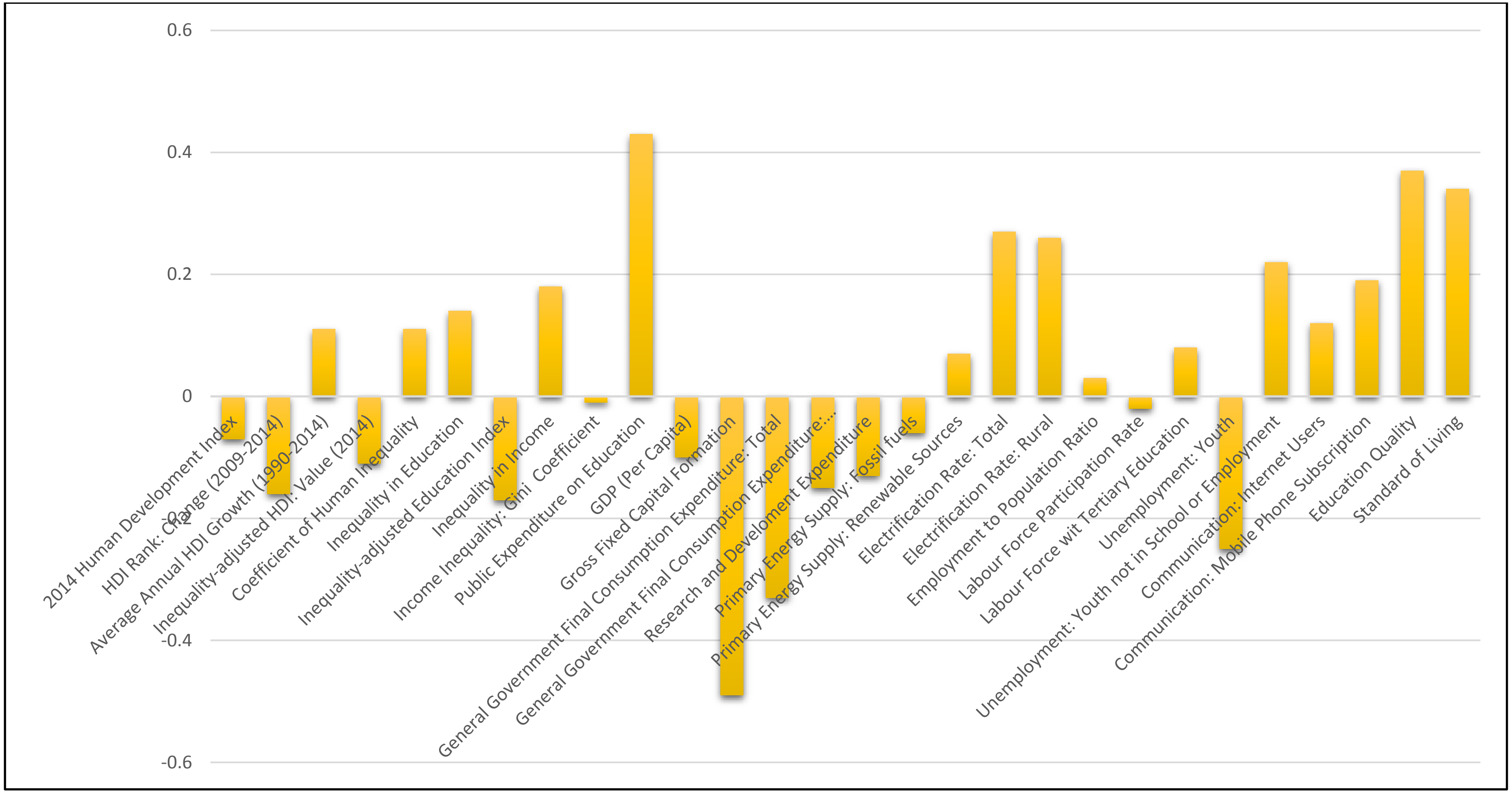


Whether this potential for progress could be harnessed for participation in the global knowledge economy without imparting the total societal development makeup, depends upon the score of the country on other PCs, especially 6 and 7. That is, the potential described in PC 5 is relative, rather than absolute; and, state interventions could as well be paradoxically destructive rather than constructive.

6.2.5.6. Principal component 6: Muted development potential and non-existent e-culture

In the virtual absence of Human Development (-0.07), PC 6 provides for Muted Development Potential because of the weak loadings of Standard of Living (0.34) and Quality of Education (0.37), the significantly low loadings of Total and Rural Electrification (0.27 and 0.26) and the seriously negative Gross Fixed Capital Formation (-0.49) and Total Government Consumption Expenditure (-0.33), amidst indifference in the use of Internet and Mobile Phones for Communication (0.12 and 0.19, respectively) (figure 6.10; appendix H). Countries that score high on this PC, would most probably be investing substantial resources in education as evidenced by the reasonable positive loading of Public Expenditure on Education (0.43). However, the PC suggests that there is an absence of national development fundamentals because of the indifferent performance in Average Annual HDI Growth (0.11), per capita GDP (-0.10), Research and Development Expenditure (-0.13) and Employment to Population Ration (0.03) (figure 6.10; appendix H). To this extent, blind and unfettered public investment in blended pedagogies may create prospects of deepening societal inequalities, especially in education between rural and urban as well as poor and rich sectors of the population. This observation is supported by the fact that the digital culture is virtually absent as evidenced by the negligible positive loadings of the use of Internet and Mobile Phones for Communication (0.12 and 0.19, respectively).

Figure 6.10: Muted Development Potential & Non-existent e-Culture

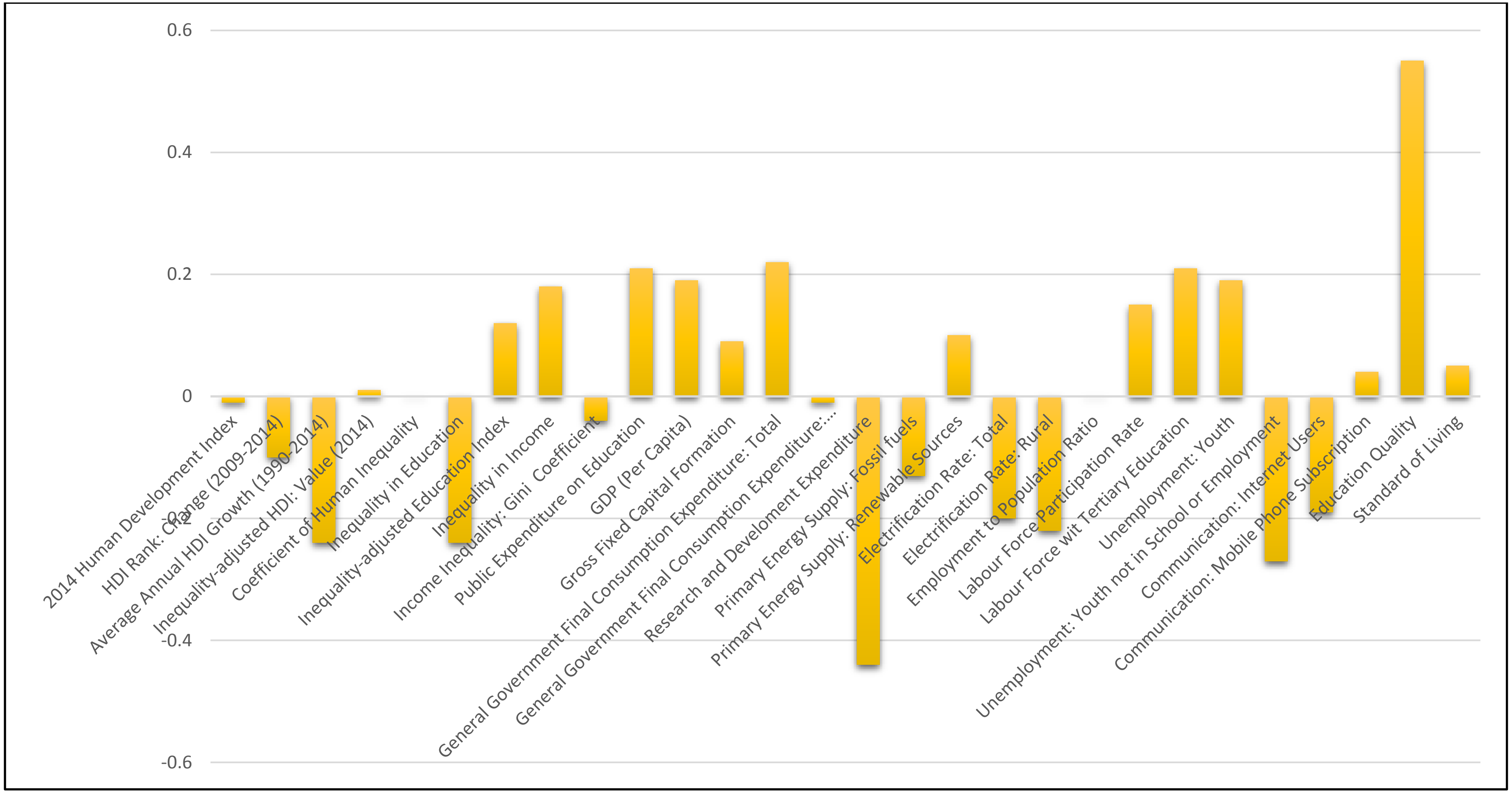


Indeed, success in the integration of digital technology in education is a function of the household adoption of e-culture, which is in terms of this PC non-existent. The seriously low levels of use of Internet and Smart Phones for Communication, as already described, suggest that there could be absence of the national infrastructure, especially in a context that Gross Fixed Capital Formation (-0.49) is seriously deficient.

6.2.5.7. Principal component 7: Quality basic education

Principal Component 7 is associated with a relatively significant loading of Education Quality (0.55), unmatched by any of the PCs. Also, Youth Unemployment among those not in School (-0.27) is not necessarily disconcerting (figure 6.11; appendix H). Given that Employment to Population Ration (0.00) is neutral as well as the ultra-poor performance in all vital political-economy variables such as HDI (-0.01) and per capita GDP (0.19), the relatively significant negative loading of Research and Development Expenditure (-044) could imply that Quality Education described in this PC refers to basic education, especially because Labour Force with Tertiary Education (0.21) produced a significantly weak loading (figure 6.11; appendix H). Overall, this PC suggests that whereas Quality of Education may be reasonable, the preconditions for development and participation in the global knowledge economy associated with governance, infrastructure, skills and culture are absent. However, the ultimate reading of a country's score on this PC would depend upon the attendant scores on the rest of other PCs, especially 5-6.

Figure 6.11: Quality Basic Education



6.2.6. Global PCA and Surrogate Cause-Effect Relationships of PCs

Global PCA of Principal Component (table 6.6; appendix J) introduces a significant capability of determining cause-effect relationships among the collective concentrations of variables in terms of their loadings on PCs. It is crucial to note that the Global PCA correlations are non-symmetrical, implying that if progressive change in conditions of PC 1 precipitate a similar shift in those for PC 2, the converse does not necessarily hold and that deterioration in PC 2 does not automatically entail a similar trend in PC 1. Also, the analysis hereunder should be read in conjunction with the scattergrams (appendices M & N).

Table 6.6: Global PCA

Principal Components	1	2	3	4	5	6	7
1	0.79	-0.50	-0.22	0.25	0.09	0.09	-0.01
2	0.33	0.67	-0.56	-0.28	0.23	0.02	0.02
3	0.20	0.46	0.49	0.54	0.26	0.29	-0.25
4	0.38	0.05	0.60	-0.60	0.00	0.08	0.35
5	0.02	0.09	-0.14	-0.02	-0.67	0.72	0.01
6	0.22	0.29	0.06	0.35	-0.56	-0.55	0.37
7	-0.20	-0.03	-0.11	0.28	0.33	0.29	0.82

The Global PCA results presented in the thesis are critical for the determination of the nature of recommendation for interventions, with accuracy and specificity.

6.2.6.1. Principal components 1 to 2 and 2 to 1

In this thesis, Global PCA shows that there is a significant negative correlation (-0.50) between PC 1 and PC 2, implying that improvement in the conditions of PC 1 would precipitate a downward spiral in the content of PC 2. While this negative correlation does not necessarily signify a fully exclusionary indirect relationship, it should be noted that the host of variables that are either loaded insignificantly (significantly) and/or positively (negatively) on PC 1 are, respectively, loaded significantly (insignificantly) and/or negatively (positively) on PC 2 (table 6.6; appendix J). That is, for all intents and purposes, PC 1 and PC 2 signify converse sides of the same coin. But a positive change in PC 2 is directly, yet very weakly, correlated (0.33) with shift in conditions of PC 1. In simple terms, a country that scores positively and high on PC 1 would present the converse state on PC 2.

6.2.6.2. Principal components 2 to 3 and 3 to 2

On its part, PC 2 is significantly negatively (-0.56) associated with PC 3, implying that a progressive change in the conditions that characterize PC 2 would precipitate a regressive shift in the variables that define PC 3. However, regressive change in conditions of PC 3 would not necessarily motivate for progressive shift in the content of PC 2 because Global PCA suggests that this directional relationship consists instead of a relatively significant and positive (0.46) (table 6.6; appendix J). For example, whereas increased levels of Youth Unemployment would motivate for improvements in Public Expenditure on Education, it does not necessarily follow that increased Public Expenditure on Education would precipitate highly exaggerated levels of Youth Unemployment. That is, the Global PCA results would provide that a recommendation that merely suggests that Youth Unemployment should be reduced would be a poorly informed symptom-mongering rather than a realistic and pragmatic intervention. The question that the Global PCA would assist in answering relates to the specific interventions that should be made in order to achieve desired change in the conditions that denote PCs.

6.2.6.3. Principal component 4 to 1 and 2

PC 4 is weakly associated with PC 1, implying that some countries with the necessary governance, infrastructure, skills and culture for implementation and operationalization of blended pedagogies may to some extent continue to experience, albeit slightly, conditions of limiting infrastructure and poorly developed capacity for participation in the global knowledge economy amidst effective public investments in the national social goods (table 6.6; appendix J). However, conditions of such countries will necessarily be neutral to conditions described by PC 2, with the result that they may not all necessarily be the antitheses of conditions of this PC as dictated by positive scoring on PC 1.

6.2.6.4. Principal component 5 to 6 and 6 to 5

PC 5 and PC 6 are relatively strongly correlated in both directions, with the PC 5 to PC 6 being the positive and strongest linkage. But change in PC 6 will generate an inverse shift in PC 5 (table 6.6; appendix J). Hence it would be logical to expect that improvement of e-skills to motivate contingent potential for progress would unlock the muted development energy by engendering the required e-culture, interventions that hope to change the culture would not necessarily establish the required e-skills. Thus interventions motivated by loadings on PC 6 could as well frustrate and destroy the existent capacity in terms of skills and human capital resourcefulness.

6.2.6.5. Principal component 7 to 4, 5 and 6

On its part, PC 7 is weakly correlated with PC 4, PC 5 and PC 6. In short, it implies that there is a potential to unlock the development potential of a country and to improve the e-skills that would establish the necessary e-culture by emphasizing and sustaining enhancement of the quality of education (table 6.6; appendix J). However, the enhancement in the quality of education limited at the basic level, as per PC 7, would remain a non-starter because tertiary education, e-infrastructure, use of Internet and smart phones for communication, equitable society and political-economy and progressive shift in HDI and per capita GDP are crucial to Labour force readiness and participation in the global knowledge economy, in the absence of which investment in blended pedagogies would be self-serving.

6.2.7. Countries Principal Components Scores

Countries' scores are crucial for linking the correlation matrix, Principal Components and Component Loading with Observations. In this way, countries' scores allow for interpretation of the meaning of the PCA and the Global PCA. In this thesis, countries' scores on PC 1 are instructive in terms of the key questions of the study whether or not there is appropriate and readiness of planning, governance, infrastructure, skills and culture to adopt and successfully implement blended pedagogies. Indeed, as eigenvalues and vectors have demonstrated, PC 1 accounts for over three quarter of variance in the twenty-eight variables (see table 6.5 and appendix E). This subsection, therefore, engages with the meaning of the countries scores based on arbitrarily created categories of below -1.5, -1.5 to -1.1, -1.0 to -0.6, 0.5 to 0.0 as well as 0.0 to

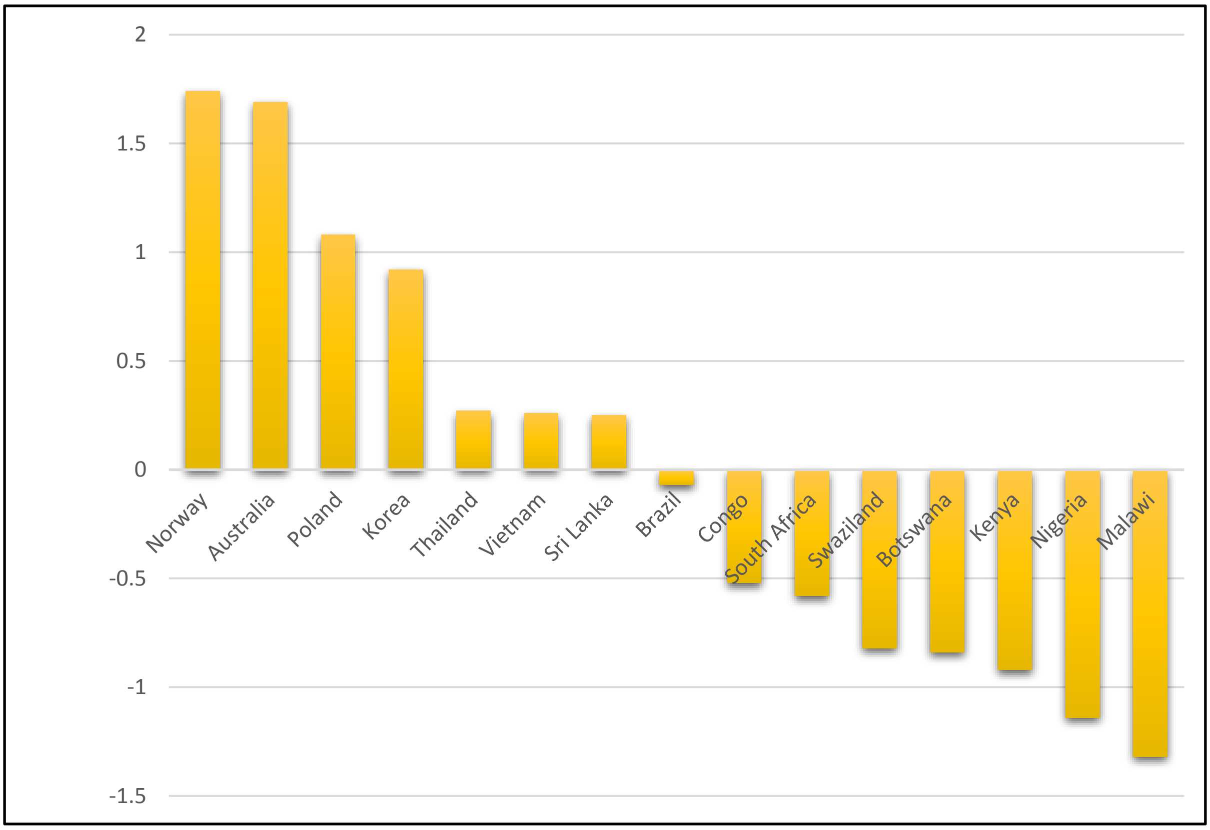
0.5, 0.6 to 1.0, 1.1 to 1.5 and above 1.5. Graphic representations of the countries' scores readily reveal the basic observation that South Africa does not necessarily have the first world-like planning, governance, infrastructure, skills and culture required for successful adoption and implementation of blended pedagogies. Evidently, South Africa's current involvement with digital technology in education is driven by replacement rather than integration. Instead, South Africa is at a development stage that would enforce accentuation of regional disparities than serve to generate the necessary national knowledge economy and human capital for competitive participation in the global knowledge economy. The analysis presented hereunder is designed to rotate around South Africa's components scores in order to allow for interpretation of the meaning in terms of the specific research questions of this thesis.

6.2.7.1. Countries' principal component 1 scores

As already described, PC 1 involves multifaceted development beyond mere modernization. To this extent, countries that score positively would be advanced industrialized nations, which are expected to have first world-like governance, infrastructure, skills and culture. Indeed, the development qualities in question demonstrate that the level of planning is advanced. As it can be expected, countries that score positively on PC 1 should necessarily have the qualities that make for adequate and appropriate planning, governance, infrastructure, culture and skills, which are prerequisites for adoption and implementation of blended pedagogies. Conversely, countries that score negatively on PC 1 are less developed, if not underdeveloped. Such countries would be less modernized with high levels of societal inequalities that confirm the poverty of governance, infrastructure and skills. To this extent, such countries would have deficit of modernizing culture that is required for blended pedagogies. Inevitably, this scenario would also reveal national planning challenges that could include a culture of exuberance, unconnected to the resources base. Under such circumstances, countries that adopt digital technologies for education tend to accentuate development disparities, especially between the rural and urban populations. As a result, implementation of e-learning becomes and end in itself rather than being integrated with conventional learning for supplementation. This observation points to the poverty of planning in countries that are less advanced as their conduct has always appeared to be emulation of the approaches and models of the advanced industrial countries.

South Africa's component score on PC 1 is -0.58 (figure 6.12; appendix L), which would in terms of the analysis mean that this country lacks the character of modernized, planning, governance, infrastructure, skills and culture necessary for engendering blended pedagogies. In this way, South Africa cannot be expected to successfully plan and execute blended pedagogies because of the inherent deficiencies in governance, infrastructure, skills and culture.

Figure 6.12: Countries Principal Component 1 Scores



It is for this reason that countries such as Norway, Australia, Poland, Korea, Thailand, Vietnam and Sri Lanka that have variably trotted the blended pedagogies route are on the opposite side of South Africa in terms of their component scores on PC 1 (figures 6.12 & 6.19; appendix L). Besides, some of these countries have not been fully successful in blended pedagogies notwithstanding their apparently enabling environment. The countries that have relatively successfully trotted with blended pedagogies with some degree of enabling environment in this case can be classified into three categories. The relatively highly successful category would include Norway and Australia, followed by the group of Poland and Korea, and the class of Thailand, Vietnam and Sri Lanka. As demonstrated in the literature review, even countries such as Norway and Australia that have successfully established credible enabling environment for blended pedagogies have continued to experience serious problems of scepticism and user apathy and/or resistance (Nyagowa et al., 2014; Blackley & Walker, 2015; Peeraer & Van Petegem, 2015; Truskolaska et al., 2015; Park et al., 2016; Pruet et al., 2016).

Also, Poland and Korea, which are relatively advanced in terms of modernization, planning processes, governance, infrastructure, skills and appropriateness of the e-learning culture in comparison with South Africa, have continued to struggle to attain complete adoption and buy-in with regard to integration of digital technologies with conventional didacticism. It has to be mentioned that South Africa is in terms of modernized planning, governance, infrastructure, skills and culture some distance below Thailand, Vietnam and Sri Lanka. Yet, South Africa is in the same Medium HDI category as Vietnam, explaining the significance of variable maturity of the planning and governance processes. Indeed, Sri Lanka and Thailand are a bar above South Africa in terms of the HDI (see table 1.1); and, they are yet to master blended pedagogies. In terms of sheer resourcefulness and societal development, Norway, Australia, Poland and Korea are in the Very High HDI, two levels above South Africa which is in the Medium HDI.

