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# Blended learning instructional delivery: enhancing learning outcomes for first-year students in South Africa

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## Abstract

This study investigated the effectiveness of blended learning in enhancing instructional delivery and learning outcomes for first-year tertiary students in South Africa. This study employed convenience sampling by recuring first-year students of a TVET College in the Western Cape, South Africa. A quantitative research approach was employed, with data collected via an online questionnaire distributed through QuestionPro to a sample of 185 students. This study is grounded in the Experiential Learning Theory, which highlights learning as an active, repeated activity that involves actual encounters and reflective observation. Additionally, the Cognitive Load Theory was used focusing on enhancing instructional design by managing primary and connected intellectual weight data, categorical variables and a Likert scale. The data was analysed using descriptive statistics with SPSS version 25. The findings revealed that while blended learning offers significant opportunities for flexibility, active engagement, and digital literacy development, challenges such as low acceptance, resistance to technology, and limited digital skills persist among first-year students. The results provide valuable insights into optimising blended learning models to enhance student engagement, improve academic performance, and foster literacy development. The findings contribute to the discourse on integrating blended learning into higher education, offering practical recommendations for policymakers and educators to create effective learning environments for first-year students.

**Keywords:** Blended learning, academic performance, digital literacy, instructional delivery, first-year students, TVET colleges.

## Introduction

In the digital age, institutions of higher learning are continually adapting to changes in digital technologies. The advancement of information and communication technology has led to increased integration and collaboration between conventional learning and online learning (Gyamfi & Gyaase, 2015). This approach ensures that teaching and learning continued during the pandemic. The central focus of blended learning is to provide a more engaging teaching and learning experience for students and teachers (Adel & Dyan, 2021; Adeoye, Adanikin & Adanikin, 2020; Asanov, 2021; Mpungose, 2020).

Blended learning combines online learning modes with face-to-face interaction. The online learning approach emphasises using computer-based technologies, requiring students to have digital skills to participate effectively. In contrast, the face-to-face approach focuses on human interaction (Adnan & Anwar, 2020; Amenduni et al., 2021; Anderson & Elloumi, 2004; Guangying & Jiahao, 2018). Blended learning offers the opportunity to mix face-to-face and online learning, fostering student engagement (Hoffman, 2006; Li, Snow & White, 2015; Nazara & Wardaningsih, 2019). The pedagogy employed in these approaches significantly impacts student learning outcomes and performance. Previous studies have shown that learning approaches differ for students at various levels (Nathan & Rajamanoharane, 2016; Simbolon, 2021; Sari & Wahyudin, 2019). However, there are few empirical studies focusing on first-year students' experiences with blended learning. Rasheed, Kamsin, and Abdullah (2020) underscore the

online aspect of blended learning as the major challenge faced by students due to self-regulation problems and challenges in using learning technology.

Thus, this study aims to understand the usefulness of blended learning in teaching and learning, improving instructional delivery and enhancing learning outcomes and academic performance. The findings will guide college management and policymakers on the learning models applicable to freshmen, ultimately improving their academic writing and performance.

## Problem statement

While blended learning has become increasingly prevalent in response to the COVID-19 pandemic, its effectiveness for first-year students in higher education remains understudied. As institutions adapt to integrating online and face-to-face learning, research is critical to understand how best to implement blended learning models that enhance first-year students' academic success in this new educational landscape. Since language learning can benefit significantly from incorporation of different learning modes, traditional classroom teaching has now appropriated different blending modes, including online learning. The incorporation of online learning can present some challenges even though contemporary students are viewed as digital natives. The major obstacles observed by lecturers with respect to blended learning are needs of some learners who require specific attention or who are not all that computer-literate (Tshabalala, Ndeya-Ndereya, & van der Merwe, 2014). Some of them have time management issues and are deficient in personal organisation skills. The study was done to investigate the view of academic staff about blended learning and unveil the challenges limiting the adoption of blended learning in developing university in South Africa showed that e-learning or blended learning policy, faculty support by management, computer skills of students and lecturers, as well as inadequate access for students to computers were the major challenge preventing proper adoption of the blended learning (Tshabalala, Ndeya-Ndereya, & Van der Merwe, 2014). Blended learning comes with flexibility. However, students need discipline, time management skills and being comfortable with technology to derive maximum benefits from it (Tuomainen, 2016). Usually, students perceive blended learning positively. Most tertiary students are accustomed to technology since they grew up with technology and can navigate various social platforms.

According to Tuomainen (2016), blended learning has emerged as a prominent educational model. Yet, its effectiveness in improving instructional delivery and enhancing learning outcomes for first-year students in higher education, particularly within the Technical and Vocational Education and Training (TVET) context, has remained underexplored. Despite being considered digital natives, many students encounter significant challenges, such as limited digital literacy, inadequate time management skills, and a lack of self-discipline. These obstacles hinder their ability to fully engage with and benefit from blended learning environments, creating a gap in understanding how to optimise this instructional approach for enhanced academic performance. As higher education institutions increasingly adopt blended learning models, it is crucial to systematically investigate and address the specific barriers faced by first-year students in South Africa, ensuring that these innovative instructional methods effectively support their transition and success in a rapidly changing academic environment. (Castro, 2019).