Given that South Africa is in the Medium HDI, questions of appropriateness of its planning, governance, infrastructure, skills and culture are indictment for trotting with e-learning in an environment of deep societal inequities and regional inequalities. That is, South Africa lacks the societal development qualities that make for successfully planning, governance, infrastructure, skills and culture necessary for adoption and implementation of blended pedagogies. There is evidence of the dearth of societal readiness and circumstantial appropriateness of planning, governance, infrastructure, skills and culture for blended pedagogies. The negative component score on PC 1 means that South African education, standard of living and human development are not supportive of the necessary situational prerequisites for the implementation of blended pedagogies. Indeed, South Africa's character involves deep human inequalities, education inequities and income inequalities. As already demonstrated

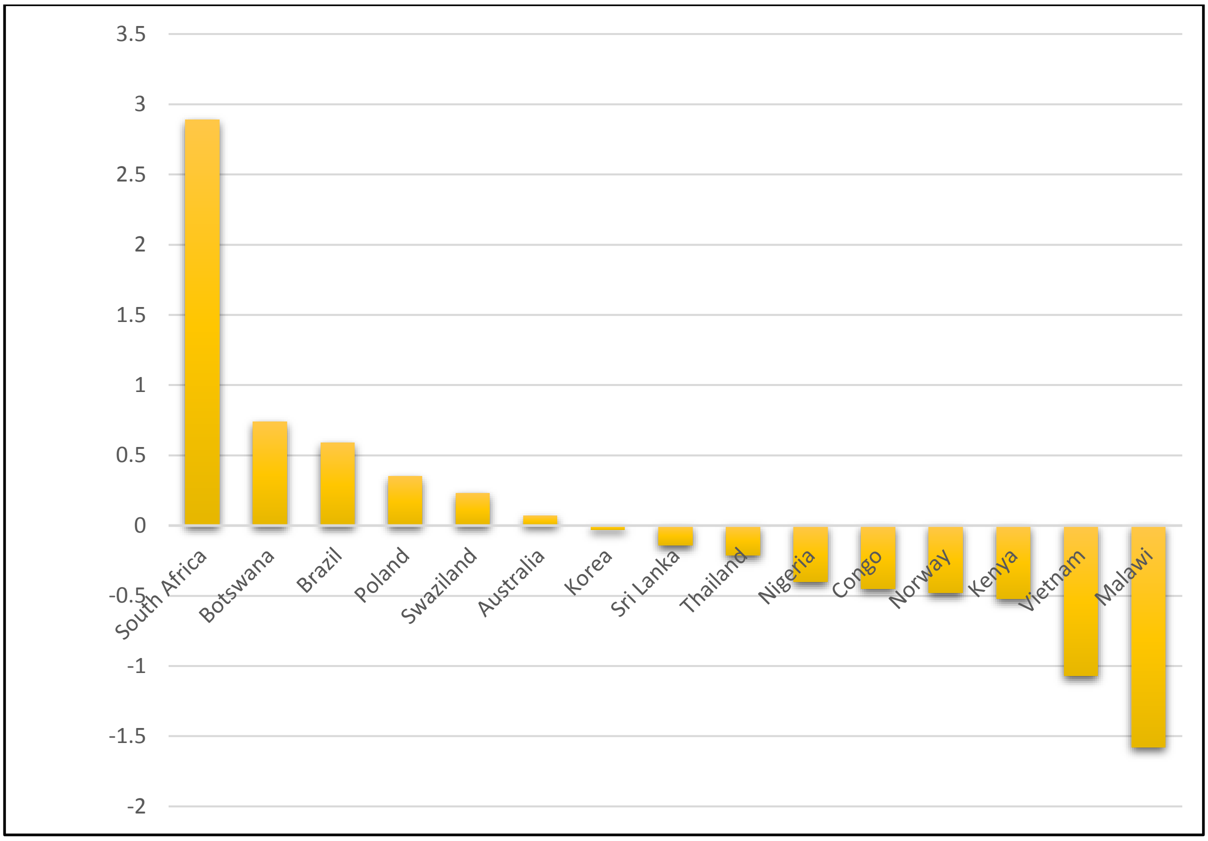
(Reagan, 1989; Kallaway, 1995; Motala, 1995; Letseka, 2014; Dipa, 2015; Greef, 2015; The Economist, 2015; Quintal, 2015; Motshekga, 2016). South Africa is yet to make significant strides in all the three core values of development, especially in overall societal self-esteem and freedoms of choice.

It should not be surprising that the South African society has been in recent time engulfed in xenophobic violence, which points to an overall national dearth of self-confidence, self-esteem and freedoms of choice (Ramnarain, 2014; Botha & Herselman, 2015; Greef, 2015; Hamid, 2015; van Wyk, 2015) notwithstanding the myriadpolitical stunts. The relatively low proportion of Labour force with tertiary education in South Africa explains the challenges associated with the paucity of economic participation and performance. Indeed, South Africa's negative score on PC 1 presents adequate evidence that the nation is not ready for blended pedagogies and that its planning systems, governance processes, infrastructure, skills and culture too are not appropriate. Hence, South Africa is attempting to implement e-learning in a context of poor societal access and use of the Internet, a dearth of universal access to electricity, virtual exclusion of the rurality from the modernization infrastructure and ongoing poor national technological connectivity. All these undesirable observations point to the poverty of planning, governance, infrastructure, skills and culture required for successful adoption and implementation of blended pedagogies. Basically, South Africa's real character is the antithesis of PC 1; and, this country's extraordinarily high scoring on PC 2 confirms this observation (figure 6.13; appendix L).

Conclusively, it can be stated that South Africa is in terms of planning, governance, infrastructure, skills and culture far from ready and that its environment is not as yet appropriate for blended pedagogies. The problem for South Africa, though, remains the puerility of planning and unrealistic envisioning of the future. As already demonstrated, the education system in South Africa has since 1994 remained an ongoing concern of failed tests and poorly planned transformation attempts (Mayisela, 2013; Murtin, 2013; Xiao et al., 2013; Farrukh & Singh, 2014; Ramnarain, 2014; Greef, 2015; Hart & Laher, 2015; Sangari, 2015). A democratic South Africa has unsuccessfully attempted to emulate the Australian and other education models, values and ethics.

Yet, South Africa does not have the modernized western-style planning, governance, infrastructure, education system, skills, expertise, culture, economic performance, and capacity to regulate societal pressures downward, nor an enabling national environment to trot with blended pedagogies.

Figure 6.13: Countries Principal Component 2 Scores



Even Universities in South Africa are not ready to adopt and implement blended pedagogies, except for a few that are formerly white institutions. Chapters 2, 3 and 4 have conclusively demonstrated that such an enabling environment of planning, governance, infrastructure, skills and culture is a necessary prerequisite for successful adoption and implementation of blended pedagogies. From a theoretical perspective see Aesaert et al. (2015), Gu et al. (2015), Hung (2016), Park et al. (2016) and Salminen et al. (2016); and for international experiences reference is made to Lee et al. (2009), Webster & Son (2015), Saekow & Samson (2011), Khlaisang & Likhitdamrongkiat (2015), Lee & Kim (2015), Ninlawan (2015) and Pruet et al. (2016). South Africa is yet to attain advancements in planning and management entailed in blended pedagogies. Fiddling with e-learning, e-planning, e-infrastructure, e-skills, e-culture and e-governance itself does not accord South Africa the character of being ready for blended pedagogies all by itself. Thus, the drive to introduce e-learning by mere imposition, devoid of informed planning and governance, has resulted in replacement attempts that have remained half-hearted.

6.2.7.2. Countries principal component 2 scores

South Africa's component score on PC 2 is extraordinarily higher than all of the 14 countries (figure 6.13; appendix L). This country's score is 2.89, which 2.15 higher than the nearest score. Countries that have relatively successfully trotted with blended pedagogies such as Vietnam, which is in the same Medium HDI Category as South Africa, have far lesser positive and mostly significantly larger negative scores on PC 2. Indeed, South Africa is characterized by high levels of Youth Unemployment and Unemployment of Youth not in School, that is succinctly captured by PC 2. The youth are in the world the drivers of the adoption of digital technologies, especially of the social media (Ronaldo et al., 2013; Pruet et al., 2014; Lee & Kim, 2015; Oz et al., 2015; Domingo & Garganté, 2016; Hung, 2016; Park et al., 2016; Salminen et al., 2016). The concept of "Net Natives" attests to the leading role of youth in digital technologies; and, the youth are supposed to be creating pressure in schools and universities for the adoption and implementation of e-learning. Given that Youth Unemployment is high, especially with youth that are not in school, it means that South Africa lacks the quality that is required for the adoption of digital technologies. As illustrated in chapter 5, one major challenge that South Africa is facing is societal refreshment for the future especially because some youth are not going to school or employed. Regarding this, it would be difficult to envision how South Africa could possibly implement blended pedagogies in a situation where the youth are out of school and unemployed.

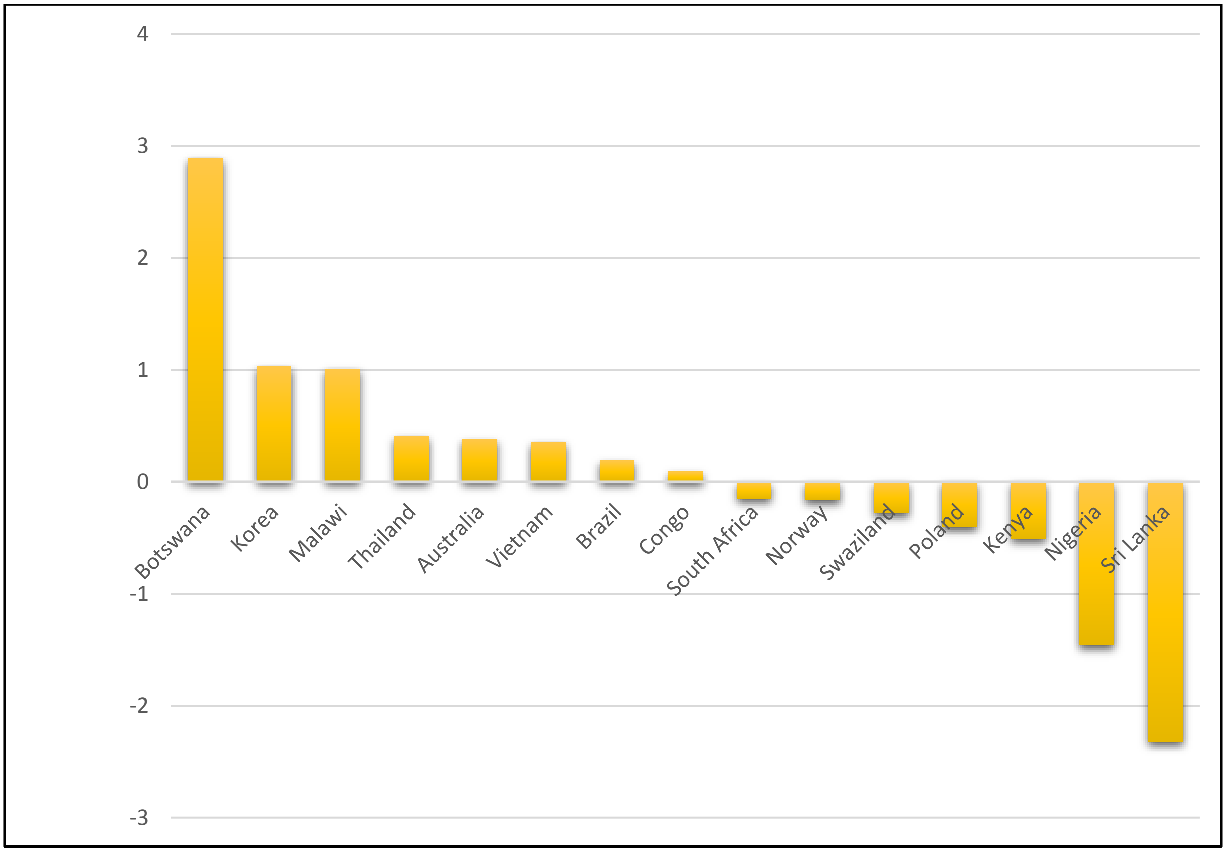
Other than the unemployment of the youth, South Africa's significantly large positive score on PC 2 shows that this country is also deeply unequal. Societal inequality in income and inequities in human development described in PC 2 are deep. The push for convenient adoption and implementation of e-planning, e-governance and e-infrastructure, in the virtual absence of e-culture and e-skills would in all probability lead to replacement rather than integration. Besides, South Africa's move towards the implementation of blended pedagogies in the Gauteng and Western Cape Provinces would instead serve to accentuate the societal inequalities and inequities. Clearly, the use of mobile phones in South Africa is itself ubiquitous whilst the population is generally experiencing high levels of unemployment with lack of growth in HDI, declining rates of Labour Participation in the economy, large proportions of the Labour Force without Tertiary Education, as well as continuing limitations in access to electrification and heavy reliance on fossil fuels, points to poverty of planning and governance. To address this South Africa had hoped to superimpose digital technology on a deeply unequal society without first creating an enabling environment. It is important to recognize that South Africa's score on PC 2 is an extreme case and a virtual outlier that has no connection to the rest of the fourteen countries, especially those in the Medium and Low HDI. Even Kenya, Nigeria and Malawi, which are in the Low HDI Category score negatively on PC 2, implying that their societal development is in relative terms largely shared compared to that of South Africa. Of the countries in the Medium HDI Category with South Africa, only Botswana scores positively on PC 2 but by 2.15 points below that of the former.

Overall, South Africa's negative score on PC 1 and positive on PC 2 shows that there has been serious failure in planning and governance because a country cannot hope to adopt and implement e-learning without prior preparations based on material conditions of the nation. Indeed, South Africa is symptomatic of frustrated development wherein societal inequalities are exacerbated by failed modernization projects as the state struggled for resources mobilization with high levels of Government Consumption Expenditure. This scenario points to a bloated bureaucracy, devoid of modernized planning nor governance, which would constitute environmental limitations as demonstrated in the literature review (see for example - Stern et al., 2009; Carlson et al., 2013; Lysko et al., 2013; Oyedemi, 2014; Ramoroka, 2014; Masonta et al., 2015). In the final analysis, South Africa lacks the necessary environment for adoption and implementation of blended pedagogies; instead, the digital technologies drive in education in this country has been a virtual replacement operation which will exacerbate societal inequalities and frustrate development.

6.2.7.3. Countries' principal component 3 scores

The analysis and interpretation drawn from Component Scores on PCs 1 and 2 above is corroborated by a trace of South Africa's Component Scores on PCs 3-7. PC 3 Component Scores (figure 6.14; appendix L) demonstrate the state intentions relating to public investments in the education system and building capacity of the Labour force for competitive participation in the global knowledge economy. Indeed, this PC 3, as already, demonstrated, is explicable through focused and dedicated state interventions in Public Expenditure on Education and Labour Force Participation Rate. As already argued, country scores that are negative on this PC would imply that whereas Quality of Education and Standards of Living have remained endemically poor, the state has itself failed to provide sustainable planning and governance that would include enhancement in Public Expenditure on Education and Labour Force Participation Rate.

Figure 6.14: Countries' Principal Component 3 Scores



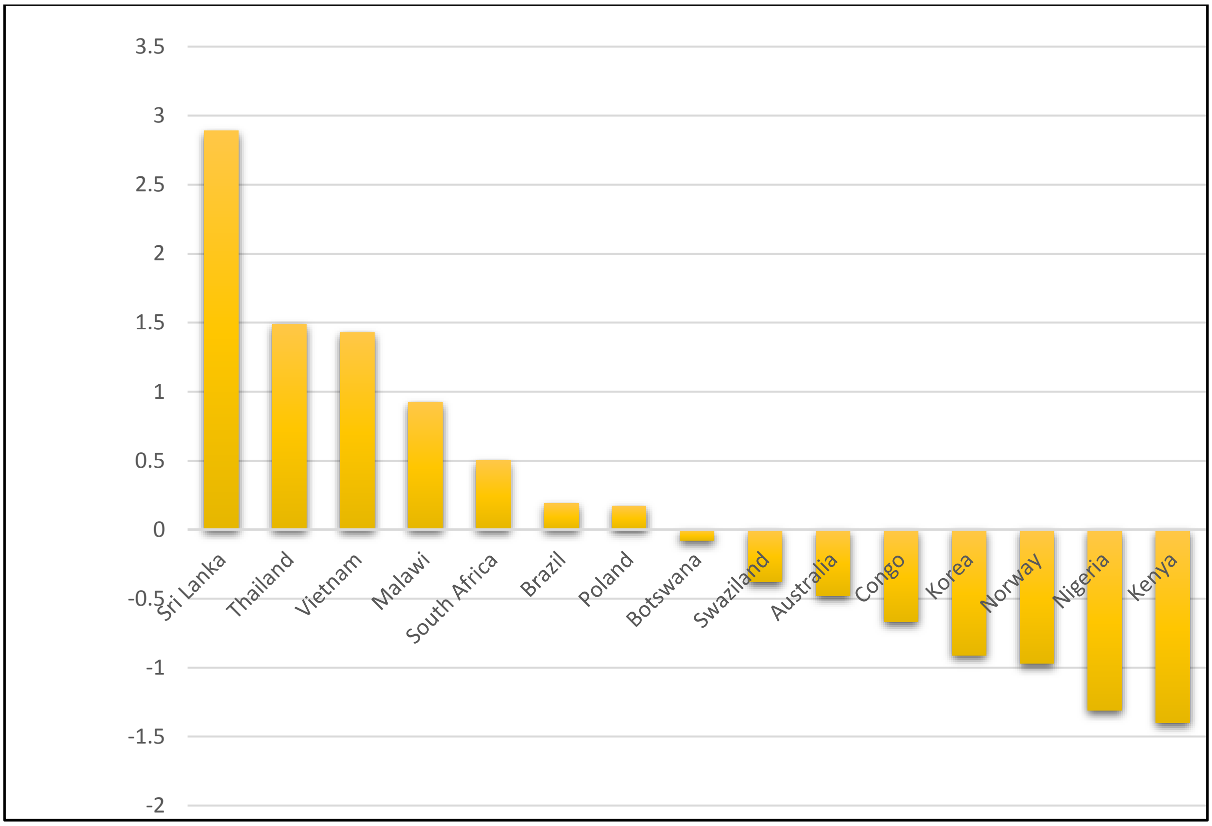
Such state planning and governance apathy, notwithstanding the fact that this PC describes unsustainable state interventions, imply that there would be a national dearth of the infrastructure, skills, expertise and culture that are required prerequisites for successful adoption and implementation of blended pedagogies. As it would be expected, given the poor performance as described in the Components Scores on PCs 1 and 2, South Africa's score on PC 3 is negative, suggesting that there is generally an absence of acutely conceived planning and governance of state interventions in education and the labour markets.

Unsurprisingly, South Africa's transformation in education, as illustrated in Chapter 5 (Czerniewicz & Brown, 2009; Makgato, 2014; Kwet, 2015; Liebenberg, 2015; Ramoroka & Tsheola, 2015; Sackstein, Spark & Jennkins, 2015; Sangari, 2015; Ramoroka & Tsheola, 2016), has been disconcertingly frustrating, leading to increases in matriculation and university graduates who are unable to participate in the labour market. Hence, a larger part of the discourse in the post-apartheid era has been captivated by the insinuation that South Africa was held back by the absence of skills (Mayisela, 2013; Murtin, 2013; Xiao, Califf, Sarker & Sarker, 2013; Farrukh & Singh, 2014; Hart & Laher, 2015; Odendaal, 2016). Indeed, South Africa has continued to have suboptimal employment rates, expenditure in research and development, negligible state investments, low per capita GDP as well as poor societal access to quality education and energy supplies amidst stark inequalities. Besides, Botswana, Vietnam and Congo that are in the Medium HDI Category with South Africa all have positive Component Scores on PC 3, whereas the latter records a negative score. That suggests, especially when compared to Botswana that leads Components Scores on PC 3, that South Africa's planning and governance is deeply suboptimal and far less than what could be justified by the objective national and global circumstances for a country of its calibre.

6.2.7.4. Countries’ principal component 4 scores

South Africa's negative component scores on PCs 1 and 3, nullify the thinking that its moderate positive score on PC 4 (figure 6.5; appendix L) may imply that Average Annual Growth in Government Consumption Expenditure, Change in HDI Ranking and Average Annual HDI Growth could be shifting in the right direction, as purported by Component Loadings as already discussed. For South Africa, the reality of unsustainable public consumption expenditure remains grounded in its component score on PC 3. Hence, Vietnam, which is in the same HDI Category with South Africa, has a positive score on PC 3, complemented by a similar and more significant one on PC 4. It should also be noted that South Africa's component score on PC 2 is basically an outlier that far exceeds those of the fourteen other countries. To this extent, and given that PCs 1-3 account for a greater variance in all the variables, the significance of South Africa's positive moderate score on PC 4 would not carry any realistic traction. Thus, South Africa's score on PC 4 is moderately positive whilst the Quality of Education remains far less than optimal. Indeed, South Africa's character reveals a virtual antithesis of all the qualities associated with PC 1.

Figure 6.15: Countries Principal Component 4 Scores



The positive score on PC 4 is apparently occasioned by the insignificant to neutral loadings of Labour Force Participation Rate and Employment to Population Ratio. Importantly, the complex South African situation is accurately reflected in this PC's relatively significant negative loading of Internet Use for Communication and positive but low Usage of Mobile Phones. The latter shows that South Africa is far from being ready for the e-governance, e-planning, e-infrastructure, e-skills and e-culture, in comparison to all the fourteen countries, especially those in the Medium HDI Category.

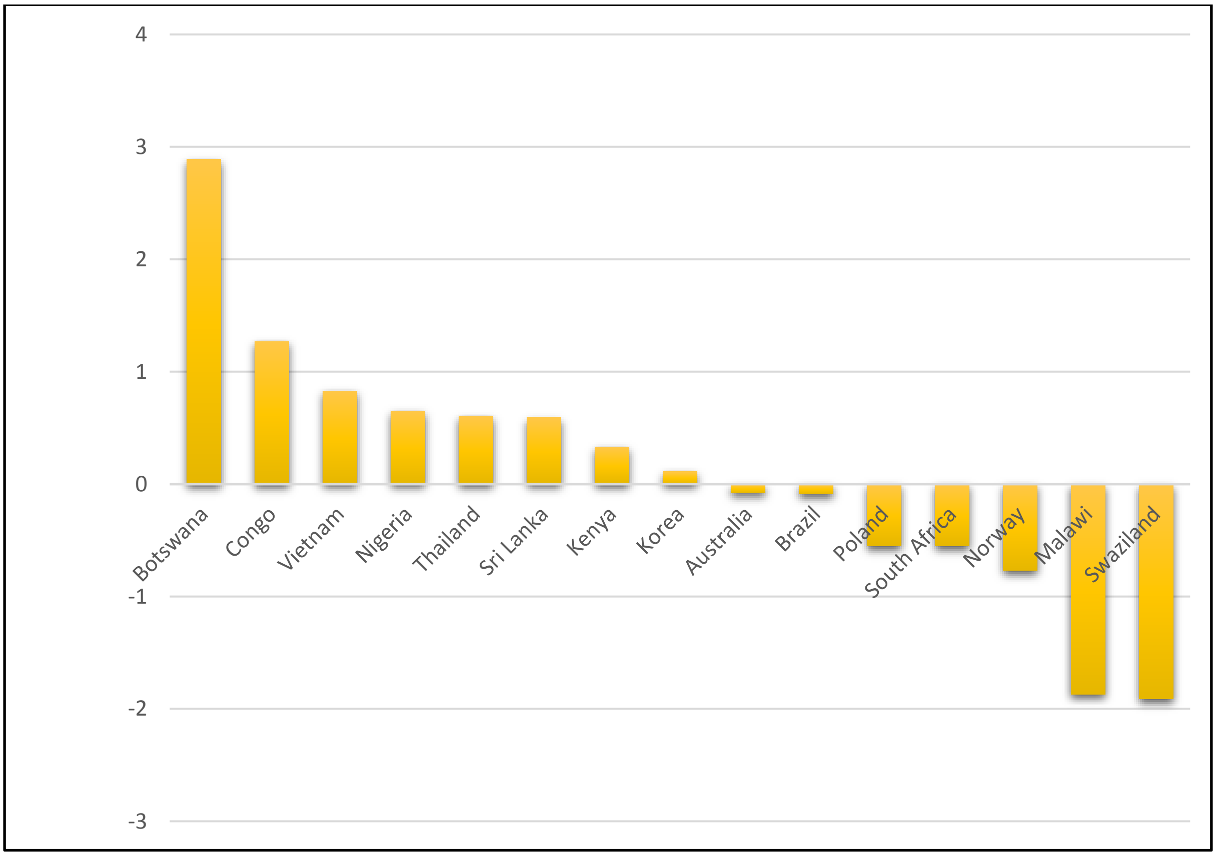
Except for Vietnam, the other two countries in the Medium HDI Category, Botswana and Congo, score negatively on PC 4 (figures 6.15 & 6.19; appendix L). South Africa's political-economy remains relatively backward, whilst public expenditure on education as well as research and development have continued to be weak and suboptimal. Furthermore, performance in supplies of electricity and renewable energy, per capita GDP, standard of living, fixed capital formation and access to mobile devices is negligible for South Africa. This substandard performance is reflective of the dearth of adequate planning and governance, which characterizes deficiencies in modernized infrastructure, skills and culture. Of the four countries in the Low HDI Category, only Malawi scored higher than South Africa on PC 4. But Sri Lanka and Thailand, that are in the High HDI Category, higher than that for South Africa, score above that of the latter on PC 4. Indeed, Sri Lanka, Thailand, Vietnam and Malawi, notwithstanding their political-economy and HDI diversity, have evidence of planning and governance as well as, in some cases, infrastructure and skills nationally-balanced compared to that of South Africa. Hence, South Africa's state interventions remain ineffective largely due to the limitations in the e-infrastructure. Indeed, attempts to superimpose the e-infrastructure upon a situation of lack of e-skills and deficiencies in e-culture will continue to render state interventions wasteful.

For the sake of emphasis, it should be noted that the cumulative eigenvalue of PCs 1-4 consists of 77%, which is a significantly large proportion of the variation in the original data (table 6.5). Collectively, PCs 5-7 consist of eigenvalue of 4.08, which accounts for a mere 15% of variation in the original data. Although deserving of consideration, component loadings on PCs 5-7 should not necessarily carry substantive weight in the final analysis and interpretation. Whereas a total of twenty-eight variables were subjected to PCA, there are only four component loadings that are 0.5 and above on PCs 5-7, all of which are associated with PC 5. To this extent, the next subsection integrates the discussions of PCs 5 to7 for unified interpretation. This aspect of the analysis and interpretation is further expatriated in the above subsection that discusses Global PCAs.

6.2.7.5. Countries principal component 5 to 7 scores

The narrative relating to component scores on PC 4 and South Africa's position thereupon, relative to the 14 countries, is confirmed through those on PC 5. The latter characterizes a realistic potential for progress, which is grounded in the qualities of a solid Gross Fixed Capital Formation and increased use of Mobile Phones for Communication. However, this PC 5 is associated with strong negative loadings of Total Government Consumption Expenditure and indifferent performance in a host of variables that define desirable trends in the national political-economy. This implies that interpretation of scores on this PC should be contingent upon those on other PCs. Unsurprisingly, South Africa scores negatively on PC 5 (figure 6.16; appendix L) because it is not performing optimally in terms of its fixed capital formation and use of mobile devices as already confirmed in the score on PC 4.

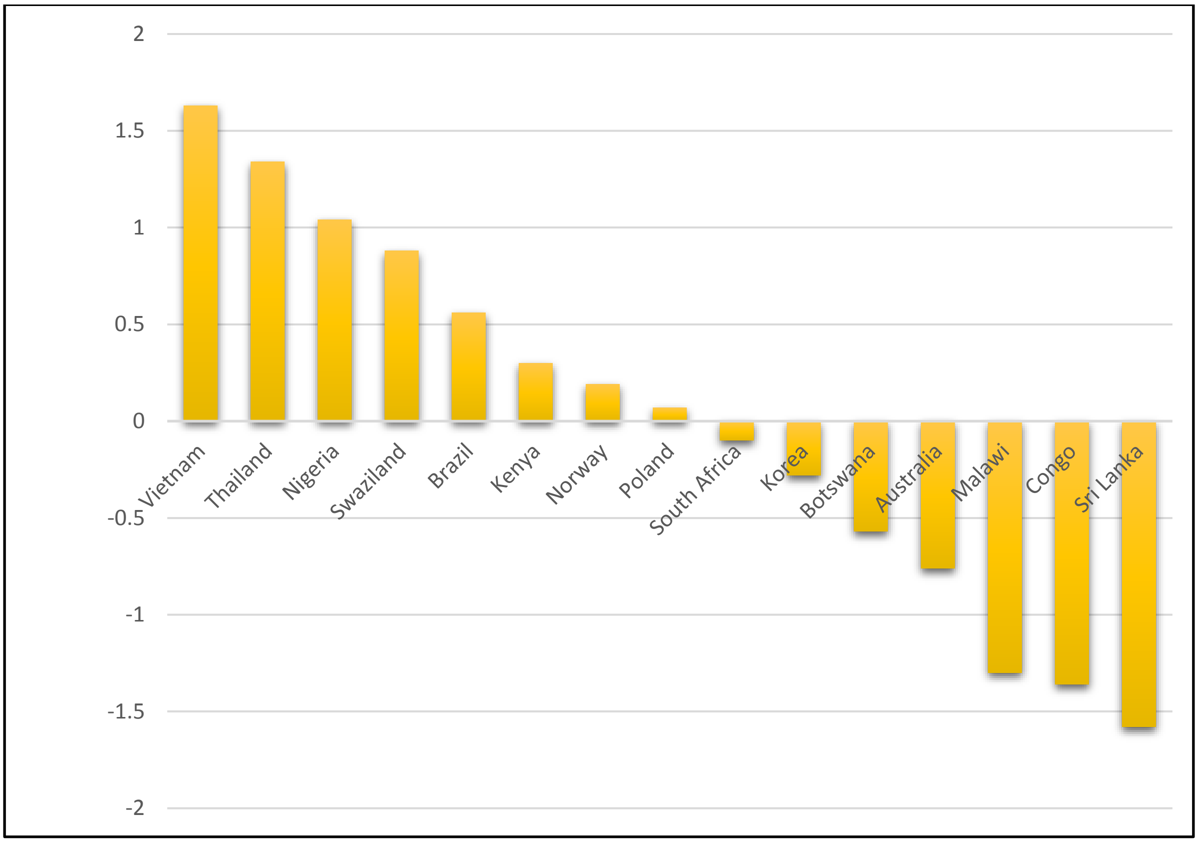
Figure 6.16: Countries Principal Component 5 Scores



As it can be expected, Botswana, Congo and Vietnam, which are in the same Medium HDI Category as South Africa, score higher than the latter on PC 5. The three countries perform better than South Africa in terms of Gross Fixed Capital Formation and Communication in Mobile Devices. In reality, South Africa's negative score on PC 5 is also indicative of the deep societal inequalities, which predetermine access to energy, electricity and the infrastructure as a whole. Even Nigeria and Kenya, that are in the

Low HDI Category, below that for South Africa, are shown to perform better in terms of their higher scores on PC 5 (figures 6.16 & 6.19; appendix L). The worst performers on PC 5, as can be expected, are Swaziland and Malawi; and, the only strange occurrence is that Norway is among the three countries that are outperformed by South Africa on PC 5. However, Norway outperforms all the fourteen countries on PC 1, which relates to modernized planning, governance, infrastructure, skills and culture.

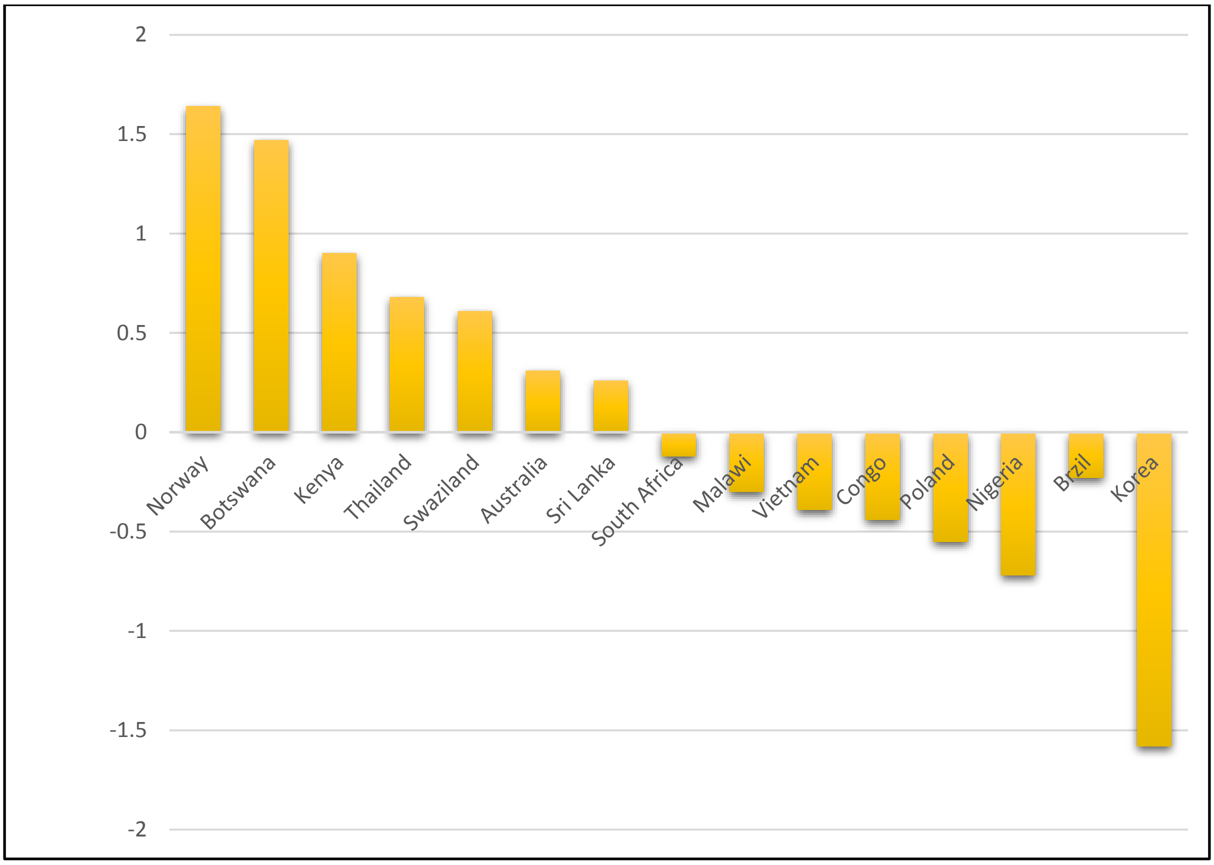
Figure 6.17: Countries Principal Component 6 Scores



Given that Australia, which scores second to Norway on PC 1, has a negative but negligible score on PC 5, may as well suggest that performance in modernized planning, governance, infrastructure, skills and culture is a defining feature that supersedes the significance of the discrepancies of potential progress in fixed capital formation amidst limitations in the former, five loadings that characterize PC 1.

Equally, it is in the context of PC 1 that the muted development potential and non-existent e-culture as captured in PC 6 as well as the quality basic education described in PC 7, should be understood. South Africa's scores on PCs 6 and 7 are almost the same, at -0.1 and -0.12, respectively (figures 6.17 & 6.18). In the PCA, South Africa does not reveal a relative strength in the potential for development nor any significant quality in basic education. Whereas South Africa outperforms Botswana and Congo in the potential for development, it falls far short of that for Vietnam.

Figure 6.18: Countries Principal Component 7 Scores



As per national resourcefulness, South Africa's poor performance on PC 6 is suboptimal, especially in comparison to that for Vietnam. The latter out performs South Africa by a margin of 1.73 on PC 6 (figure 6.17; appendix L) whereas Botswana does the same by a difference of 1.56 on PC 7 (figure 6.18). Collectively reading component scores on PCs 1-7, South Africa is underperforming in terms of development planning and governance as well as the modernization of infrastructure and skills for shared culture of digital pedagogies.

Indeed, South Africa's potential for development is derailed through endless planning that has become an end in itself. Planning for its own sake, which defines South Africa's democratic history, means that governance has remained substandard. To this extent, South Africa has evidently failed to implement amidst a myriad planning exercises. For the sake of emphasis, the planning and governance stalemate in a doom ratio South Africa is briefly revisited hereunder. Planning without implementation implies that there is no substance in governance.

According to the 2015 Report of the United Nations Industrial Development Organization to the China G-20 Development Working Group, “Rarely has a country progressed and become developed without sustained structural transformation from an agrarian or resource-based economy towards a higher productive agriculture and a sophisticated industrial or service-based economy. Industry, by providing decent jobs and by expanding the fiscal revenues needed for social investments can boost capacity for inclusive development” (cited in Bonnett, 2016: 52). Evidently, the PCA results demonstrate conclusively that South Africa lacks this character, with the result that its desire to invest in e-learning would not deliver bended pedagogies; instead, it would stir a process of widening socioeconomic disparities and polarization of the population. In the absence of productive capabilities and larger markets, South Africa’s political-economy cannot be realistically expected to create adequate jobs. The PCA results demonstrate that South Africa is unable to create jobs and that the proportion of the population with tertiary education is severely limited. This national environment is evidence to the dearth of planning and governance; however, the South African state is instead blamed for over planning without implementation (figure 6.16; appendix L).

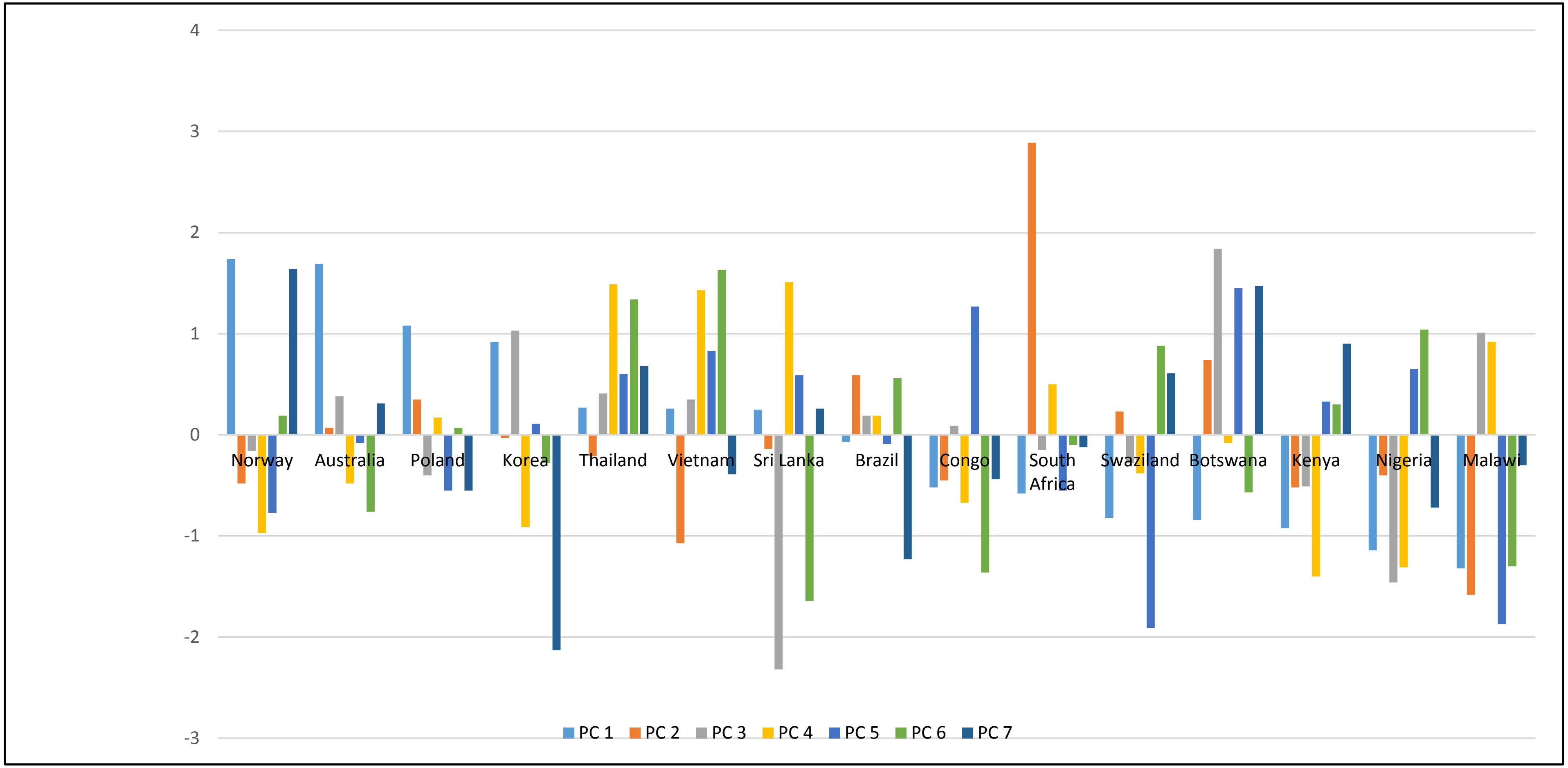
The absence of implementation in South Africa is to a large extent blamed on the absence of state capacity; hence, there are calls that government should engage in public-private partnerships that allocate implementation of plans to the private sector (Bonnett, 2016; Wilkinson, 2016). Frans Pienaar, Chairperson of the Inyatsi Construction Group Holdings, mourns the decline in infrastructure development as well as the substandard quality of products as the key limiting factor in Africa’s modernization (cited in Wilkinson, 2016). He further points to reliance on outdated models of governance for stalling delivery of modernized infrastructure for development. According to Pienaar, “a lack of capacity in government and professional structures tasked to implement infrastructure projects is one of the main challenges facing the construction industry in Africa” (cited in Wilkinson, 2016: 53). Since 2012, the Presidential Infrastructure Coordinating Commission has been tasked with the launch of the NIP which was mandated "to define the challenges and enablers which South Africa needs to respond to in planning and developing enabling infrastructure that fosters economic growth" (James, Wilkinson & Mavuso, 2016: 48). Subsequently, 18 Sips were developed and approved in order to "support economic development and address service delivery in the poorest provinces". Of the 18 Sips, 5 are geographically focused, 3 spatial, 3 energy, 3 social infrastructure, 2 knowledge, 1 regional integration, and 1 water and sanitation Sip. "Infrastructure implementation: Capital and capacity planning are two crucial elements that have a direct impact on infrastructure backlog" (James et al., 2016: 48). According to Lutchman, capability availability and capacity planning are two crucial elements that have a direct impact on the growing project implementation backlog (James et al., 2016). These elements involve financial capital for project funding and human capital (skilled human capacity) in the spheres of the public and private sectors responsible for planning.

Instead, recent public sector headlines have been overwhelmed with "vast amounts of planning" devoid of implementation. South Africa is currently captured by an infrastructure projects hype (Vishaal Lutchman, Divisional Director of WSP/Parsons Brinckerhoff, (cited in James et al., 2016: 48). The hype is driven through Government National Infrastructure Plan and the Strategic Infrastructure Projects (Sips), which have however remained stagnated in the planning phase. The crisis of implementation in South Africa is largely explicable through the dearth of clarity and the non-actionable planning. Hence, there is an absence of public sector leadership in project implementation, resulting in suboptimal productivity and economic growth. Public sector leadership of projects is ineffective and it lacks integrity. In addition to dearth of project funding, Lutchman "notes that Africa faces a significant shortage of experienced and capable engineers - in government, where projects need to be planned and committed to, and in the private sector, where delivery needs to be executed" (James et al., 2016: 51). Human capital is one thing, hence "the private sector's planning and developing the local skills pipelines effectively depends on a clear indication of the projects that will be implemented and a solid commitment from government to ensure their execution" (James et al., 2016: 51).

Hence, South Africa’s problem is in the governance of implementation of plans. Infrastructure planning presents a vivid illustration of this weakness in South Africa; and, it is the same deficiency that explains why the implementation of the e-learning project is at best ad hoc, if not chaotic. South Africa’s spending on infrastructure has been momentous; yet, the country is blamed for having many plans that remain on paper. South Africa’s public sector spent R102 trillion on infrastructure between 2009/10 and 2013/14 (Engineering News, 2016). State spending on infrastructure has been on the increase since at least 2011, whereas that by State-owned Enterprises (SOEs) such as Transnet and Eskom increased substantially in 2007/08 and then declined in 2013/14 and 2014/15 (Engineering News, 2016). Indeed, SOEs have been the largest contributors towards public sector infrastructure expenditure in South Africa (Engineering News, 2016); whereas economic services have accounted for 82.2% of total public sector infrastructure spending, that for social services, education and health was 13.1%, 5.4% and 3.6%, respectively (Engineering News, 2016). This indicates that there is implementation which is ineffective because it has continued to fail to deliver shared national connectivity.

Connectivity refers to the ability to access the national electricity grid, transport, information and/or social network as required (James, 2016). Connectivity is fundamental to the national capacity to plan, establish and govern modernized infrastructure for blended pedagogies. According to the Sales Director of Ruckus Wireless Sub-Saharan Africa, Riaan Graham, “connectivity will play an integral role in infrastructure and socioeconomic development” (cited in James, 2016: 50). For example, Wi-Fi is “fundamental to infrastructure development” because it enables connectivity (Graham cited in James, 2016: 50). In Graham’s opinion, “Infrastructure development has been highly prioritised on the African agenda, as countries have realized the need for a long-term plan that drives socioeconomic development by improving infrastructure and increasing internet coverage”. Indeed, improved infrastructure “such as Internet cafes, connected libraries and electrified households” to recharge mobile devises is central to modernised planning and governance connectivity (Graham cited in James, 2016: 50).

Figure 6.19: Countries Principal Component 1-7 Composite Scores



The majority of the populace in South Africa, especially those in rural settlements where fixed-line connectivity is virtually absent rely on mobile devices; however, they have not necessarily used them for education purposes. To this extent, the household has been instrumental in informing the use of mobile devices for purely social purposes rather than pedagogical goals. However, it is also true that Wi-Fi coverage in South Africa is not necessarily pervasive, inclusive of the urban areas and townships where the majority of users of mobile devices reside. Furthermore, South Africa has not invested in efforts to provide pervasive Wi-Fi coverage, amidst the known high limiting costs of broadband solutions. Whereas South Africa aspires to rolling out e-learning possibilities, it does so in a context which has not provided for substantive planning and implementation of blended pedagogies. It will most certainly take long-term planning to incorporate Wi-Fi solutions into rural construction plans; in fact, it is difficult to foresee such planning taking shape because of the depth and severity of poverty in rural settlements.

South Africa's rural populations are preoccupied with the pressing requirement to earn a living, rather than being concerned with using the mobile devices for pedagogic purposes. It can therefore be envisaged that the connectivity of urban informal, rural and township settlements in South Africa, which are home to the largest majority of the population, would not have access to either the costly broadband solutions or Wi-Fi coverage in the foreseeable future. Even where state intervention could seek to introduce Wi-Fi coverage, protracted problems of device "compatibility with the building design and aesthetics", load density, signal strength and coverage adequacy would remain (Graham cited in James, 2016: 50). Additionally, there are significant environmental hostilities that may imperil communication devices and compromise network performance (James, 2016). Thus, the poorly planned implementation of e-learning for schools would not be realistic for rural and urban informal settlements nor for most townships. Even where the connectivity is manually improved at the schools' buildings, the household environment will remain a limiting factor as blended pedagogies will require a whole societal culture. The hope to create an oasis of modernized infrastructure would not transform the societal culture into that required for blended pedagogies. It would be virtually unrealistic to expect rural and urban informal settlements as well as townships to afford the necessary site inspections required for designing adequate access points and blanket carrier-grade coverage.

Based on this recitation of chapter 5 and the PCA results, the finding that South Africa's modernization and development failings are in planning, governance, infrastructure, skills and culture become unavoidable. Government plans infrastructure projects, but hopes to deliver implementation in collaboration with the private sector, largely due to the need for capital funding and human capital. Whereas the cry for project funding and skills have dominated the discourse in South Africa, the failure of implementation appears to point to a substantive challenge of governance. The latter is guided by diverse ideologies and principles in the public and private sectors. The former's governance is by nature driven by the national public good and social objectives, whilst the latter is undergirded by the commercial and financial interests. Also, the structures of governance involve public and private ownerships, which are hugely diverse and opposite extremes. It is this discrepancy in governance of public and private sectors that explains the disconnect of infrastructure planning and implementation in South Africa, which makes for suboptimal productivity and economic growth, which are at the centre of the deficiencies in the rolling out of blended pedagogies.

6.3. Findings

The following findings are derived from the analysis of results from this study:

- Theoretically, a number of planning approaches were discussed which include, among others, economic planning, physical development planning, policy analysis and planning, interpretative planning and collaboration planning. International experiences suggest that most countries in the very high and high HDI group adopt the policy analysis and planning approach for planning of the implementation and adoption of blended learning. Whereas experiences from developing countries with medium HDI as well as low HDI revealed that these countries adopt various planning approaches for the adoption and implementation of blended learning. South Africa has a national plan (NDP 2030) towards the implementation of what it considers as effective and sustainable ICT infrastructure for the development of skills necessary for the country's participation in the global knowledge economy. However, South Africa's conduct of e-learning is evidently hyperbolic, with provinces such as

Gauteng and Western Cape engaged in a rush towards replacement rather than blended pedagogies, far divorced from the provisions of the National Development Plan 2030.

- Additionally, three governance models were identified and discussed as the monocentric, multilevel and adaptive models. In practice, most countries with a very high HDI group have adopted the monocentric model which seems to be the most appropriate for the governance of blended learning in countries with a high level of development. For governance of blended learning, countries with a very high level of development generally adopted the monocentric model for the governance. Countries with a medium or low level of development prefer the adaptive model for the governance of the implementation and adoption of blended learning. South Africa adopted the multilevel model of governance in its implementation of blended learning.
- From a theoretical perspective, there is universal acceptance that blended pedagogies provide for active and effective knowledge acquisition whereas conventional didactics render learners passive recipients of information and presented by teachers. Seemingly, the intellectual capabilities needed for participation in the knowledge economy, inclusive of analytical, interactive and computing skills, among others, cannot be acquired through conventional didactics, thus, the need for adoption of blended pedagogies. Both the international and South Africa's experiences confirmed this theoretical perspective although most countries seem to replace conventional didactics with e-learning instead of blending.
- Theoretically, blended pedagogies have a number of prospects such as the importance to train learners by encouraging critical thinking as well as active learning which allows them to have control over their knowledge acquisition, learning ability, outcomes and achievements necessary for participation in the global knowledge economy and the national development. However, there are a number of possible challenges which include, among others, cyberloafing, prioritization of adequate access to digital technologies and resourcing ahead of the training requirements for teachers and learners as well as increased levels of anxiety precipitated by the lack of relevant skills among users. The international experiences revealed that most of the educational digital

technologies provided are not used for the intended purposes but instead for personal gains, especially among teachers. One of the major reasons behind this phenomenon was the lack of ICT skills to implement the blended pedagogies. Simultaneously, South Africa also faces the theoretical and practical challenges as identified.