## Research question

The research questions below resonate with this study.

- What is the usefulness of blended learning in teaching and learning for first-year students at a tertiary institution in South Africa?
- How does the usefulness of blended learning in teaching and learning improve academic performance for first-year students?
- What are first-year tertiary students' experiences and perceptions of blended learning instructional delivery?

## Literature review

Blended learning technologies create a learning environment where students are

motivated to take part in learning. Learning can take place at any time and at any place with sufficient connectivity. The blended learning model supports active learning and offers flexibility to learners. The integration of blended learning in teaching and learning gives rise to literacy development, and this is one essential component that makes blended learning impactful. The benefits of using blended learning for higher education institutions are numerous. It fosters easy communication and interaction between teachers and learners. It also enhances course delivery and fosters collaborative activities and assignments (Nazara & Wardaningsih, 2019).

The Blended learning approach to learning provides both opportunities and challenges for teaching and learning. One of the greatest features of the blended learning approach is that it provides flexibility to learning by mixing online learning and face-to-face learning. There is a myriad of studies conducted on the use of blended learning in teaching and learning (Bourelle et al., 2016; Zhang et al., 2004; Ni, 2013). Some studies found that blended learning is more effective than the conventional teaching and learning in terms of students' grades and academic performance (Bourelle et al., 2016; Zhang et al., 2004). Other studies such as Xu and Jaggars (2014) and Ni (2013) found no significant effect on student academic performance and achievement concerning the mode of teaching and learning that was employed. It could be seen from these studies that disparities in the findings regarding the usefulness and impact of blended learning may be a result of the different categories and levels of study of students sampled in these studies.

Students are struggling with the change that online learning brings, and its advantages have not surfaced as the overall choice of learning method due to the power disruptions, unfamiliarity, resistance, and problems associated with technology (Mhlanga, 2021). Yet there is a lack of empirical evidence suggesting that the effectiveness and impact of traditional learning differs from the blended learning model for freshmen in terms of their academic performance.

Previous studies have been conducted on the usefulness and impact of the blended learning approach on different levels of education and different categories of students (Gamage et al., 2023). This ranges from post-secondary to tertiary institutions. The findings vary from one category of students. For instance, the usefulness of blended technology brings a new way of learning technical terms and concepts in the fields of science, medicine, and engineering compared to social science and arts. For instance, Kagohara et al. (2010) observe that the use of multimedia platforms such as video, simulation software, and virtual labs may aid teaching and learning over textbooks. This approach to teaching and learning can be useful in explaining difficult concepts and complex scientific topics students are not familiar with. Furthermore, the usefulness of blended learning has been seen in students' academic performance. There is a huge difference in students' academic learning for science students compared to social science students and the arts. Irrespective of the student's course of study the impact of blended learning cannot be over-emphasised. Little is known about the usefulness of blended learning for first-year students at TVET College in South Africa.

According to Castro (2019), digital technologies such as video capsules and intelligent tutoring systems have the potential to enhance learning and teaching activities. For example, by providing access to more students, facilitating self-paced online learning and advancing the individualised path of learning for each student, blended teaching and learning mode has the potential to improve out-of-class activities and feedback. Furthermore, the capabilities of educational technologies provide harmonised insights into the best approach when aligning learning goals in technology-based approaches (Castro, 2019). Therefore, when educational technologies are adopted to manage and support distance education, blended learning can positively impact and influence especially students' achievements (Jowsey et al., 2020). In view of this, it is not surprising that as e-learning systems have developed, higher education institutions worldwide, have increasingly embraced these systems as a fundamental part of student learning.

Since the early 1990s, higher education institutions have increasingly adopted blended

learning, described as the "thoughtful fusion of face-to-face and online learning experiences" (Garrison & Vaughan, 2008). The benefits of blended learning – for students, staff, and institutions – have been extensively documented in the research literature over the years. For instance, Vaughan (2007) identifies key advantages, including greater flexibility in scheduling, improved student outcomes, enhanced opportunities for staff-student interaction, increased student engagement, adaptable teaching methods, opportunities for continuous improvement, the enhancement of institutional reputation and reach, and cost reductions.

Much of the existing research supporting these findings tends to focus on practical, small-scale, and outcomes-oriented studies (Smith & Hill, 2019). However, the potential benefits of blended learning extend beyond individual gains. They hold promise for fostering transformative institutional change by enabling a rethinking and restructuring of pedagogical practices (Garrison & Kanuka, 2004; Van Der Linden, 2014). These shifts can occur not only within individual courses but also across entire institutions.