- In theory, e-learning requires, at the minimum, specific levels of computer and ICT literacy as well as pedagogic technological informatics. Collectively, computer and ICT literacy for the application of blended learning involves issues of the user's "capacity" or "self-efficacy" rather than mere access for both the teachers and learners. Therefore, self-efficacy, perceived usefulness, perceived ease of use, teaching and learning beliefs, ICT anxiety, and general attitudes towards computers are identified as fundamental determinants of teachers' and learners' ICT integration.
- International experience suggests that, notwithstanding the overwhelming adoption of the idea of blended pedagogies across the world, both developed and developing countries included, the dominant practice has been for substitution of conventional didactics with e-learning techniques and South Africa too is not an exception.
- Generally, the four levels of development are directly linked to the conception of developed and developing countries. Seemingly, countries with the very high and high development levels are developed countries whereas medium and low levels represent the developing countries.
- International experiences revealed that infrastructure has been the most common precondition that received significant attention from the planners and investors of blended learning. Even though infrastructure is given priority, skills and culture are seldom prioritised and they are mostly treated as afterthought effects and thus, compromise the successful implementation of blended learning and South Africa is not an exception.
- Given that the raw data consisted of 15 observations by 28 variables, a 28 by 28 variables correlation matrix was generated to determine if there are relationships. This correlation matrix describes the direction and, provides an accurate numerical statement of the strength of the association and the chances that such a relationship would hold. Of the 378 correlations that the

thesis discovered, 183 (48.41%) are direct and 195 (51.59%) are indirect. However, 276 of the 378 relationships are negligible, which is 59.00% of the total correlation frequencies of which only 102 correlations were strong and significant enough to deserve closer examination.

- A high percentage variance was described as a 0.80 to 0.89, which is 80 to 89 percent; whereas a significantly high percentage variance is described as 0.90 and above, which is 90% and above. Of the 28 variables, percentage variance of 18 variables are characterised as significantly high; whereas percentage variance of 10 are denoted as high percentage.
- PCA extracted a total of 15 Principal Components; and, the first seven accounted for the cumulative percentage variance of 92% in the interrelationships. Respectively, the first six PCs account for 39%, 17%, 11%, 10%, 6% and 5% variance, which provide for a cumulative total percentage of 88% variance in the data. The 7 principal components included in this analysis from 1 to 7 are named as Modernized, Planning, Governance, Infrastructure, Skills and Culture; Frustrated Development; Unsustainable State Intervention and Societal Inequalities; Effective State Interventions and Limiting e-infrastructure; Contingent Potential for Progress with e-skills Constraint; Muted Development Potential & Non-existent e-culture; as well as, Quality Basic Education, respectively.
- Twelve (12) of the 28 variables have strong positive loadings on PC 1 and collectively, these positive loadings, especially the strongest ones, imply that this PC describes multifaceted development, which transcends the usual modernization philosophy to encapsulate societal equality and equitable access to national resources. Furthermore, there is evidence of social development as denoted in the strong positive loadings of variables related to education, standard of living and human development. To this extent, and given the significance and strength of the loadings of variables relating to communication, countries that score positively and highly on PC 1 should signify the presence of enabling environments for e-infrastructure, e-governance, e-culture and e-skills for the planning, implementation and operationalization of blended pedagogies. A relatively low and negative score

would imply that the country in question is scarcely prepared to adopt strategies for blended pedagogies, which ultimately leads to replacement behaviours.

- PC 2 was justifiably denoted as Frustrated Development, where the struggle for modernization has exacerbated societal inequities. A society in conditions as described in this PC should be far less prepared for blended pedagogies; and, unrelenting push for e-infrastructure, e-governance, e-skills and e-culture will be a mere attempt at imposition of e-learning and therefore replacement behaviour rather than integration of conventional didactics with digital technologies. That is, it would be unrealistic for such a society to hope to superimpose digital technologies for e-learning over such gross societal deficiencies and inequities. Instead of delivering blended learning models, superimposition of digital technologies in education in such a society would most probably reproduce and exacerbate societal inequalities and frustrated development. Therefore, a country that scores positively and highly on PC 2 would imply the absence of an enabling environment for the implementation and operationalization of blended pedagogies. That is, the status of governance, infrastructure, skills and culture would remain less optimal for the adoption of blended pedagogies.
- PC 3 captures the essence of state interventions in Education and the Labour market that are designed to promote societal wellbeing. However, the Public Expenditure on Education interventions have not generated strategic outcomes to propel sustainable progressive change in societal conditions. That is, countries that score positively on this PC would be characterized by Unsustainable State Interventions in Public Education and Labour Force Participation, which have however failed to engender improvements in the Quality of Education and Standards of Living. It could as well be insinuated that such state interventions are a dead-end exercise.
- PC 4 describes conditions under which State Interventions are effective in sustaining a positive quality of education and progressive change in HDI, as well as suppressing societal ills of Human and Education Inequality. Therefore, countries characterized by conditions of this PC would most definitely have effective state interventions with poorly developed capacity for participation in the modern global knowledge economy. For such countries, investing heavily

in blended pedagogies without first creating the requisite conditions for engagement in the global knowledge economy would imply that they would have sought to exploit non-existent capacity in governance, infrastructure, skills and culture. Such a national drive would create vulnerability to destruction of the scarce or inadequate capacity for integration of digital technologies. However, the limitations in e-infrastructure would not necessarily entail direct state investment therein because it is contextual in terms of a variety of other national development imperatives and factors.

- PC 5 was denoted Contingent Potential for Progress with e-Skills Constraint especially because relatively significant loading of Gross Fixed Capital Formation (0.67) and the heightened use of Mobile Phones for Communication (0.50) suggest that this PC encapsulates potential. Whether this potential for progress could be harnessed for participation in the global knowledge economy without imparting the total societal development makeup, depends upon the score of the country on other PCs, especially 6 and 7. That is, the potential described in PC 5 is relative, rather than absolute; and, state interventions could as well be paradoxically destructive rather than constructive.
- In the virtual absence of Human Development (-0.07), PC 6 provides for Muted Development Potential. To this extent, blind and unfettered public investment in blended pedagogies may create prospects of deepening societal inequalities, especially in education between rural and urban as well as poor and rich sectors of the population. Indeed, success in the integration of digital technology in education is a function of the household adoption of e-culture, which is in terms of this PC non-existent. The seriously low levels of use of Internet and Smart Phones for Communication, as already described, suggest an absence of national infrastructure, especially in a context where the Gross Fixed Capital Formation (-0.49) is seriously deficient.
- Principal Component 7 is associated with a relatively significant loading of Education Quality (0.55), unmatched by any of the PCs. Overall, this PC suggests that whereas Quality of Education may be reasonable, the preconditions for development and participation in the global knowledge economy associated with governance, infrastructure, skills and culture are

absent. However, the ultimate reading of a country's score on this PC would depend upon the attendant scores on the rest of other PCs, especially 5-6.

- South Africa's component score on PC 1 is -0.58, which would in terms of the analysis mean that this country lacks the character of modernized, planning, governance, infrastructure, skills and culture necessary for engendering blended pedagogies. This suggests that the country cannot be expected to successfully plan and execute blended pedagogies because of the inherent deficiencies in governance, infrastructure, skills and culture. It is for this reason that countries such as Norway, Australia, Poland, Korea, Thailand, Vietnam and Sri Lanka that have variably trotted the blended pedagogies route are on the opposite side of South Africa in terms of their component scores on PC 1. Besides, some of these countries have not been fully successful in blended pedagogies notwithstanding their apparently enabling environment. The negative component score on PC 1 therefore, means that South Africa’s education, standard of living and human development are not supportive of the necessary situational prerequisites for the implementation of blended pedagogies.
- South Africa's component score on PC 2 is extraordinarily higher than all of the 14 countries. This country's score is 2.89, which 2.15 higher than the nearest score. Countries that have relatively successfully trotted with blended pedagogies such as Vietnam, which is in the same Medium HDI category as South Africa, have far lesser positive and mostly significantly larger negative scores on PC 2. It is important to recognize that South Africa's score on PC 2 is an extreme case and a virtual outlier that has no connection to the rest of the fourteen countries, especially those in the Medium and Low HDI. Overall, South Africa's negative score on PC 1 and positive on PC 2 shows that there has been serious failure in planning and governance because a country cannot hope to adopt and implement e-learning without prior preparations based on material conditions of the nation. Indeed, South Africa is symptomatic of frustrated development wherein societal inequalities are exacerbated by failed modernization projects as the state struggled for resources mobilization with high levels of Government Consumption Expenditure. Conclusively, it can be stated that South Africa is in terms of planning, governance, infrastructure, skills

and culture far from ready and that its environment is not as yet appropriate for blended pedagogies. Thus, the drive to introduce e-learning by mere imposition, devoid of informed planning and governance, has resulted in replacement attempts that have remained half-hearted.

- The analysis and interpretation drawn from Component Scores on PCs 1 and 2 above is corroborated by a trace of South Africa's Component Scores on PCs 3-7. PC 3 Component Scores demonstrate the state intentions relating to public investments in the education system and building capacity of the Labour force for competitive participation in the global knowledge economy. As it would be expected, given the poor performance as described in the Components Scores on PCs 1 and 2, South Africa's score on PC 3 is negative, suggesting that there is generally an absence of acutely conceived planning and governance of state interventions in education and labour markets. Therefore, South Africa's planning and governance is deeply suboptimal and far less than what could be justified by the objective national and global circumstances for a country of its calibre.
- Hence, given that PCs 1-3 account for a greater variance in all the variables, the significance of South Africa's positive moderate score on PC 4 would not carry any realistic traction. Thus, South Africa's score on PC 4 is moderately positive whilst the Quality of Education remains far less than optimal. Indeed, South Africa's character reveals a virtual antithesis of all the qualities associated with PC 1. Hence, South Africa's state interventions remain ineffective largely due to the limitations in the e-infrastructure. Indeed, attempts to superimpose the e-infrastructure upon a situation of lack of e-skills and deficiencies in e-culture will continue to render state interventions wasteful.
- The cumulative eigenvalue of PCs 1-4 comprises 77%, which is a significantly large proportion of the variation in the original data. Collectively, PCs 5-7 consist of an eigenvalue of 4.08, which accounts for a mere 15% variation in the original data. Whereas deserving of consideration, component loadings on PCs 5-7 do not necessarily carry substantive weight in the final analysis and interpretation.
- Unsurprisingly, South Africa scores negatively on PC 5 (figure 6.16) because it is not performing optimally in terms of its fixed capital formation and use of

mobile devices as already confirmed in the score on PC 4. In reality, South Africa's negative score on PC 5 is also indicative of the deep societal inequalities, which predetermine access to energy, electricity and the infrastructure as a whole. Even Nigeria and Kenya, that are in the Low HDI Category, below that for South Africa, are shown to perform better in terms of their higher scores on PC 5.

- Equally, it is in the context of PC 1 that the muted development potential and non-existent e-culture as captured in PC 6 as well as the quality basic education described in PC 7, should be understood. South Africa's scores on PCs 6 and 7 are almost the same, at -0.1 and -0.12, respectively. In the PCA, South Africa does not reveal a relative strength in the potential for development nor any significant quality in basic education. Whereas South Africa outperforms Botswana and Congo in the potential for development, it falls far short of that for Vietnam.
- Collectively reading component scores on PCs 1-7, South Africa is underperforming in terms of development planning and governance as well as the modernization of infrastructure and skills for shared culture of digital pedagogies.

6.4. Conclusion

Evidently, there is no direct correlation between the level of development and adoption of blended pedagogies. Instead, adoption of blended pedagogies appears to be a result of a convoluted process that involves creation of enablers for e-culture largely through modernized planning, governance, infrastructure, skills and culture. These qualities are embedded in societal equality, equity of access to services, capital formation, employment, education as well as Internet infrastructure. The study therefore, concludes that South Africa's potential for development has been derailed through endless planning that has become an end in itself. Planning for its own sake and perhaps to compete with developing countries means that in South Africa modernized governance, skills and e-culture necessary for blended pedagogies have remained substandard, thus, resulting in the replacement of conventional didactics with e-learning instead of integration of the two. The subsequent chapter presents the key findings and recommendations of the study.

Chapter 7

Concluding Remarks and Recommendations

7.1. Introduction

This chapter aims at providing a summary of the thesis including the key findings of this study. The summary provides a brief background of what each chapter covered in relation to the aim and objectives of the study. The key research findings are presented as per the themes of the study. Then the conclusion and recommendations of the study are drawn from the research findings. This chapter is presented in four sections inclusive of the introduction and the conclusion. The second section presents the purpose of the study and a summary of each chapter is provided in relation to the research questions. The third section discusses recommendations drawn from the findings of the study are outlined in section five. Lastly, section six concludes this chapter.

7.2. Purpose of the Study

The aim of the study was to investigate the readiness and appropriateness of South Africa's planning approach, governance model, infrastructure, culture and skills for blended pedagogies and participation in the global knowledge economy for national development. To operationalize this aim, the study framed the following specific working objectives:

- To analyse the generic planning approaches.
- To evaluate the models of governance.
- To identify and discuss the tenets of conventional didactics.
- To analyse the principles of e-learning pedagogies.
- To rigorously appraise the preconditions for blending e-learning pedagogies with conventional didactics.
- To discover an appropriate planning approach, governance model, infrastructure, culture and skills, for blended pedagogies.
- To examine the prospects and challenges of South Africa attaining appropriate blended pedagogies for participation in the global knowledge economy and

national development, relative to other countries of various human development standing.

- To recommend measures for the adoption of planning approaches and governance models, as well as infrastructure, culture and skills, that are appropriate for blending e-learning pedagogies with conventional didactics.

In order to present the findings as per the aim and objectives of the study, this thesis consists of seven chapters. Firstly, the research questions were established and South Africa was identified as the study area. Among others, the research design and methodology were developed and PCA was selected as the data analysis tool in this study (chapter 1). A theoretical perspective on the appropriate planning approaches, governance models, infrastructure, culture and skills necessary for successful implementation of blended pedagogies was provided. The planning approaches discussed include, among others, economic planning, physical development planning, policy analysis and planning, interpretative planning and collaboration planning. Theoretically, three governance models were identified and discussed, namely, the monocentric, multilevel and adaptive models. The intellectual capabilities needed for participation in the knowledge economy, which include analytical, interactive and computing skills, among others, cannot be acquired through conventional didactics, thus, the need for adoption of blended pedagogies. Blended pedagogies require infrastructure such as computers, reliable computer systems and applications, non-freezing computer screens, seldom dropping online connections, short download time spans and reliable electricity connections, among others. However, to use the infrastructure effectively and efficiently for teaching and learning, relevant culture and skills are required from both teachers and learners.

Regardless of teachers' and learners' values, knowledge, experience, language and symbols, attitudes as well as behaviour, there are five external factors that affect their e-culture necessary for blended pedagogies. The factors include socio-economic characteristics, ICT oriented home situations, and general educational, classroom and school level factors. Moreover, e-learning requires, at the minimum, specific levels of computer and information literacy, pedagogic technological informatics as well as self-efficacy. Blended pedagogies have a number of prospects such as the importance of training learners by encouraging critical thinking as well as active learning which allow them to have control over their knowledge acquisition, learning ability, outcomes and achievements necessary for participation in the global knowledge economy and national development. However, there are a number of challenges faced which include, among others, cyberloafing, prioritization of adequate access to digital technologies and resourcing ahead of the training requirements for teachers and learners as well as increased levels of anxiety precipitated by the lack of relevant skills among users. Planning approaches, governance models, infrastructure, culture and skills appropriate for blended pedagogies are, therefore, at the core of the country's participation in the global knowledge economy and national development (chapter 2).

The models, approaches and principles of blended learning were discussed in order to clarify its misconceptions in many countries. The conceptualization of blended learning and provision of a clear discussion on the importance of the integration of knowledge domains as well as online and offline learning environments; its models, typologies, levels, constructs and taxonomy were discussed. Accordingly, blended learning is far from the conventional perspective as a "mere combination" of classroom and online activities, it is a way of optimizing "learner learning and success" through transformation of the traditional pedagogies for both on-site and distance modes of education delivery. TPACK involves teachers' "understanding of the difficulties learners encounter when they have to learn a particular subject matter domain. This form of situated knowledge derives from the integration of at least three knowledge domains, which are: technological knowledge, pedagogical knowledge and content knowledge. Therefore, it could be deduced that a creativity mindset is a function of the level and depth of inquiry and integratedness of technological, pedagogical and content knowledge in the blended online and offline learning environment. There are four possible combinations and types of blended learning which include "mostly face-to-face class with substantial online activities"; "mostly online class with learner offline group meeting"; "mostly face-to-face class with online resources"; and, "mostly online class with optional face-to-face meeting".

For this reason, teachers need to be aware of the different phases and typologies of blended learning. Based on the same framework, three adoption levels of online instruction were identified, namely, "blended learning adoption spectrum with awareness and exploration (level 1), adoption and early implementation (level 2), and mature implementation and growth (level 3)". Moreover, five levels or dimensions of blended learning were identified as "simple blending of offline and online (1st level), blending self-paced and live collaborative learning (2nd level), blending structured and unstructured learning (3rd level), blending custom content with off-the-shelf content (4th level), and blending learning, practice, and performance support (5th level)". Evidently, enhancement of the effectiveness of teaching and the learners' learning experiences entail the 5th level or dimension, which is heavily involved in terms of the teachers' role in establishing the environment of group creativity, innovation, adaptability and flexibility. Additionally, blended learning is complex because its implementation involves understanding other constructs, such as hybrid, blended, flipped and inverted, among others. Four (4) types of blended learning were identified through a learning experience taxonomy. These are: "face-to-face mixed" (course with laboratory); "lecture hybrid" (part face-to-face, part online lecture); "practice hybrid" (part face-to-face, part online praxis); and, "online mixed".

Additionally, the levels and processes of inquiry offered by blended learning as well as the characteristics required from both teachers and learners for successful blended learning were discussed. Based on the learning objectives taxonomy, four levels of depth in collaborative teacher conversations were identified as follows: "No inquiry"; "Sharing and Reacting"; "Analyzing and Generalizing"; and, "Planning and Problem-solving". The skills, attitudes and self-efficacy as well as teachers' roles and responsibilities in blended learning were also outlined. Accordingly, e-learning requires, at the minimum, specific levels of computer and ICT literacy as well as pedagogic technological informatics. Collectively, computer and ICT literacy for the application of blended learning involves issues of the user's "capacity" or "self-efficacy" rather than mere access for both the teachers and learners. The delineation of the determinants of a blended learning environment with a focus on teaching creatively and teaching for creativity, teachers-as-learners as well as infrastructure and teachers' and learners' ICT literacy were also discussed. An understanding of teachers-as-learners' readiness to engage in blended learning, can better assist teachers in enhancing their online-learning experiences necessary for blended pedagogies and offering of online courses. For teachers-as-learners, communication self-efficacy assists and allows them to create and manage time for information searching, thinking, and reflection of the given subject matter. Therefore, self-efficacy, perceived usefulness, perceived ease of use, teaching and learning beliefs, ICT anxiety, and general attitudes towards computers are identified as fundamental determinants of teachers' and learners' ICT integration (chapter 3).

International experiences were evaluated to establish whether the level of development matters or not for the successful adoption and implementation of blended learning. The analysis of countries in the four levels of development in relation to the planning approaches and governance models adopted as well as the infrastructure, skills and culture required for successful adoption and implementation of blended learning was established in order to juxtapose South Africa's chances of victory in modernizing education. The planning experiences from developed countries such as Australia, Poland and Republic of Korea (with very high HDI) as well as Thailand (with high HDI), generally suggest that most countries in the very high and high HDI group adopt the policy analysis and planning approach for planning of the implementation and adoption of blended learning. The experiences from developing countries such as Vietnam and Zambia (medium HDI) as well as Kenya (low HDI) revealed that these countries adopt various planning approaches for the adoption and implementation of e-learning and/or blended learning. Respectively, policy and analysis and collaborative planning approaches were adopted in Vietnam and Zambia whereas Kenya has adopted both collaborative as well as policy and analysis planning approaches.

For governance of blended learning, countries with a very high level of development generally adopted the monocentric model for the governance. Experiences both from Poland and Republic of Korea confirm that the state is in charge of the implementation of blended learning. Similar to countries in the very high HDI group, the monocentric governance model seems to be the most appropriate for the governance of blended learning in countries with high level of development. In Thailand and Brazil the decision making authority and management of blended learning developments are the responsibility of the government. However, Algeria adopted the multilevel approach of governance which promotes the involvement of various stakeholders at different levels. Countries with a medium and low levels of development prefer the adaptive model for the governance of the implementation and adoption of e-learning and/or blended learning. Both Vietnam's and Zambia's as well as Kenya's adoption of the adaptive model reveals that the countries are aware of their worlds which are characterised by continuous and unexpected changes mostly accompanied by unpredictable consequences. Generally, experiences from both developed and developing countries confirm the theoretical claim that conventional didactics promotes learners' passive rather than active knowledge acquisition. However, for some developed countries, conventional didactics are still necessary for effective learning whereas most developing countries seem to suggest that the adoption of e-learning can do better in education.

Although the majority of countries with a very high level of development have acknowledged the benefits of e-learning pedagogies, evidence suggests that the countries still face challenges in their adoption and implementation. Drawing from Algeria, Thailand and Brazil (high HDI) as well as Vietnam's (medium HDI) experiences, the introduction of e-learning has been mistaken for the provision of infrastructure such as hardware, computers, personal laptops and ICT labs to a large number of educational institutions. Apparently, the governments of these countries expected e-learning pedagogies to be adopted through osmosis processes with the provided infrastructure. For countries with a low level of development such as Kenya, implementation of e-learning pedagogies still remains the major challenge. The time-intensive teacher-approach leaves them with no any other choice but to replace conventional didactics with e-learning instead of blending the two. Evidently, a lack of ICT skills and e-culture among teachers and learners both in developed and developing countries is the most common challenge experienced in the adoption and implementation of blended learning. However, countries with a low HDI have more chances of experiencing challenges related to lack of infrastructure in addition to limited skills and e-culture in their attempt to modernise teaching and learning (chapter 4).

South Africa's adopted planning approaches and governance models, provision and availability of appropriate infrastructure as well as required teachers' and learners' skills and culture for the country's successful implementation of blended learning were evaluated. The country has a national plan (NDP 2030) for the implementation of what it considers as effective and sustainable ICT infrastructure for the development of skills necessary for the country's participation in the global knowledge economy. The plan is informed by a number of policies and legislation which include, among others, the White Paper on e-Education and South Africa's ten-year innovation plan. The Gauteng and the Western Cape provinces are in the forefront of the implementation of blended learning. The Paperless Classrooms and the Smart Classrooms in the Gauteng and the Western Cape provinces, respectively, are the two projects in the country which have invested heavily in blended learning. However, evidence from the Gauteng and the Western Cape provinces suggests that the provincial governments do not have tailor-made plans, rather they rely on the national plans, strategies and policies for adoption and implementation of blended learning. Drawing from the planning experiences of Gauteng and Western Cape provinces, the country seems to have adopted the policy and analysis planning approach for the implementation of educational technology. The provincial planning approaches in question are derived from the national plans which hope to technologically transform South Africa for national development and participation in the global knowledge economy. Although the implementation of blended learning is largely driven by the government, the private sectors and other relevant stakeholders are also involved. Thus, South Africa has adopted the multilevel model of governance in its implementation of blended learning.

Generally, conventional didactics do not offer South African learners the level and standard of education that allows them opportunities to participate in the global knowledge economy for national development and thus, the implementation of blended learning. For educational purposes, most schools rely on the use of computers and lately on tablets for 1:1 learner-gadget as a solution to improving academic engagement, performance and achievement. However, without proper training on how to best integrate educational ICT with conventional didactics in the classroom, South Africa is faced with the risk of teachers becoming "mediators" who will simply instruct learners to use certain applications on a tablet to complete a given task. Drawing from the experiences from Gauteng and the Western Cape provinces, the massive investments made for e-learning in a democratic South Africa are questionable. For both provinces, the appropriateness of their adopted planning approaches, governance models, infrastructure, skills and culture need to be evaluated. Although the government seem to be at the forefront of the governance of the educational transformations, respectively, the Gauteng and Western Cape provinces' Big Switch On and the Smart Schools Projects do not have plans which explain how they will unfold. Seemingly, the implementation of the projects happened so suddenly, without any plans, and relies on the prescription by the ICT related policies and plans for blended learning. However, the two provinces seem to be replacing conventional didactics with e-learning instead of the implementation of blended learning, a phenomenon which creates confusion with regard to the country's educational ICT vision.

The link between institutional planning, governance and culture is significant for the successful and sustainable implementation of the schools' ICT initiatives. In this regard, school management and concerned teachers should play a major role in the identification of the level of ICT relevant for teaching and learning in their schools in collaboration with the provincial government rather than being driven by the latter. To effectively implement the national ICT policies and plans, teacher professionalism is crucial for the integration of e-learning with conventional didactics. In practice however, the integration of ICT in education does not give professional development of teachers a priority. Instead, for most policy makers the expectation is that the modern transformation of the teaching and learning environment through the implementation of technology should unfold naturally whereas e-culture of both teachers and learners is also ignored. Although some ICT policies prescribe teachers' professional development for the implementation of the technology, little support is usually provided for them and learners during the actual implementation stage which results in insignificant effect on pedagogy. Like many other countries, South Africa's educational ICT infrastructure seems to be appropriate but, its planning approaches, governance models, teachers' and learners' skills and e-culture's appropriateness should be questioned for successful implementation of blended learning (chapter 5).

7.3. Recommendations

To be able to create enabling environments that are appropriate and adequate for e-infrastructure, e-governance, e-culture and e-skills for the planning, implementation and operationalization of blended pedagogies in South Africa, the thesis recommends as follows:

- **Address the social, e-cultural and economic inequalities**

For a democratic country such as South Africa which is characterised by social and economic inequalities, there is a need to adequately and appropriately address these challenges ahead of the momentous state investments in blended learning. Seemingly, the success of blended pedagogies does not only depend on infrastructure but it requires modernized planning, governance and skills which South Africa lacks mainly as a result of challenges associated with social, e-cultural and economic inequalities. Therefore, the country needs to address these inequalities especially those that are related to communication and the use of technological infrastructure in order to build a society that can participate in the national and global knowledge economy.

- **Revisit the planning and governance of blended pedagogies**

The successful implementation of blended pedagogies starts with their planning and governance. Thus, South Africa should ensure that its planning and governance translate into successful integration of e-learning with blended pedagogies. Also, the country's planning should be informed by, among others, the resource base, GDP, socio-economic status, culture and skills. Furthermore, governance of blended pedagogies should be characterised by collaboration of multiple stakeholders inclusive of government, private business, households as well as NGOs, among others. That is, South Africa's aspiration for blended pedagogies and preparation for participation in global knowledge economy cannot be fulfilled through osmosis, rather it requires conscious modernized planning and governance that support the technological transformation across all geographic and sectors of the population, inclusive of the rural, urban informal and township settlements.

- **Provide regular digital acculturation and support of households**

Appropriate ICT skills especially among teachers are a prerequisite for successful implementation and operationalization of blended pedagogies. However, households could present a serious obstacle if they are not cultured into the use of digital technologies in education. Apparently, the replacement of conventional didactics with e-learning in South Africa is partly a result of limited and/or lack of Technological Pedagogical Content Knowledge among teachers, who are members of the community and households. Therefore, the majority of teachers and households still need regular ICT support from relevant stakeholders especially because they have to teach the “Net Natives” who are already socialised into technology. To acquire modernized skills and e-culture necessary for the participation in the national and global economy, teachers and households should be given an opportunity to regularly attend education ICT related training and always be supported.

- **Encourage e-culture and ICT self-efficacy among in society**

In addition to planning and governance as well as infrastructure and skill and e-culture, ICT self-efficacy plays an important role in the successful implementation of blended pedagogies. Both teachers, learners and households should be socialised into digital culture for education, which should in turn improve their ICT self-efficacy. That is, South Africa’s potential for the successful implementation of blended pedagogies and participation in the national and global knowledge economy depends on both teachers’, learners’ and households’ e-culture and self-efficacy. Therefore, South Africa and all other countries that are in favour of blended pedagogies should evaluate their planning, governance, infrastructure and skills such that they inculcate the necessary e-culture and improve ICT self-efficacy in the society that are necessary and sufficient for participation in the national and global knowledge economy.

7.4. Conclusion

Generally, there is no correlation between the successful implementation of blended pedagogies and any country’s level of human development. International experiences revealed that even countries such as Australia and Poland as well as Thailand and Brazil in very high and high HDI categories, respectively, still struggle to implement blended pedagogies. Instead, the majority of both developed and developing countries that were sampled in this study including South Africa, are practically replacing convectional didactics with e-learning instead of establishing blended pedagogies. Evidence suggests that the failure of implementation of blended pedagogies in most countries is largely because of the absence of modernized planning, governance, skills and culture notwithstanding the presence of the state-of-the-art infrastructure. Therefore, South Africa's potential for modern development and participation in the national and global knowledge economy is disrupted by endless ICT related planning that is associated with lack of implementation. The democratic country's reverence for planning means that governance of blended pedagogies has remained substandard; thus, explaining the lack of societal skills and e-culture and low participation rate in the national and global knowledge economy.

In the final analysis, this study has established that there is limited knowledge on the planning approaches and governance models that are appropriate to developing countries such as South Africa. The frustration with the aspiration to emulate developed countries and to participate competitively in the global knowledge economy has thrust developing countries into a race to the bottom in as far as adoption of blended pedagogies is concerned. The study recommends future studies on the planning approaches and governance models that would support societal digital acculturation for developing countries such as South Africa. Such studies would have to determine how households that are largely lacking in formal education and residing in infrastructure-poor rural, urban informal and township settlements could be encouraged to support the integration of digital pedagogies in the education of the "Net Generation". It is necessary to theorize how households that have not necessarily embraced the culture of being involved in the conventional education of their members could be encouraged to become enablers for societal adoption of blended pedagogies. In equal measure, the state intervention in planning and governance has to be investigated for its enabling qualities relative to the societal environmental *status quo*.

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Appendices

Appendix A: Raw Data Matrix

COUNTY	*HDI*	*HDIRC*	*AAHDIG*	*IAHDIV*	*CHI*	*IE*	*IAEI*	*II*	*IIGC*	*PEE*	*GDP*	*GFCF*	*TGGFCE*	*AAGGCE*	*RDE*	*FFPES*	*RSPES*	*TER*	*RER*	*EPR*	*LFPR*	*LFTE*	*YU*	*YNSE*	*IUC*	*MPSC*	*QE*	*SL*
Norway	0.944	0	0.44	0.892	5.3	2.3	0.886	10.2	26.8	6.6	62.448	22.6	21.9	1.8	1.7	57.3	47.8	100.0	100.0	62.6	64.9	41.9	9.2	5.6	96.3	116.5	82	95
Australia	0.935	0	0.32	0.858	7.9	1.9	0.914	17.7	34	5.1	42.831	28.3	17.7	0.0	2.4	95.4	4.6	100.0	100.0	61.5	65.2	37.3	12.2	4.7	84.6	131.2	67	83
Korea	0.898	0	0.86	0.751	15.9	25.5	0.644	18.4	43.7	7.4	32.708	29.7	14.9	2.7	4.0	82.8	17.2	100.0	100.0	59.1	61.0	31.0	9.3	11.9	84.3	115.5	49	63
Poland	0.843	1	0.70	0.76	9.6	5.6	0.778	17.5	32.8	4.9	22.877	18.8	18.1	2.1	0.9	90.7	9.6	100.0	100.0	50.7	56.5	29.6	4.4	12.2	66.6	156.5	59	71
Sri Lanka	0.757	5	0.83	0.699	11.6	12.8	0.646	13.7	36.4	1.7	9.426	29.2	13.1	5.5	0.2	48.7	51.3	88.7	86.0	52.6	55.0	14.6	20.1	0.5	25.8	103.2	83	60
Brazil	0.755	3	0.91	0.557	25.6	23.6	0.518	38.7	52.7	5.8	14.555	18.2	22.0	2.0	1.2	54.6	44.2	99.5	97.0	65.6	69.8	18.3	15.0	19.6	57.6	139.0	46	75
Thailand	0.726	3	1.00	0.576	19.9	16.1	0.519	34	39.4	7.6	13.932	26.7	13.8	4.9	0.3	80.4	18.9	100.0	99.8	71.7	72.3	25.6	3.4	11.9	34.9	144.4	88	76
Botswana	0.698	1	0.74	0.431	36.5	32.1	0.437	55.5	60.5	9.5	15.247	33.9	19.7	4.3	0.5	65.4	22.3	53.2	23.9	62.6	76.7	25.6	36.0	11.9	18.5	167.3	56	32
South Africa	0.666	4	0.29	0.428	33	16.1	0.594	57.3	65	6.2	12.106	19.3	22.2	2.4	0.8	87.2	12.9	85.4	66.9	39.2	52.1	6.6	51.4	31.4	49.0	149.7	73	44
Vietnam	0.666	1	1.41	0.549	17.4	18	0.474	22	35.6	6.3	5.125	23.8	6.2	7.3	1.2	71.0	28.2	99.0	97.7	75.9	77.5	25.6	6.0	9.3	48.3	147.1	85	78
Congo	0.591	2	0.42	0.434	26.2	21.5	0.402	21.2	40.2	6.2	5.68	30.7	13.6	-3.8	1.2	48.8	51.0	41.6	11.7	66.1	70.7	25.6	16.0	11.9	48.9	116.1	36	41
Kenya	0.548	0	0.62	0.378	31.1	26	0.38	36	47.7	6.6	2.705	20.4	14.0	1.1	1.0	19.7	80.3	23.0	6.7	61.1	67.3	25.6	16.0	11.9	43.4	73.8	68	45
Swaziland	0.531	-2	-0.80	0.354	33.1	26.8	0.404	37.6	51.5	7.8	6.471	9.6	19.9	5.5	1.2	63.0	36.2	42.0	24.5	44.5	57.4	25.6	16.0	11.9	27.1	72.3	77	60
Nigeria	0.514	2	0.80	0.32	37.5	43.3	0.254	28.4	43	6.2	5.423	14.5	8.1	1.4	0.2	17.4	82.6	55.6	34.4	51.8	56.1	25.6	16.0	11.9	42.7	77.8	51	40
Malawi	0.445	2	1.90	0.299	32.6	30.2	0.308	27.7	46.2	5.4	7.55	19.7	22.1	11.6	1.2	63.0	36.2	9.8	2.0	76.7	83.0	25.6	8.6	11.9	5.8	30.5	54	41

Appendix B: Summary Statistics

Variable	N	Mean	Standard Deviation	Minimum	Maximum
2014 Human Development Index (HDI)	15	0.70	0.16	0.445	0.944
HDI Rank Change between 2009 & 2014	15	1.71	1.53	0	5
Average Annual HDI Growth between 1990 & 2014	15	0.80	0.42	0.29	1.9
2014 Inequality-adjusted HDI Value	15	0.55	0.20	0.299	0.892
Coefficient of Human Inequality	15	22.88	11.06	5.3	37.5
Inequality in Education	15	20.12	11.51	1.9	43.3
Inequality-adjusted Education Index	15	0.54	0.20	0.254	0.914
Inequality in Income	15	29.06	14.18	10.2	57.3
Income Inequality Gini Coefficient	15	43.70	10.52	26.8	65
Public Expenditure on Education	15	6.22	1.71	1.7	9.5
Per Capita GDP	15	17.27	16.73	2.705	62.448
Gross Fixed Capital Formation	15	23.03	6.70	9.6	33.9
Total General Government Final Consumption Expenditure	15	16.49	5.08	6.2	22.2
Average Annual Growth of General Government Final Consumption Expenditure	15	3.76	2.94	0	11.6
Research and Development Expenditure	15	1.20	0.97	0.2	4
Fossil Fuels Primary Energy Supply	15	63.03	23.35	17.4	95.4
Renewable Sources Primary Energy Supply	15	36.22	23.77	4.6	82.6
Total Electrification Rate	15	73.19	32.25	9.8	100
Rural Electrification Rate	15	63.37	40.61	2	100
Employment to Population Ratio	15	60.11	10.81	39.2	76.7
Labour Force Participation Rate	15	65.70	9.32	52.1	83
Labour Force with Tertiary Education	15	25.61	8.38	6.6	41.9
Youth Unemployment	15	15.96	12.61	3.4	51.4
Youth not in School or Employment	15	11.90	6.91	0.5	31.4
Internet Users Communication	15	48.92	25.66	5.8	96.3
Mobile Phone Subscription Communication	15	116.06	38.33	30.5	167.3
Quality of Education	15	64.93	16.16	36	88
Standard of Living	15	60.29	19.04	32	95

Appendix C: Correlation Matrix

	HDI	HDIRC	AAHDIG	IAHDIV	CHI	IE	IAEI	II	IIGC	PEE	GDP	GFCF	GGFCET	GGFCEAAG	RDE	PESFF	PESRS	TER	RER	EPR	LFPR	LFTE	UY	UYSE	CIU	CMPS	EQ	SL
HDI	1.00	-0.27	-0.44	0.96	-0.84	-0.74	0.93	-0.42	-0.45	-0.13	0.83	0.43	0.17	-0.51	0.50	0.56	-0.52	0.84	0.84	-0.05	-0.23	0.43	-0.17	-0.26	0.80	0.60	0.18	0.72
HDIRC	-0.27	1.00	0.10	-0.27	0.22	0.09	-0.22	0.27	0.31	-0.46	-0.48	-0.08	0.03	0.28	-0.59	-0.06	0.05	0.06	0.02	-0.26	-0.26	-0.83	0.39	0.28	-0.51	0.03	0.15	-0.23
AAHDIG	-0.44	0.10	1.00	-0.35	0.19	0.38	-0.48	-0.07	-0.03	-0.04	-0.39	-0.14	-0.15	0.85	-0.09	-0.05	0.03	-0.28	-0.16	0.60	0.60	-0.06	-0.42	-0.13	-0.54	-0.41	0.03	-0.09
IAHDIV	0.96	-0.27	-0.35	1.00	-0.95	-0.82	0.94	-0.63	-0.66	-0.31	0.83	0.38	0.09	-0.41	0.47	0.50	-0.44	0.80	0.83	0.02	-0.22	0.51	-0.34	-0.44	0.78	0.45	0.26	0.80
CHI	-0.84	0.22	0.19	-0.95	1.00	0.86	-0.87	0.77	0.81	0.45	-0.70	-0.33	0.04	0.23	-0.39	-0.45	0.37	-0.72	-0.79	-0.13	0.14	-0.49	0.50	0.54	-0.68	-0.33	-0.35	-0.83
IE	-0.74	0.09	0.38	-0.82	0.86	1.00	-0.90	0.46	0.56	0.39	-0.64	-0.23	-0.23	0.26	-0.20	-0.58	0.51	-0.63	-0.67	0.03	0.18	-0.30	0.19	0.25	-0.59	-0.44	-0.46	-0.74
IAEI	0.93	-0.22	-0.48	0.94	-0.87	-0.90	1.00	-0.45	-0.50	-0.29	0.84	0.28	0.30	-0.45	0.42	0.61	-0.54	0.74	0.76	-0.16	-0.32	0.41	-0.12	-0.26	0.76	0.48	0.31	0.73
II	-0.42	0.27	-0.07	-0.63	0.77	0.46	-0.45	1.00	0.94	0.54	-0.45	-0.15	0.32	0.02	-0.36	-0.01	-0.08	-0.30	-0.39	-0.25	0.07	-0.59	0.74	0.74	-0.48	0.19	-0.07	-0.55
IIGC	-0.45	0.31	-0.03	-0.66	0.81	0.56	-0.50	0.94	1.00	0.43	-0.48	-0.15	0.36	0.07	-0.18	-0.05	-0.04	-0.37	-0.46	-0.33	-0.02	-0.67	0.78	0.75	-0.49	0.04	-0.25	-0.66
PEE	-0.13	-0.46	-0.04	-0.31	0.45	0.39	-0.29	0.54	0.43	1.00	0.02	0.02	0.13	-0.05	0.15	0.06	-0.13	-0.19	-0.26	0.12	0.33	0.24	0.14	0.32	-0.04	0.19	-0.12	-0.19
GDP	0.83	-0.48	-0.39	0.83	-0.70	-0.64	0.84	-0.45	-0.48	0.02	1.00	0.23	0.38	-0.42	0.55	0.41	-0.35	0.54	0.57	0.01	-0.12	0.68	-0.20	-0.29	0.80	0.25	0.14	0.66
GFCF	0.43	-0.08	-0.14	0.38	-0.33	-0.23	0.28	-0.15	-0.15	0.02	0.23	1.00	-0.15	-0.02	0.22	0.25	-0.30	0.23	0.18	0.39	0.34	0.14	0.06	-0.34	0.11	0.44	-0.09	-0.02
GGFCET	0.17	0.03	-0.15	0.09	0.04	-0.23	0.30	0.32	0.36	0.13	0.38	-0.15	1.00	0.00	0.14	0.34	-0.35	-0.07	-0.05	-0.21	-0.01	-0.02	0.33	0.36	0.05	0.01	-0.12	0.04
GGFCEAAG	-0.51	0.28	0.85	-0.41	0.23	0.26	-0.45	0.02	0.07	-0.05	-0.42	-0.02	0.00	1.00	-0.19	0.05	-0.08	-0.40	-0.31	0.46	0.55	-0.20	-0.16	-0.11	-0.69	-0.38	0.14	-0.22
RDE	0.50	-0.59	-0.09	0.47	-0.39	-0.20	0.42	-0.36	-0.18	0.15	0.55	0.22	0.14	-0.19	1.00	0.39	-0.35	0.25	0.30	0.10	0.00	0.48	-0.26	-0.09	0.65	-0.02	-0.25	0.33
PESFF	0.56	-0.06	-0.05	0.50	-0.45	-0.58	0.61	-0.01	-0.05	0.06	0.41	0.25	0.34	0.05	0.39	1.00	-0.99	0.56	0.57	-0.03	-0.01	0.10	0.01	0.16	0.30	0.55	0.20	0.42
PESRS	-0.52	0.05	0.03	-0.44	0.37	0.51	-0.54	-0.08	-0.04	-0.13	-0.35	-0.30	-0.35	-0.08	-0.35	-0.99	1.00	-0.51	-0.51	0.02	-0.04	-0.06	-0.07	-0.17	-0.22	-0.58	-0.16	-0.33
TER	0.84	0.06	-0.28	0.80	-0.72	-0.63	0.74	-0.30	-0.37	-0.19	0.54	0.23	-0.07	-0.40	0.25	0.56	-0.51	1.00	0.98	-0.08	-0.30	0.11	-0.15	-0.05	0.65	0.72	0.34	0.75
RER	0.84	0.02	-0.16	0.83	-0.79	-0.67	0.76	-0.39	-0.46	-0.26	0.57	0.18	-0.05	-0.31	0.30	0.57	-0.51	0.98	1.00	0.01	-0.25	0.17	-0.28	-0.13	0.65	0.60	0.38	0.83
EPR	-0.05	-0.26	0.60	0.02	-0.13	0.03	-0.16	-0.25	-0.33	0.12	0.01	0.39	-0.21	0.46	0.10	-0.03	0.02	-0.08	0.01	1.00	0.92	0.36	-0.56	-0.33	-0.10	-0.06	-0.06	0.19
LFPR	-0.23	-0.26	0.60	-0.22	0.14	0.18	-0.32	0.07	-0.02	0.33	-0.12	0.34	-0.01	0.55	0.00	-0.01	-0.04	-0.30	-0.25	0.92	1.00	0.24	-0.30	-0.15	-0.31	-0.06	-0.13	-0.05
LFTE	0.43	-0.83	-0.06	0.51	-0.49	-0.30	0.41	-0.59	-0.67	0.24	0.68	0.14	-0.02	-0.20	0.48	0.10	-0.06	0.11	0.17	0.36	0.24	1.00	-0.64	-0.60	0.54	-0.07	-0.01	0.49
UY	-0.17	0.39	-0.42	-0.34	0.50	0.19	-0.12	0.74	0.78	0.14	-0.20	0.06	0.33	-0.16	-0.26	0.01	-0.07	-0.15	-0.28	-0.56	-0.30	-0.64	1.00	0.60	-0.24	0.23	-0.06	-0.55
UYSE	-0.26	0.28	-0.13	-0.44	0.54	0.25	-0.26	0.74	0.75	0.32	-0.29	-0.34	0.36	-0.11	-0.09	0.16	-0.17	-0.05	-0.13	-0.33	-0.15	-0.60	0.60	1.00	-0.09	0.22	-0.24	-0.34
CIU	0.80	-0.51	-0.54	0.78	-0.68	-0.59	0.76	-0.48	-0.49	-0.04	0.80	0.11	0.05	-0.69	0.65	0.30	-0.22	0.65	0.65	-0.10	-0.31	0.54	-0.24	-0.09	1.00	0.36	-0.03	0.66
CMPS	0.60	0.03	-0.41	0.45	-0.33	-0.44	0.48	0.19	0.04	0.19	0.25	0.44	0.01	-0.38	-0.02	0.55	-0.58	0.72	0.60	-0.06	-0.06	-0.07	0.23	0.22	0.36	1.00	0.12	0.31
EQ	0.18	0.15	0.03	0.26	-0.35	-0.46	0.31	-0.07	-0.25	-0.12	0.14	-0.09	-0.12	0.14	-0.25	0.20	-0.16	0.34	0.38	-0.06	-0.13	-0.01	-0.06	-0.24	-0.03	0.12	1.00	0.49
SL	0.72	-0.23	-0.09	0.80	-0.83	-0.74	0.73	-0.55	-0.66	-0.19	0.66	-0.02	0.04	-0.22	0.33	0.42	-0.33	0.75	0.83	0.19	-0.05	0.49	-0.55	-0.34	0.66	0.31	0.49	1.00

Appendix D: Communalities

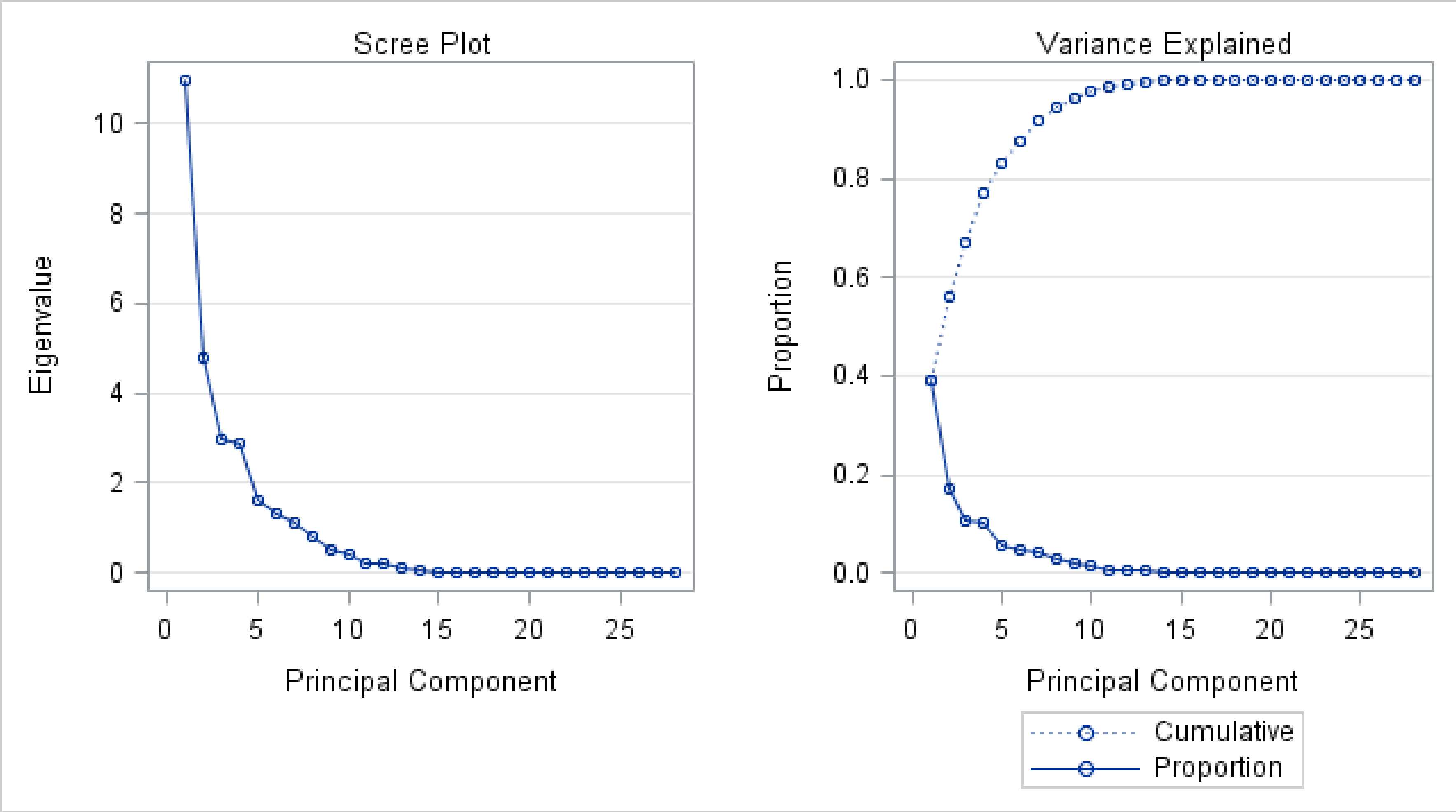
Variables	Initial	Extraction
2014 Human Development Index (HDI)	1.00	0.96
HDI Rank Change between 2009 & 2014	1.00	0.88
Average Annual HDI Growth between 1990 & 2014	1.00	0.93
2014 Inequality-adjusted HDI Value	1.00	0.98
Coefficient of Human Inequality	1.00	0.99
Inequality in Education	1.00	0.89
Inequality-adjusted Education Index	1.00	0.99
Inequality in Income	1.00	0.97
Income Inequality Gini Coefficient	1.00	0.94
Public Expenditure on Education	1.00	0.92
Per Capita GDP	1.00	0.89
Gross Fixed Capital Formation	1.00	0.95
Total General Government Final Consumption Expenditure	1.00	0.83
Average Annual Growth of General Government Final Consumption Expenditure	1.00	0.92
Research and Development Expenditure	1.00	0.82
Fossil Fuels Primary Energy Supply	1.00	0.88
Renewable Sources Primary Energy Supply	1.00	0.87
Total Electrification Rate	1.00	0.97
Rural Electrification Rate	1.00	0.96
Employment to Population Ratio	1.00	0.87
Labour Force Participation Rate	1.00	0.90
Labour Force with Tertiary Education	1.00	0.95
Youth Unemployment	1.00	0.90
Youth not in School or Employment	1.00	0.85
Internet Users Communication	1.00	0.95
Mobile Phone Subscription Communication	1.00	0.92
Quality of Education	1.00	0.83
Standard of Living	1.00	0.93

Appendix E: Eigenvalues and Cumulative Principal Components Matrix

Eigenvalues of the Correlation Matrix

PC	Eigenvalue	Difference	Proportion	Cumulative
1	10.96	6.18	0.39	0.39
2	4.78	1.82	0.17	0.56
3	2.96	0.10	0.11	0.67
4	2.86	1.23	0.10	0.77
5	1.64	0.32	0.06	0.83
6	1.31	0.18	0.05	0.88
7	1.13	0.33	0.04	0.92
8	0.80	0.27	0.03	0.94
9	0.53	0.12	0.02	0.96
10	0.41	0.20	0.01	0.98
11	0.21	0.01	0.01	0.99
12	0.19	0.08	0.01	0.99
13	0.11	0.03	0.00	1.00
14	0.09	0.09	0.00	1.00
15	0.00	0.00	0.00	1.00

Appendix F: Scree Plot and Variance Explained



Appendix G: Eigenvector

	Prin1	*Prin2*	*Prin3*	*Prin4*	*Prin5*	*Prin6*	*Prin7*
2014 Human Development Index (HDI)	0.28	0.10	0.05	-0.02	0.09	-0.06	-0.01
HDI Rank Change between 2009 & 2014	-0.10	0.16	-0.27	0.37	0.03	-0.14	-0.09
Average Annual HDI Growth between 1990 & 2014	-0.11	-0.28	0.13	0.30	-0.19	0.10	-0.22
2014 Inequality-adjusted HDI Value	0.30	0.01	-0.03	0.01	0.03	-0.10	0.01
Coefficient of Human Inequality	-0.29	0.08	0.09	-0.09	0.00	0.09	0.00
Inequality in Education	-0.25	-0.06	0.06	-0.13	0.11	0.13	-0.23
Inequality-adjusted Education Index	0.28	0.11	-0.02	0.01	-0.09	-0.15	0.12
Inequality in Income	-0.19	0.29	0.20	0.03	0.03	0.16	0.17
Income Inequality Gini Coefficient	-0.21	0.28	0.17	-0.01	-0.03	-0.01	-0.04
Public Expenditure on Education	-0.07	0.06	0.41	-0.20	0.08	0.38	0.20
Per Capita GDP	0.25	0.02	0.10	-0.17	-0.14	-0.09	0.18
Gross Fixed Capital Formation	0.09	-0.03	0.20	0.10	0.52	-0.43	0.09
Total General Government Final Consumption Expenditure	0.02	0.19	0.20	-0.03	-0.48	-0.29	0.21
Average Annual Growth of General Government Final Consumption Expenditure	-0.13	-0.20	0.13	0.37	-0.22	-0.13	-0.01
Research and Development Expenditure	0.15	-0.04	0.24	-0.22	-0.15	-0.12	-0.41
Fossil Fuels Primary Energy Supply	0.17	0.16	0.27	0.24	-0.18	-0.05	-0.12
Renewable Sources Primary Energy Supply	-0.14	-0.18	-0.31	-0.25	0.12	0.06	0.09
Total Electrification Rate	0.24	0.14	-0.04	0.16	0.15	0.24	-0.19
Rural Electrification Rate	0.25	0.08	-0.05	0.19	0.06	0.23	-0.20
Employment to Population Ratio	0.01	-0.33	0.28	0.16	0.18	0.03	0.00
Labour Force Participation Rate	-0.06	-0.25	0.39	0.15	0.12	-0.01	0.14
Labour Force with Tertiary Education	0.17	-0.25	0.16	-0.27	-0.07	0.07	0.20
Youth Unemployment	-0.12	0.36	0.01	-0.02	0.09	-0.22	0.18
Youth not in School or Employment	-0.12	0.32	0.13	0.00	-0.12	0.19	-0.26
Internet Users Communication	0.25	0.05	0.00	-0.26	0.01	0.10	-0.18
Mobile Phone Subscription Communication	0.14	0.25	0.15	0.15	0.39	0.17	0.03
Quality of Education	0.09	0.01	-0.16	0.28	-0.12	0.32	0.51
Standard of Living	0.26	-0.06	-0.04	0.10	-0.15	0.30	0.05

Appendix H: Principal Components Matrix

Variables	*Prin1*	*Prin2*	*Prin3*	*Prin4*	*Prin5*	*Prin6*	*Prin7*
2014 Human Development Index (HDI)	0.94	0.21	0.09	-0.03	0.12	-0.07	-0.01
HDI Rank Change between 2009 & 2014	-0.34	0.35	-0.46	0.62	0.04	-0.16	-0.10
Average Annual HDI Growth between 1990 & 2014	-0.35	-0.60	0.23	0.51	-0.24	0.11	-0.24
2014 Inequality-adjusted HDI Value	0.98	0.02	-0.05	0.02	0.04	-0.11	0.01
Coefficient of Human Inequality	-0.95	0.18	0.16	-0.16	0.01	0.11	0.00
Inequality in Education	-0.84	-0.14	0.10	-0.23	0.13	0.14	-0.24
Inequality-adjusted Education Index	0.94	0.24	-0.03	0.01	-0.11	-0.17	0.12
Inequality in Income	-0.63	0.63	0.34	0.06	0.04	0.18	0.18
Income Inequality Gini Coefficient	-0.68	0.62	0.30	-0.01	-0.03	-0.01	-0.04
Public Expenditure on Education	-0.23	0.13	0.70	-0.33	0.10	0.43	0.21
Per Capita GDP	0.84	0.04	0.18	-0.29	-0.18	-0.10	0.19
Gross Fixed Capital Formation	0.31	-0.06	0.35	0.16	0.67	-0.49	0.09
Total General Government Final Consumption Expenditure	0.06	0.42	0.34	-0.06	-0.61	-0.33	0.22
Average Annual Growth of General Government Final Consumption Expenditure	-0.42	-0.45	0.22	0.63	-0.28	-0.15	-0.01
Research and Development Expenditure	0.50	-0.09	0.42	-0.37	-0.19	-0.13	-0.44
Fossil Fuels Primary Energy Supply	0.55	0.36	0.47	0.41	-0.22	-0.06	-0.13
Renewable Sources Primary Energy Supply	-0.48	-0.38	-0.53	-0.42	0.16	0.07	0.10
Total Electrification Rate	0.81	0.31	-0.07	0.27	0.19	0.27	-0.20
Rural Electrification Rate	0.84	0.18	-0.08	0.32	0.07	0.26	-0.22
Employment to Population Ratio	0.05	-0.71	0.48	0.28	0.23	0.03	0.00
Labour Force Participation Rate	-0.19	-0.56	0.67	0.26	0.15	-0.02	0.15
Labour Force with Tertiary Education	0.56	-0.54	0.28	-0.45	-0.09	0.08	0.21
Youth Unemployment	-0.39	0.79	0.02	-0.03	0.12	-0.25	0.19
Youth not in School or Employment	-0.39	0.70	0.23	0.00	-0.16	0.22	-0.27
Internet Users Communication	0.83	0.12	0.01	-0.45	0.01	0.12	-0.19
Mobile Phone Subscription Communication	0.46	0.54	0.26	0.25	0.50	0.19	0.04
Quality of Education	0.29	0.02	-0.27	0.47	-0.15	0.37	0.55
Standard of Living	0.85	-0.14	-0.06	0.16	-0.19	0.34	0.05

Appendix I: Rotated Principal Components Matrix

Variables	*Prin1*	*Prin2*	*Prin3*	*Prin4*	*Prin5*	*Prin6*	*Prin7*
2014 Human Development Index (HDI)	0.81	-0.30	-0.32	0.22	0.11	0.23	-0.07
HDI Rank Change between 2009 & 2014	-0.02	0.18	0.02	-0.89	-0.03	-0.02	0.20
Average Annual HDI Growth between 1990 & 2014	-0.16	-0.08	0.90	-0.13	-0.09	-0.23	-0.05
2014 Inequality-adjusted HDI Value	0.75	-0.53	-0.25	0.16	0.12	0.17	-0.02
Coefficient of Human Inequality	-0.69	0.69	0.10	-0.07	-0.07	-0.10	-0.04
Inequality in Education	-0.69	0.43	0.20	0.00	-0.33	-0.12	-0.25
Inequality-adjusted Education Index	0.75	-0.39	-0.36	0.12	0.34	0.12	0.05
Inequality in Income	-0.20	0.94	-0.03	-0.07	0.11	0.04	0.17
Income Inequality Gini Coefficient	-0.28	0.89	-0.05	-0.19	0.18	0.01	-0.10
Public Expenditure on Education	-0.08	0.64	0.11	0.70	-0.05	0.05	0.05
Per Capita GDP	0.53	-0.37	-0.29	0.49	0.37	0.08	-0.03
Gross Fixed Capital Formation	0.24	-0.12	0.10	0.03	-0.04	0.92	-0.13
Total General Government Final Consumption Expenditure	0.11	0.26	-0.07	0.07	0.86	-0.09	-0.04
Average Annual Growth of General Government Final Consumption Expenditure	-0.22	-0.02	0.86	-0.29	0.18	-0.05	0.10
Research and Development Expenditure	0.36	-0.18	-0.01	0.44	0.19	-0.06	-0.65
Fossil Fuels Primary Energy Supply	0.81	0.16	0.19	-0.01	0.40	0.06	-0.10
Renewable Sources Primary Energy Supply	-0.77	-0.25	-0.22	0.00	-0.39	-0.13	0.09
Total Electrification Rate	0.93	-0.12	-0.21	-0.05	-0.22	0.01	0.05
Rural Electrification Rate	0.93	-0.24	-0.11	-0.04	-0.17	-0.07	0.05
Employment to Population Ratio	0.01	-0.24	0.76	0.31	-0.21	0.30	-0.02
Labour Force Participation Rate	-0.14	0.05	0.80	0.35	-0.02	0.35	0.03
Labour Force with Tertiary Education	0.12	-0.53	0.04	0.81	0.08	0.04	-0.04
Youth Unemployment	-0.14	0.67	-0.42	-0.33	0.28	0.26	0.07
Youth not in School or Employment	0.06	0.83	-0.13	-0.17	0.08	-0.27	-0.19
Internet Users Communication	0.59	-0.31	-0.48	0.44	-0.03	-0.07	-0.27
Mobile Phone Subscription Communication	0.73	0.35	-0.19	0.02	-0.20	0.41	0.14
Quality of Education	0.33	-0.16	0.05	-0.08	0.04	-0.17	0.82
Standard of Living	0.74	-0.46	0.00	0.26	-0.02	-0.24	0.23

Appendix J: Component Transformation Matrix

Component	***Prin1***	***Prin2***	***Prin3***	***Prin4***	***Prin5***	***Prin6***	***Prin7***
Prin1	0.79	-0.50	-0.22	0.25	0.09	0.09	-0.01
Prin2	0.33	0.67	-0.56	-0.28	0.23	0.02	0.02
Prin3	0.20	0.46	0.49	0.54	0.26	0.29	-0.25
Prin4	0.38	0.05	0.60	-0.60	0.00	0.08	0.35
Prin5	0.02	0.09	-0.14	-0.02	-0.67	0.72	0.01
Prin6	0.22	0.29	0.06	0.35	-0.56	-0.55	0.37
Prin7	-0.20	-0.03	-0.11	0.28	0.33	0.29	0.82

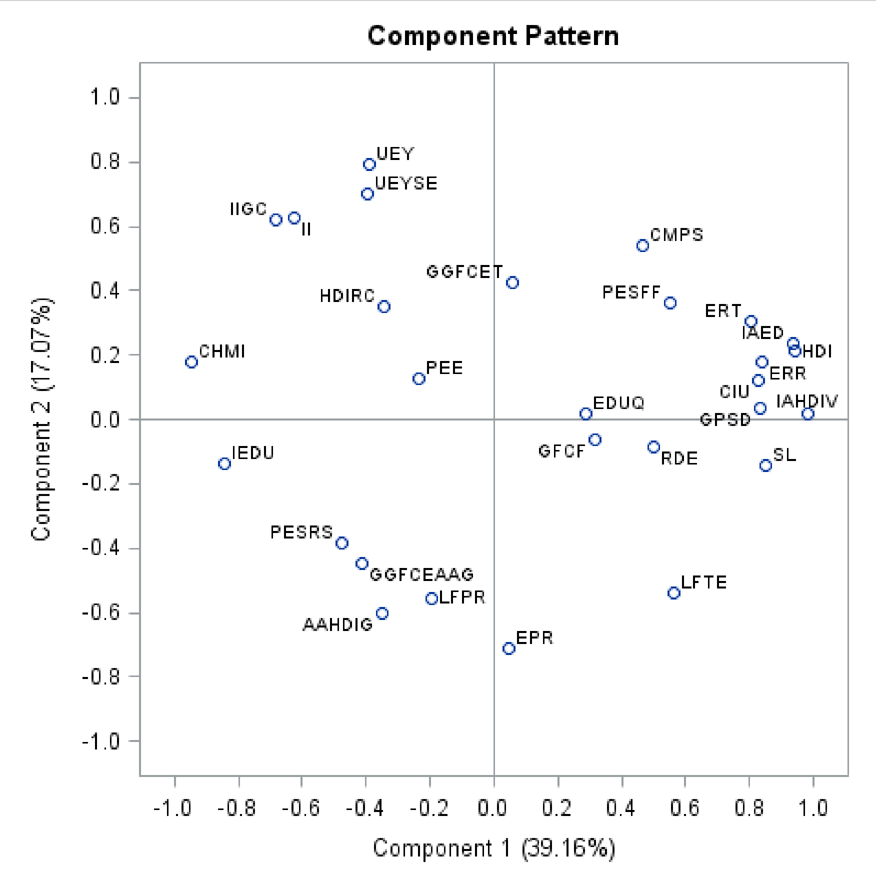
Appendix K: Component Principle Score Coefficient Matrix by Variable

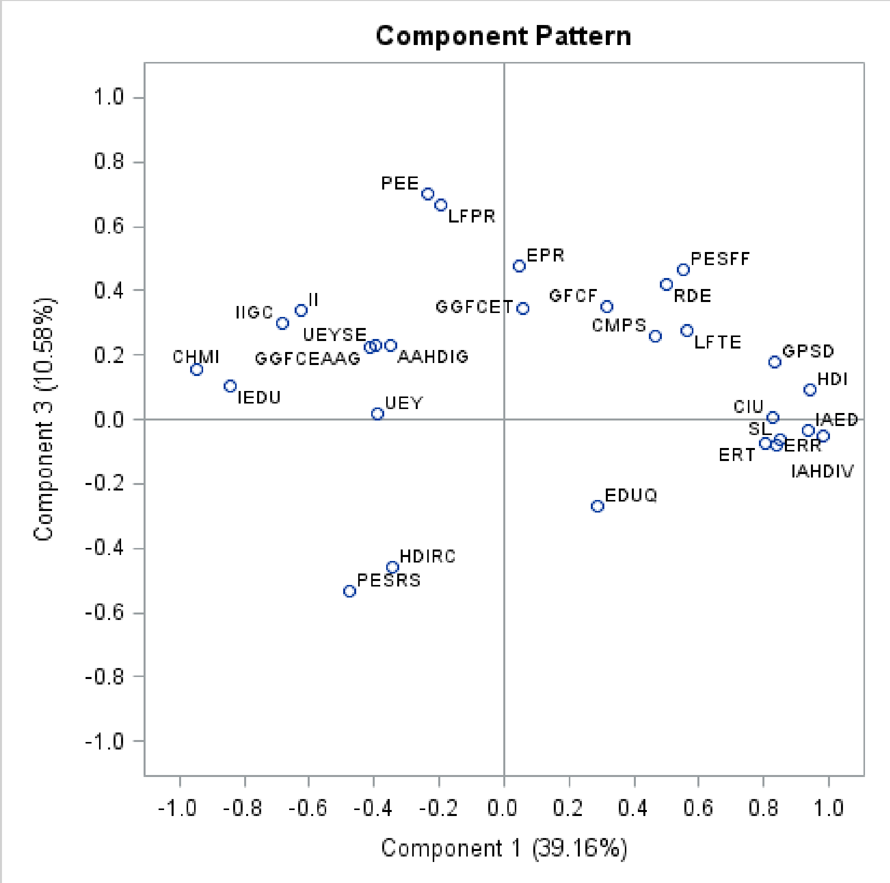
Variables	***Prin1***	***Prin2***	***Prin3***	***Prin4***	***Prin5***	***Prin6***	***Prin7***
2014 Human Development Index (HDI)	0.08	-0.01	-0.05	0.01	0.00	0.10	-0.04
HDI Rank Change between 2009 & 2014	0.04	-0.03	0.02	-0.31	0.00	0.03	0.00
Average Annual HDI Growth between 1990 & 2014	0.08	-0.01	0.27	-0.06	-0.03	-0.18	-0.10
2014 Inequality-adjusted HDI Value	0.05	-0.07	-0.03	-0.02	0.04	0.07	-0.02
Coefficient of Human Inequality	-0.05	0.11	0.00	0.06	-0.03	-0.04	0.00
Inequality in Education	-0.03	0.08	0.02	0.03	-0.19	-0.07	-0.17
Inequality-adjusted Education Index	0.03	-0.06	-0.06	-0.01	0.17	0.06	0.05
Inequality in Income	0.03	0.21	-0.01	0.09	0.01	0.02	0.17
Income Inequality Gini Coefficient	0.02	0.16	0.00	-0.01	0.06	0.01	-0.05
Public Expenditure on Education	0.03	0.23	0.03	0.35	-0.10	-0.03	0.18
Per Capita GDP	-0.02	-0.05	-0.06	0.13	0.20	0.02	0.06
Gross Fixed Capital Formation	-0.03	-0.04	0.00	-0.08	-0.01	0.57	-0.08
Total General Government Final Consumption Expenditure	-0.05	0.00	0.01	0.02	0.50	-0.04	0.03
Average Annual Growth of General Government Final Consumption Expenditure	0.01	-0.04	0.25	-0.11	0.17	-0.03	0.01
Research and Development Expenditure	0.06	-0.01	0.05	0.03	0.05	-0.11	-0.44
Fossil Fuels Primary Energy Supply	0.16	0.08	0.14	-0.05	0.14	-0.04	-0.10
Renewable Sources Primary Energy Supply	-0.15	-0.10	-0.14	0.04	-0.14	-0.01	0.08
Total Electrification Rate	0.19	0.07	0.01	-0.05	-0.23	-0.07	-0.03
Rural Electrification Rate	0.19	0.05	0.04	-0.06	-0.19	-0.12	-0.04
Employment to Population Ratio	0.03	0.00	0.20	0.08	-0.10	0.14	0.00
Labour Force Participation Rate	0.00	0.04	0.20	0.13	0.02	0.18	0.08
Labour Force with Tertiary Education	-0.06	-0.06	-0.01	0.27	0.07	0.00	0.09
Youth Unemployment	-0.05	0.08	-0.13	-0.07	0.15	0.20	0.07
Youth not in School or Employment	0.12	0.20	0.01	-0.02	-0.06	-0.21	-0.16
Internet Users Communication	0.06	0.00	-0.10	0.09	-0.10	-0.10	-0.16
Mobile Phone Subscription Communication	0.15	0.16	-0.02	0.03	-0.22	0.19	0.09
Quality of Education	0.03	0.01	0.02	0.09	0.04	-0.09	0.58
Standard of Living	0.12	0.00	0.05	0.09	-0.06	-0.21	0.15

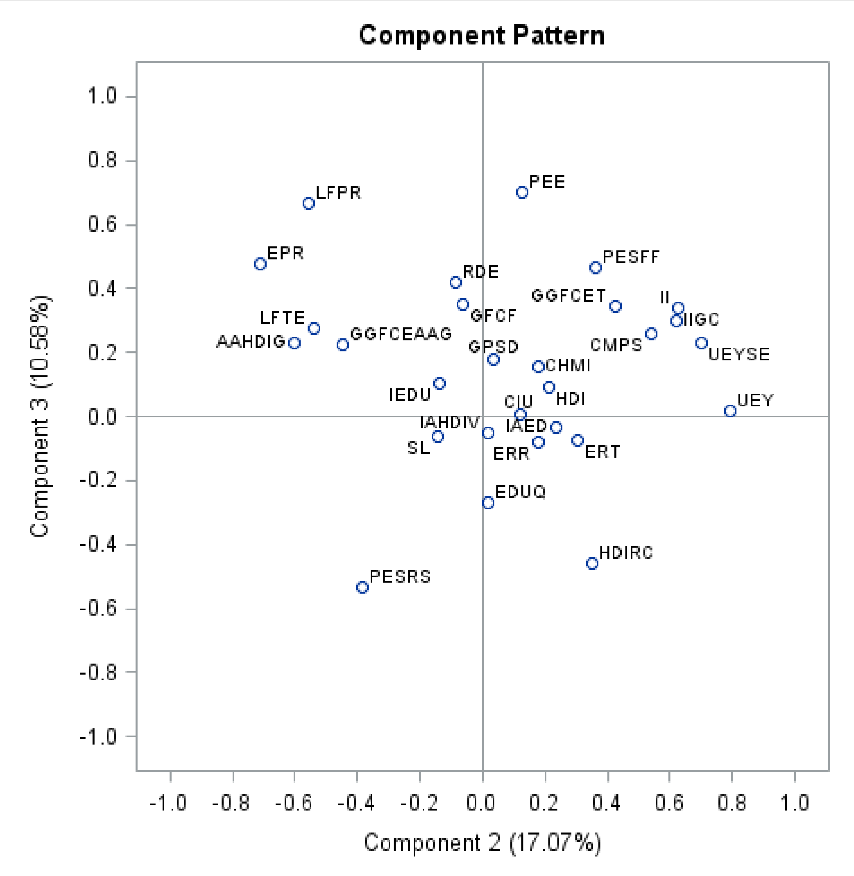
Appendix L: Component Principle Score Coefficient Ranked per Country

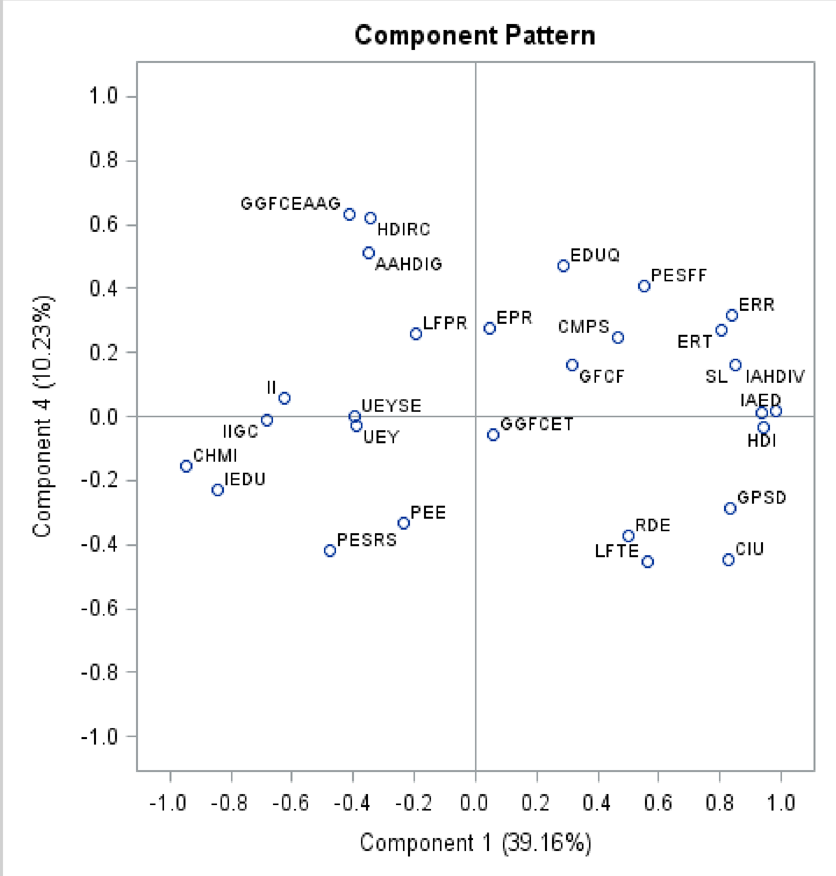
Country	*Prin1*	*Country*	*Prin2*	*Country*	*Prin3*	*Country*	*Prin4*	*Country*	*Prin5*	*Country*	*Prin6*	*Country*	*Prin7*
Norway	1.74	South Africa	2.89	Botswana	1.84	Sri Lanka	1.51	*Botswana*	1.45	Vietnam	1.63	Norway	1.64
Australia	1.69	Botswana	0.74	Korea	1.03	Thailand	1.49	*Congo*	1.27	Thailand	1.34	Botswana	1.47
Poland	1.08	Brazil	0.59	Malawi	1.01	Vietnam	1.43	*Vietnam*	0.83	Nigeria	1.04	Kenya	0.9
Korea	0.92	Poland	0.35	Thailand	0.41	Malawi	0.92	*Nigeria*	0.65	Swaziland	0.88	Thailand	0.68
Thailand	0.27	Swaziland	0.23	Australia	0.38	South Africa	0.5	*Thailand*	0.6	Brazil	0.56	Swaziland	0.61
Vietnam	0.26	Australia	0.07	Vietnam	0.35	Brazil	0.19	*Sri Lanka*	0.59	Kenya	0.3	Australia	0.31
Sri Lanka	0.25	Korea	-0.03	Brazil	0.19	Poland	017	*Kenya*	0.33	Norway	0.19	Sri Lanka	0.26
Brazil	-0.07	Sri Lanka	-0.14	Congo	0.09	Botswana	-0.08	*Korea*	0.11	Poland	0.07	South Africa	-0.12
Congo	-0.52	Thailand	-0.21	South Africa	-0.15	Swaziland	-0.38	*Australia*	-0.08	South Africa	-0.1	Malawi	-0.3
South Africa	-0.58	Nigeria	-0.4	Norway	-0.16	Australia	-0.48	*Brazil*	-0.09	Korea	-0.28	Vietnam	-0.39
Swaziland	-0.82	Congo	-0.45	Swaziland	-0.28	Congo	-0.67	*Poland*	-0.55	Botswana	-0.57	Congo	-0.44
Botswana	-0.84	Norway	-0.48	Poland	-0.4	Korea	-0.91	*South Africa*	-0.55	Australia	-0.76	Poland	-0.55
Kenya	-0.92	Kenya	-0.52	Kenya	-0.51	Norway	-0.97	*Norway*	-0.77	Malawi	-1.3	Nigeria	-0.72
Nigeria	-1.14	Vietnam	-1.07	Nigeria	-1.46	Nigeria	-1.31	*Malawi*	-1.87	Congo	-1.36	Brazil	-1.23
Malawi	-1.32	Malawi	-1.58	Sri Lanka	-2.32	Kenya	-1.4	*Swaziland*	-1.91	Sri Lanka	-1.64	Korea	-2.13

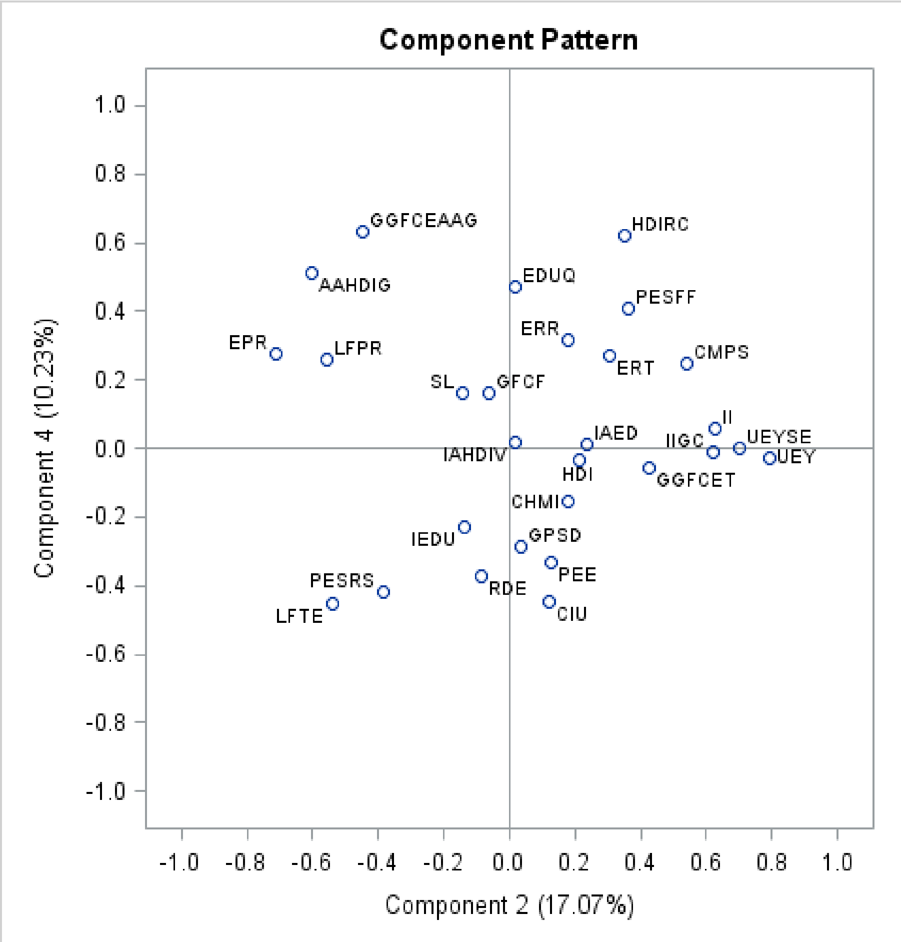
Appendix M: Principle Component Pattern

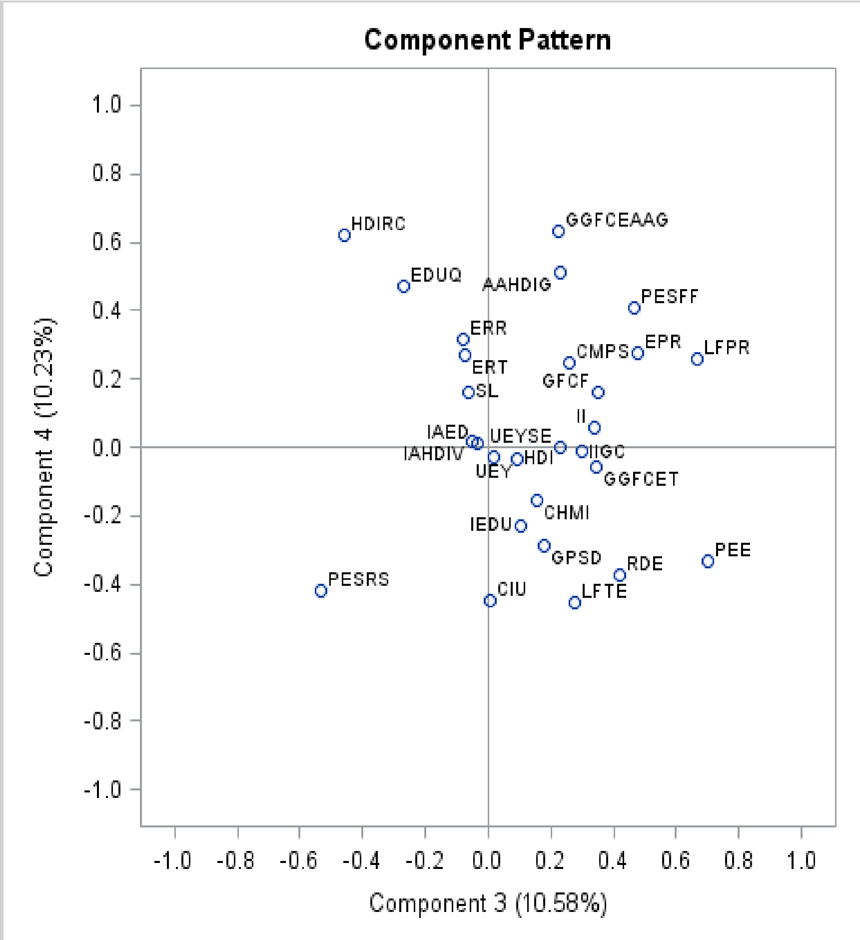


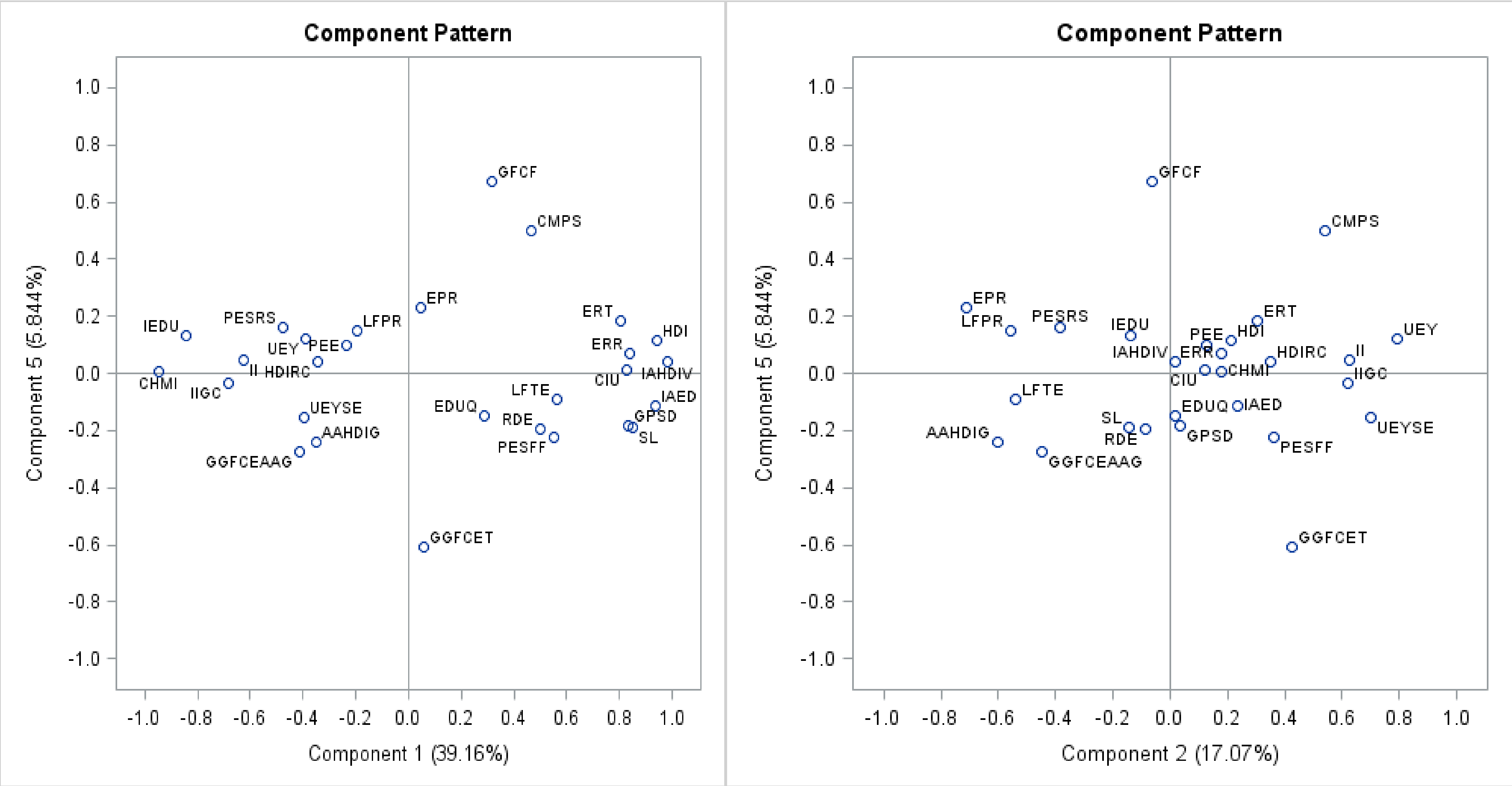


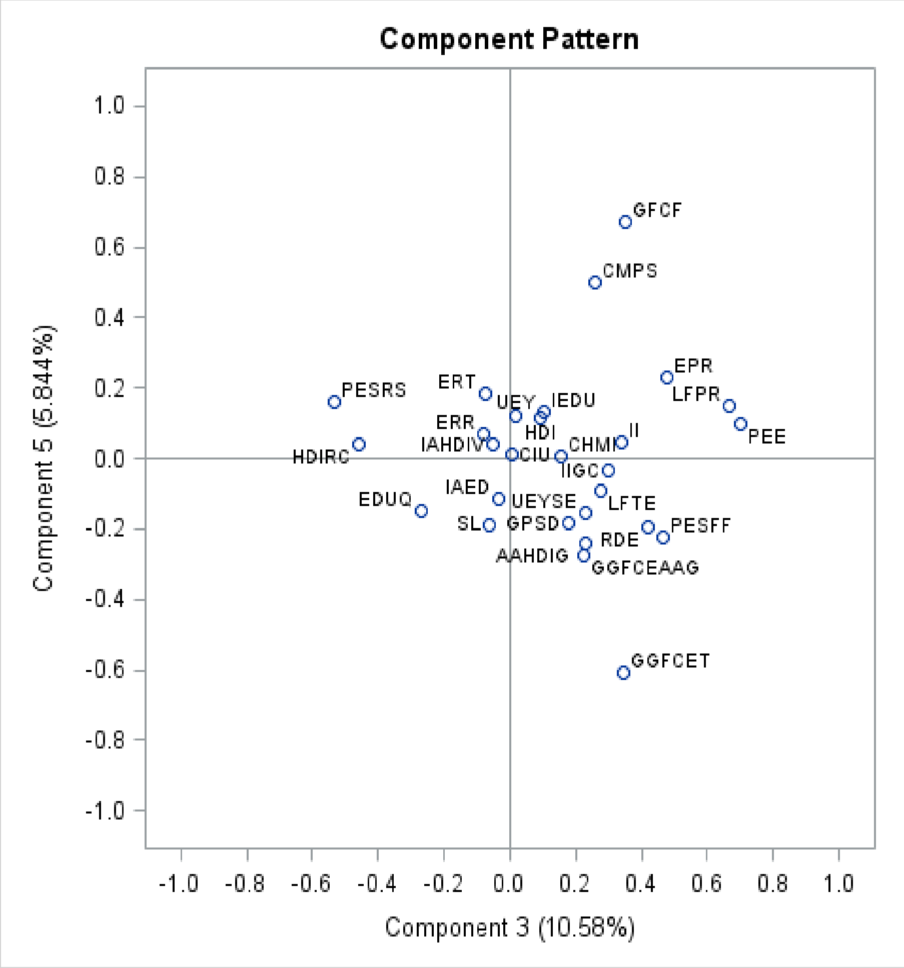

Component Pattern
Component 3 (10.58%)
Component 2 (17.07%)
LFPR
PEE
EPR
PESFF
RDE
GGFCET
II
LFTE
GFCF
IIGC
AAHDIG
GGFCEAAG
GPSD
CMPS
UEYSE
CHMI
IEDU
HDI
CIU
UEY
IAHDIV
IAED
SL
ERR
ERT
EDUQ
HDIRC
PESRS

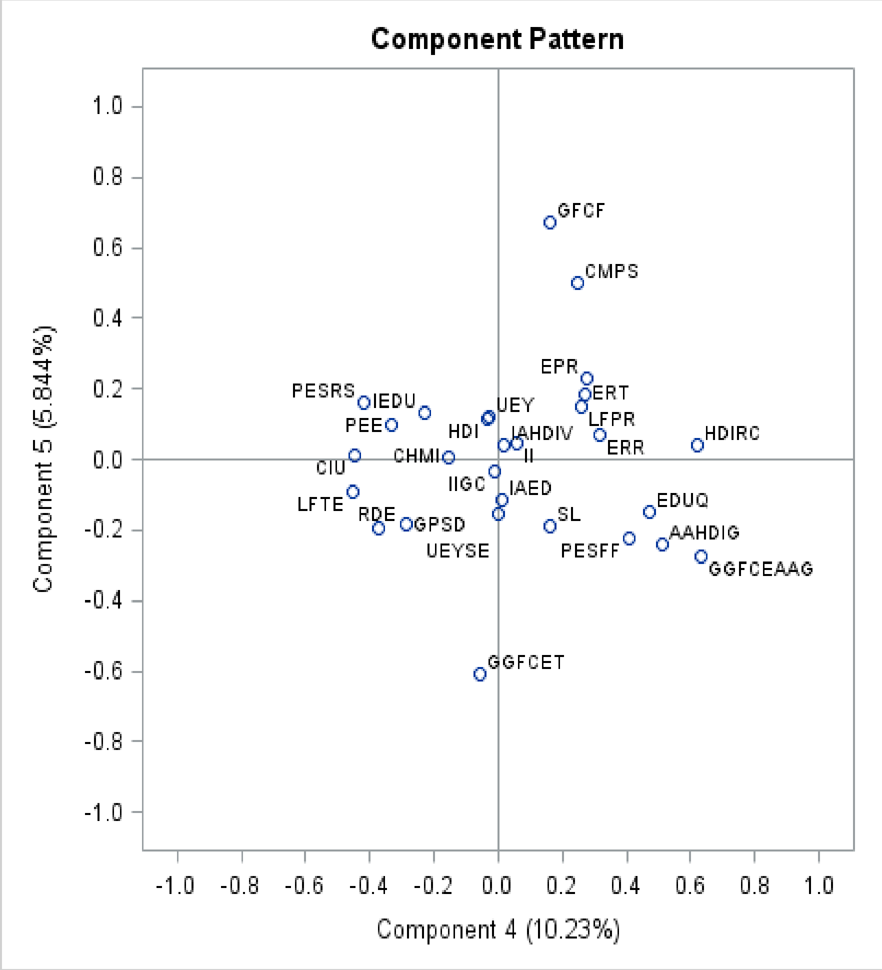

Component Pattern
Component 4 (10.23%)
Component 1 (39.16%)
GGFCEAAG
HDIRC
AAHDIG
EDUQ
PESFF
ERR
LFPR
EPR
CMPS
ERT
GFCF
SL
IAHDIV
II
UEYSE
IAED
IIGC
GGFCET
UEY
HDI
CHMI
IEDU
GPSD
PEE
RDE
PESRS
LFTE
CIU


Component Pattern
Component 4 (10.23%)
Component 2 (17.07%)
GGFCEAAG
HDIRC
AAHDIG
EDUQ
PESFF
EPR
LFPR
ERR
ERT
CMPS
SL
GFCF
II
IAED
IIGC
UEYSE
IAHDIV
UEY
HDI
GGFCET
CHMI
IEDU
GPSD
PESRS
RDE
PEE
LFTE
CIU

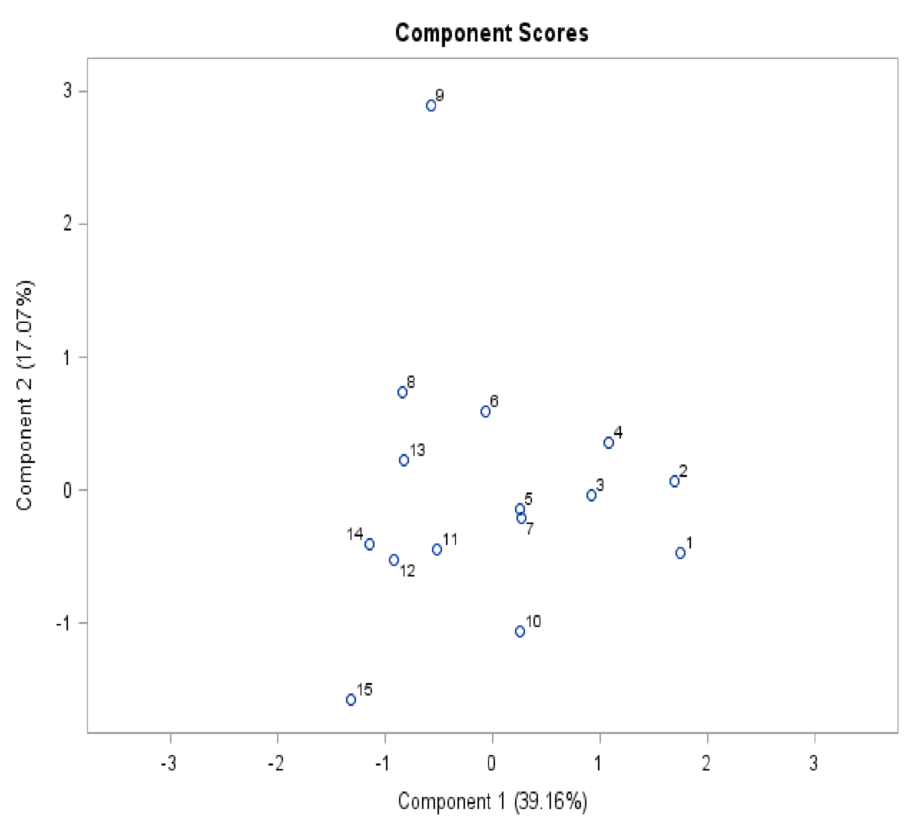

Component Pattern
Component 4 (10.23%)
Component 3 (10.58%)
HDIRC
GGFCEAAG
EDUQ
AAHDIG
PESFF
ERR
CMPS
EPR
LFPR
ERT
GFCF
SL
II
IAED
UEYSE
IAHDIV
HDI
IIGC
UEY
GGFCET
CHMI
IEDU
GPSD
PEE
RDE
PESRS
CIU
LFTE

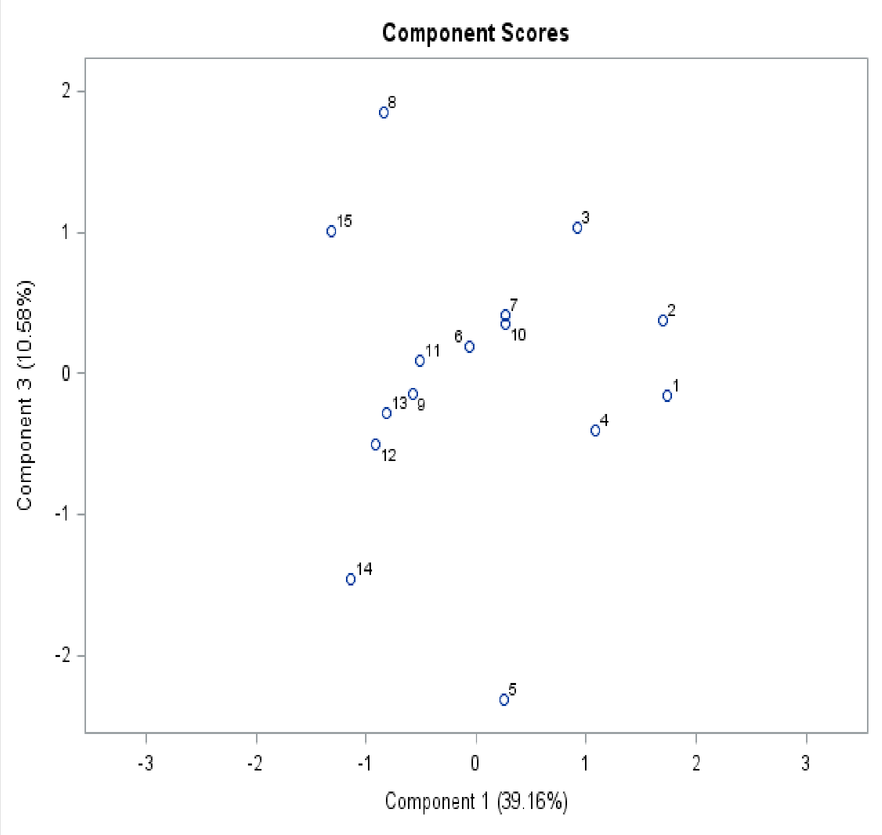

Component Pattern
Component 5 (5.844%)
Component 1 (39.16%)
GFCF
CMPS
EPR
ERT
HDI
IEDU
PESRS
LFPR
UEY
PEE
ERR
CHMI
II
HDIRC
CIU
IAHDIV
IIGC
LFTE
IAED
EDUQ
GPSD
RDE
SL
UEYSE
AAHDIG
PESFF
GGFCEAAG
GGFCET
Component Pattern
Component 5 (5.844%)
Component 2 (17.07%)
GFCF
CMPS
EPR
LFPR
PESRS
IEDU
ERT
PEE
HDI
UEY
IAHDIV
ERR
HDIRC
II
CIU
CHMI
IIGC
LFTE
EDUQ
IAED
SL
AAHDIG
RDE
GPSD
UEYSE
GGFCEAAG
PESFF
GGFCET

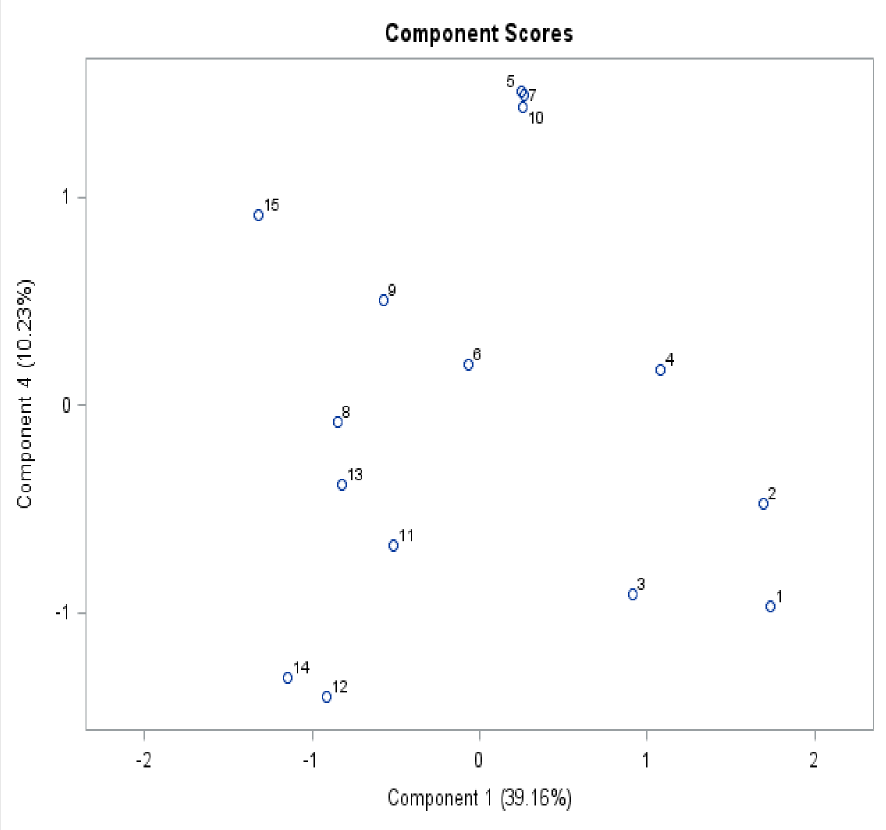

Component Pattern
Component 5 (5.844%)
Component 3 (10.58%)
GFCF
CMPS
EPR
LFPR
PEE
PESRS
ERT
UEY
IEDU
ERR
HDI
IAHDIV
II
HDIRC
CIU
CHMI
IIGC
IAED
LFTE
EDUQ
UEYSE
SL
GPSD
PESFF
RDE
AAHDIG
GGFCEAAG
GGFCET

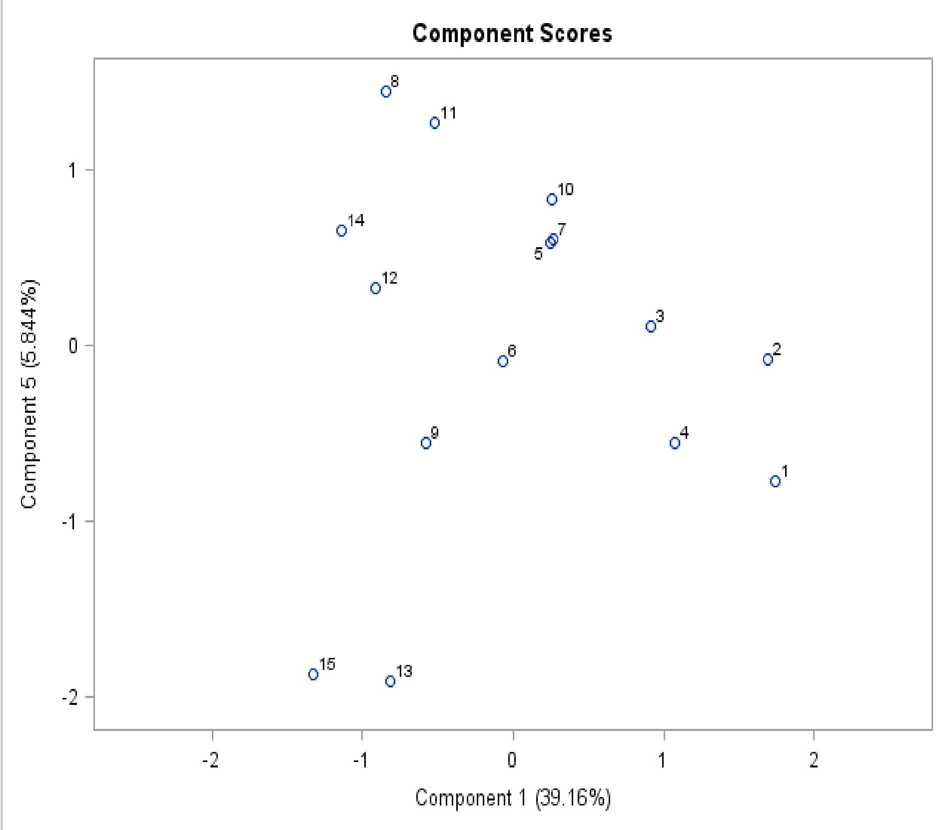

Component Pattern
Component 5 (5.844%)
Component 4 (10.23%)
GFCF
CMPS
EPR
PESRS
IEDU
UEY
ERT
LFPR
PEE
HDI
IAHDIV
ERR
HDIRC
II
CIU
CHMI
IIGC
IAED
LFTE
RDE
GPSD
SL
EDUQ
AAHDIG
UEYSE
PESFF
GGFCEAAG
GGFCET

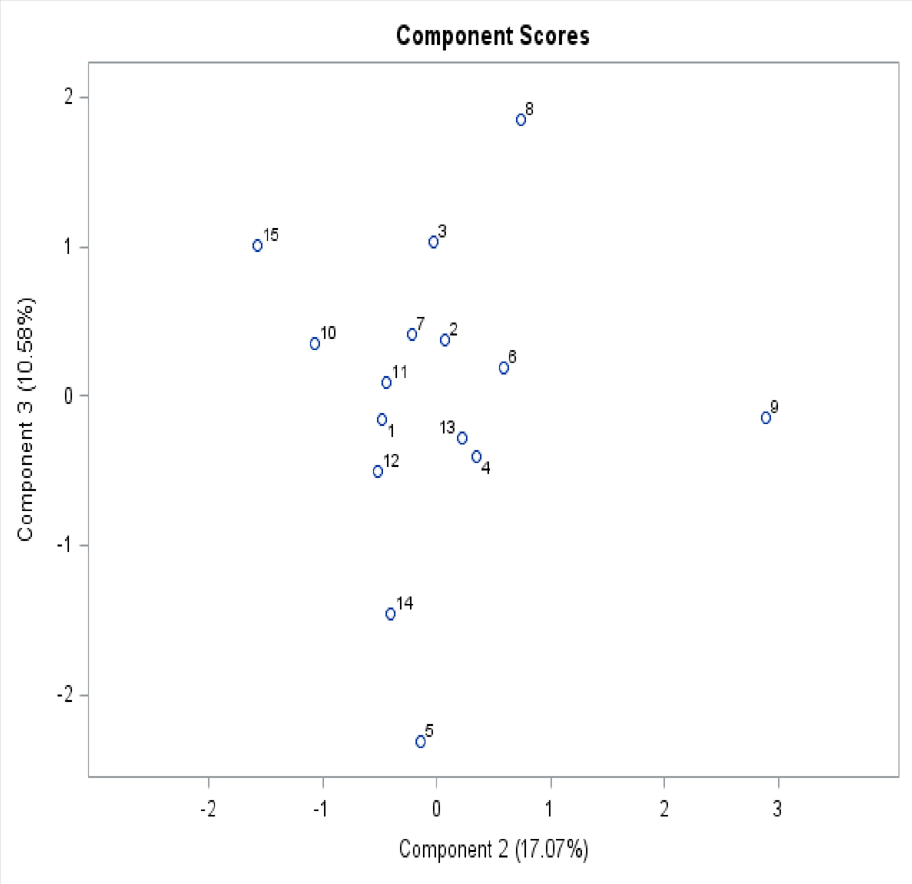
Appendix N: Scatter Diagrams

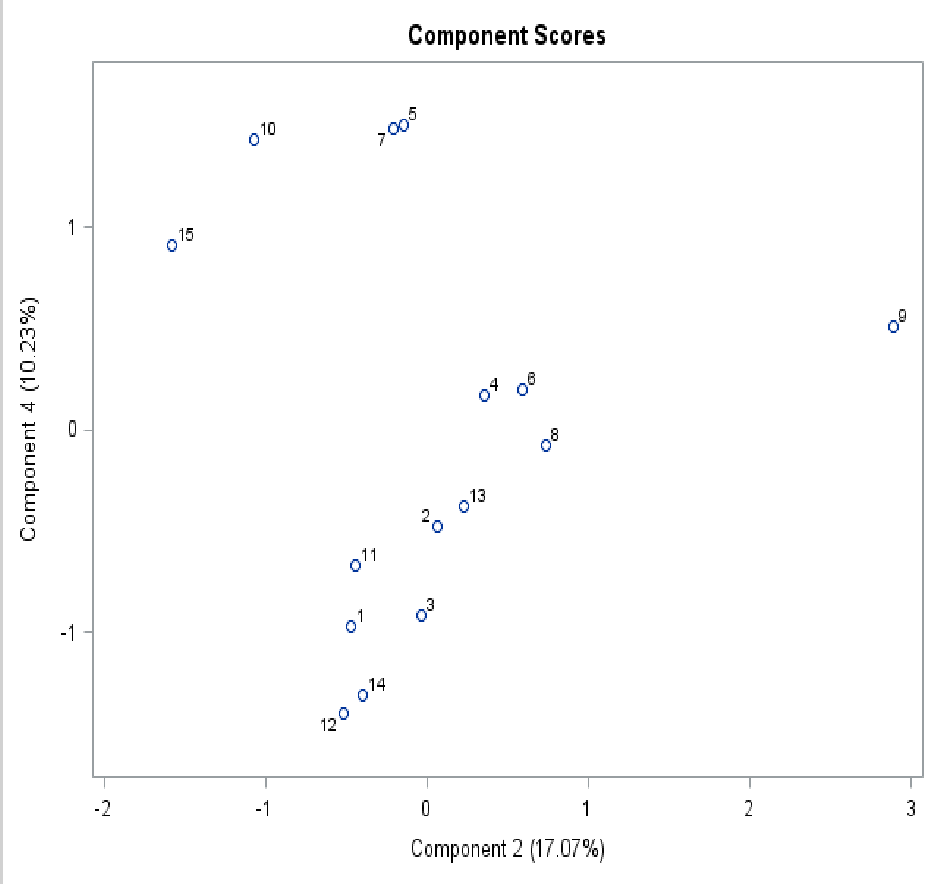


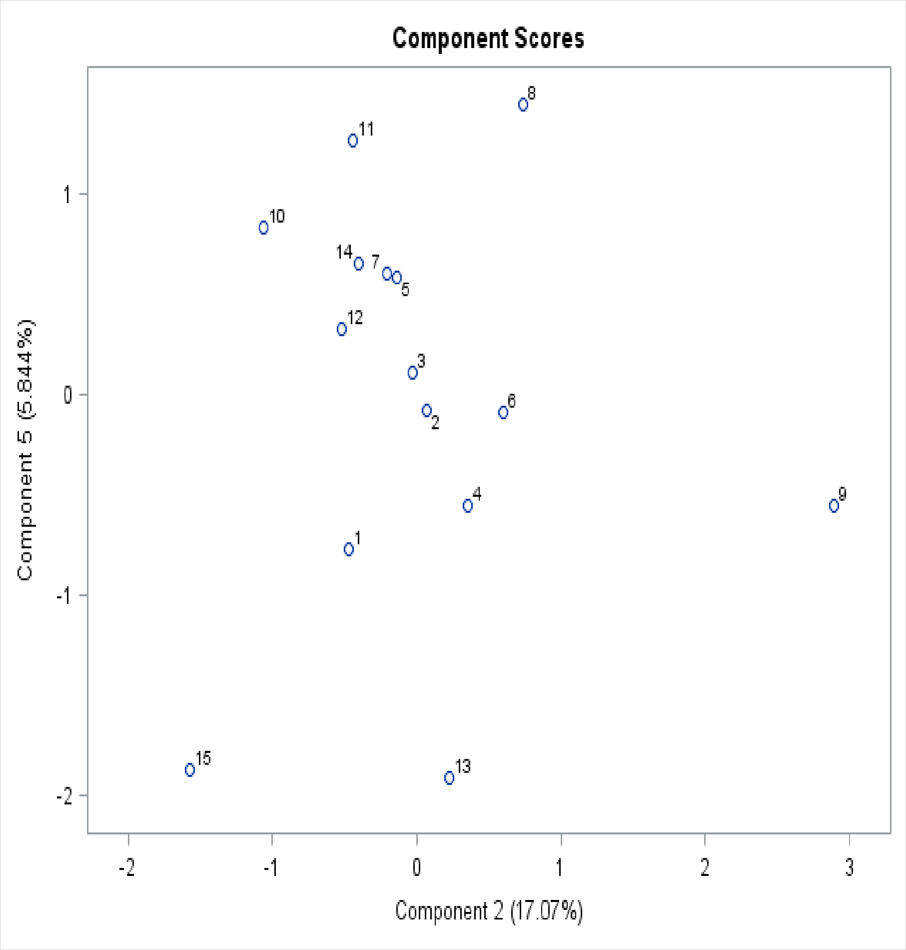


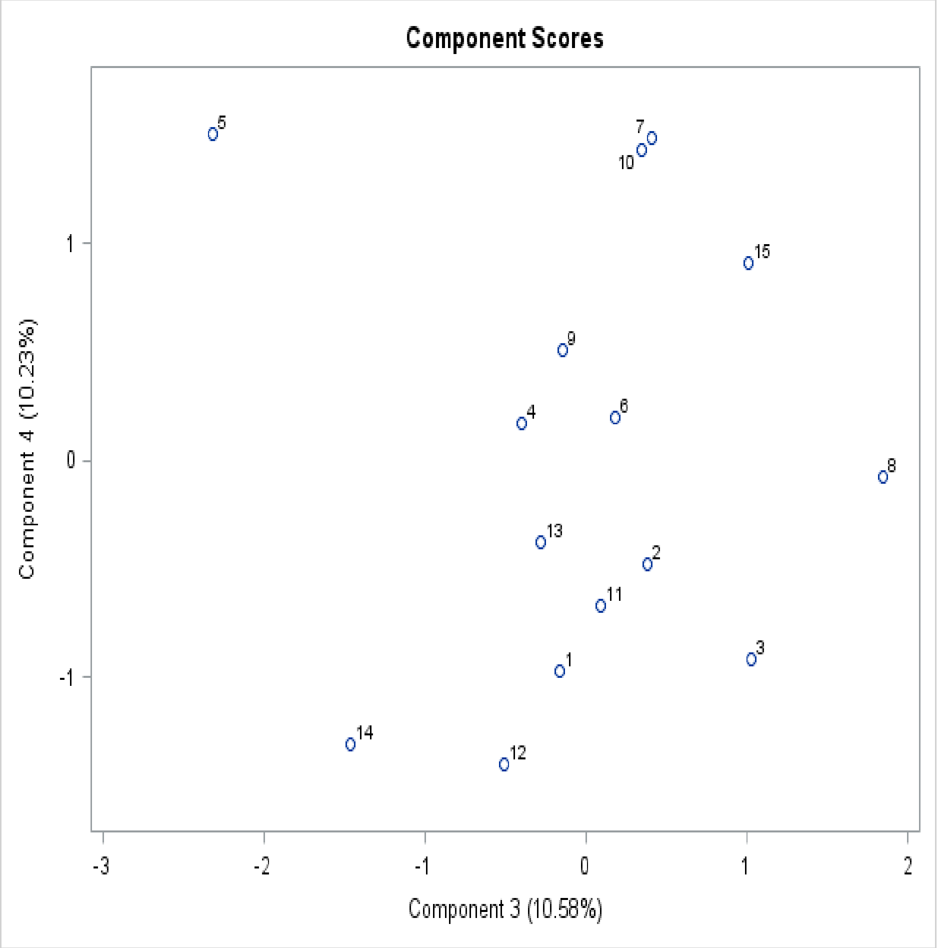

Component Scores
Component 4 (10.23%)
Component 1 (39.16%)
1
0
-1
-2
2
15
9
6
4
8
13
11
2
3
1
14
12
5
7
10

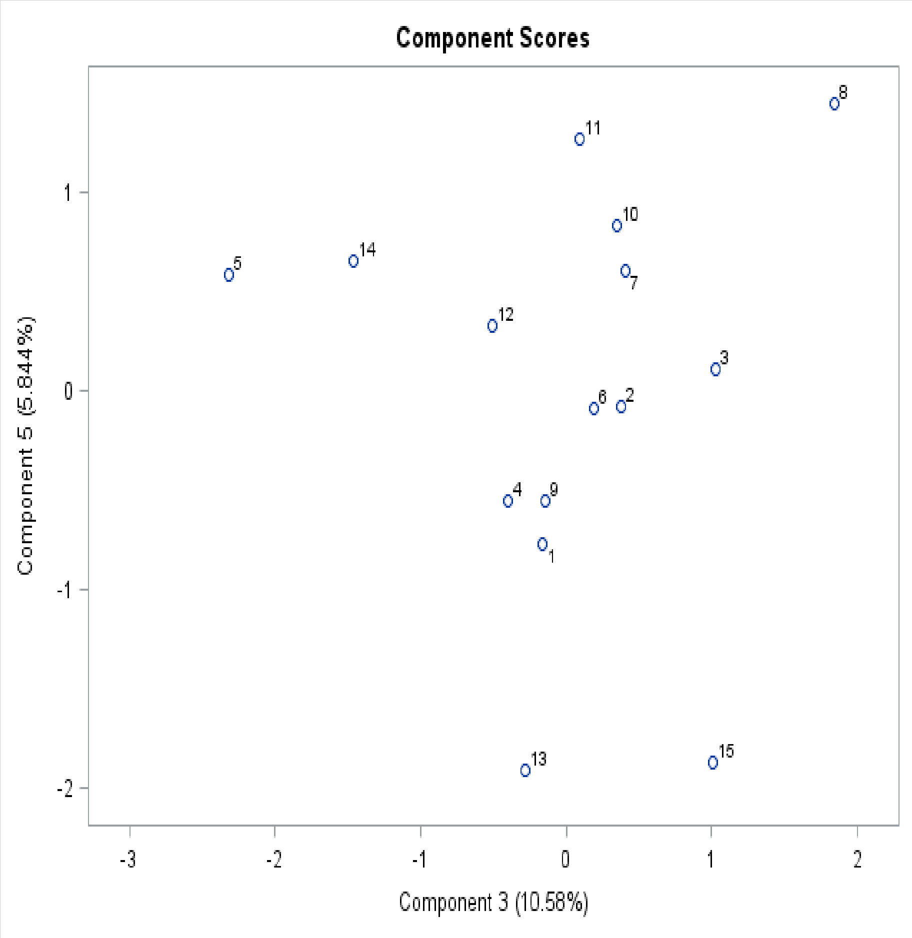

Component Scores
Component 5 (5.844%)
Component 1 (39.16%)
1
0
-1
-2
2
8
11
10
14
7
5
12
3
6
2
9
4
1
15
13

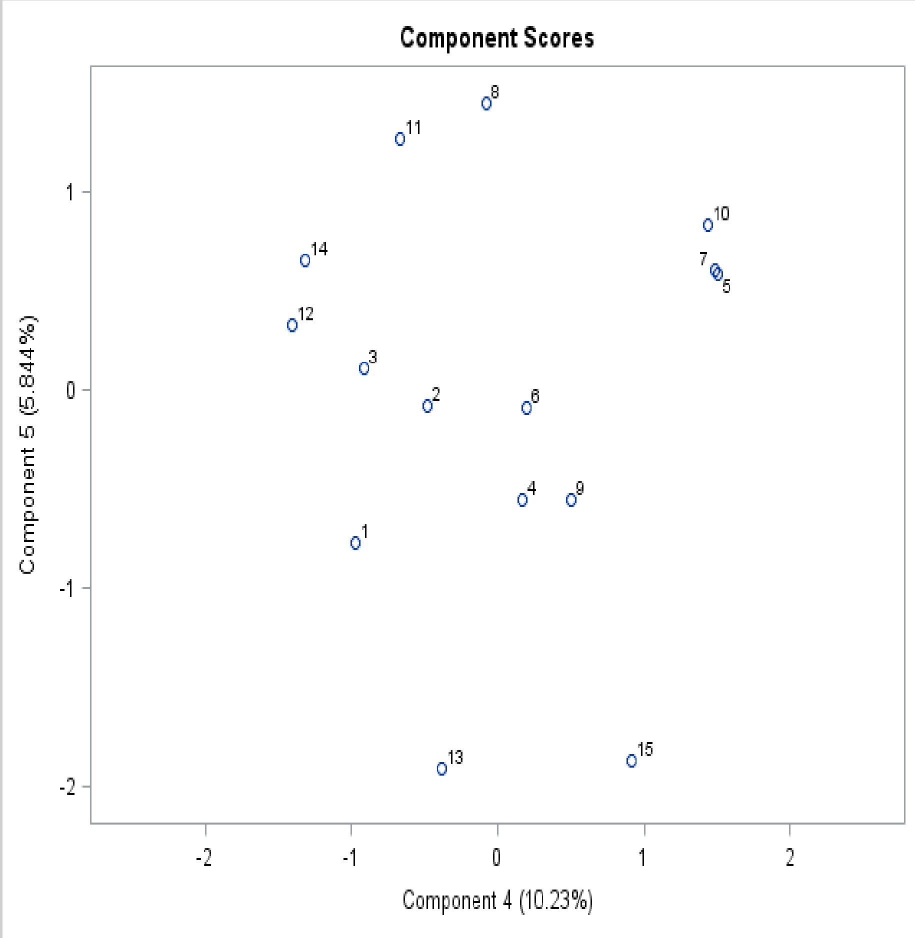

Component Scores
Component 3 (10.58%)
Component 2 (17.07%)
2
1
0
-1
-2
-2
-1
0
1
2
3
8
15
3
10
7
2
6
11
9
1
13
4
12
14
5


Component Scores
Component 4 (10.23%)
Component 2 (17.07%)
1
0
-1
-2
-1
0
1
2
3
10
7
5
15
9
4
6
8
13
2
11
3
1
14
12


Component Scores
Component 5 (5.844%)
Component 2 (17.07%)
1
0
-1
-2
-2
-1
0
1
2
3
8
11
10
14
7
5
12
3
6
2
4
9
1
15
13


Component Scores
Component 4 (10.23%)
Component 3 (10.58%)
1
0
-1
-3
-2
-1
0
1
2
5
7
10
15
9
4
6
8
13
2
11
3
1
14
12


Component Scores
Component 5 (5.844%)
Component 3 (10.58%)
1
0
-1
-2
-3
-2
-1
0
1
2
8
11
10
14
5
7
12
3
6
2
4
9
1
13
15


Component Scores
Component 5 (5.844%)
Component 4 (10.23%)
1
0
-1
-2
-2
-1
0
1
2
8
11
10
14
7
5
12
3
2
6
4
9
1
13
15


Component Scores
Component 3 (10.58%)
Component 2 (17.07%)
Component 1
2
1
0
-1
-2
-2
-1
0
1
2
3
1
0
-1
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15