## Theoretical framework

This study was based on the Experiential Learning Theory (Kolb, 1984), which highlights learning as an active, repeated activity involving actual encounters and reflective observations. (Kolb, 1984). Similarly, the Cognitive Load Theory (Sweller, 1988) focuses on optimising instructional design connecting intellectual weight. Given the involvement of blended learning environments, this theory is contributory in ensuring that digital and in-person instructional components are structured in a way that enhances learning efficiency without overwhelming the instructors (Sweller, 1988).

## Methods

A quantitative approach involving the circulation of questionnaires was used to investigate the usefulness of blended learning among first-year students at TVET College in the Western Cape, South Africa. The research methodology incorporates Experiential Learning Theory (Kolb & Kolb, 2005) through data collection methods such as surveys. Additionally, Cognitive Load Theory (Sweller, 1988) informs the exploration of instructional materials to evaluate content based on intellectual demand.

The study population comprised first-year students, suitable due to their transition from high school to the university environment. Convenience sampling was employed, and invitations were sent to 600 freshmen via email. A total of 185 students completed the circulated online questionnaire (Creswell, 2018). The study population was first-year students at a TVET College. This category of students was suitable for this study because of their online readiness for blended learning, considering the transition from high school to the college environment. This study employed convenience sampling by recuring first-year students of a TVET College in the Western Cape, South Africa. Invitation to participate in the study was sent to 600 freshmen by email. Only students who gave their consent to participate in the study by signing the consent letter completed the online survey. In all, 185 students completed the survey (Creswell, 2018). A questionnaire adapted from existing literature was the instrument for data collection.

## Results

### *Face-to-face learning when interacting with peers and lecturers*

In Table 1, Item 1 is concerned with the respondents' viewpoints on the quality of their interactions with other students. Twelve per cent (12%) of the respondents reported that they were very satisfied with their interactions with other students, 48% of the respondents reported that they were satisfied, 19% of the respondents reported neither, 13% said they were dissatisfied, and 8% reported that they were very dissatisfied. These findings are supported by previous studies (Donnelly, 2014, pp. 61-69; Reino, 2020), which found that social interaction is meant to ascertain whether the learner is on the same page with the instructor during the learning activity.

As for Item 2, ranked number two in terms of importance, regarding the quality of interaction with the instructor, 19% were very satisfied, 44% were satisfied, but 19% were neither satisfied, 13% were dissatisfied, and 5% were very dissatisfied. Many satisfied students

have been welcomed since online learning and communication have become increasingly important, as opposed to face-to-face contact (Almaiah et al., 2020). As for the satisfaction with the amount of time spent with teachers, in Item 3, 44% indicated satisfactory communication with the online instructor. In item 4, 51% indicated that they were satisfied with the amount of time interacting with other students. Since understanding among the various groups is so vital, it emerged that the gap of not being attended to and the amount of time, must be addressed. This is a definite aspect that must be taken note of. It follows that online time must be extended.

**Table 1**: Face-to-face learning when interacting with peers and lecturers (n=185)

| Likert item | Response (%) | | | | | Mean | Rank |
|---|---|---|---|---|---|---|---|
| | Very satisfied | Satisfied | Neither satisfied | Dissatisfied | Very dissatisfied | | |
| 1. The quality of interaction with other students | 12% | 48% | 19% | 13 % | 8% | 3.46 | 1 |
| 2. The quality of interaction with the instructor (lecturer) | 19% | 44% | 19% | 13 % | 5% | 3.44 | 2 |
| 3. The amount of time interacting with the instructor (lecturer) | 15% | 44% | 20% | 13 % | 7% | 3.43 | 3 |
| 4. The amount of time interacting with other students | 11% | 51% | 16% | 18 % | 5% | 3.40 | 4 |

***Students' familiarity with blended learning models***

Table 2 shows students' familiarity with blended learning models. In Table 2, Item 1, the first-year students voted for the model of blended learning models that they were familiar with. E-learning self-study emerged as the most common blended technology the students were familiar with at 44.4 %, with a mean score of 3.61, and it was self-paced in collaboration with their learning. The respondents provided their viewpoints on the other forms of blended learning technologies they are familiar with, such as e-learning self-study. Twelve per cent (12%) were unfamiliar with it, and 4% were very unfamiliar with it. Hughes (2003) supports e-learning study because it allows learners to select what they wish to learn and decide when they will learn.

As for Item 2, which tested the familiarity with cooperative learning, it was revealed that 14% were very familiar, 43% familiar, 23% were unsure, 16% were unfamiliar, and 4% were very unfamiliar. It follows that many of the students were familiar with this learning strategy. Furthermore, the respondents provided their viewpoints on the form of blended learning technologies with which they are familiar. In the case of the learning management systems as described in Item 3 of Table 2, it emerged that 9% of the respondents reported that they were very familiar with it, 36% said they were familiar with it, 33% reported that they were unsure about it, 16% of the respondents reported they were not familiar with cooperative learning, and only 5% said that they were very unfamiliar with. It emerged that many were not so familiar or sure of what it was.

Instructor-led learning, as part of Item 4, received the following votes: 14% were very unfamiliar with it, 30% were familiar, 31% were unsure, 16% were unfamiliar, and 8% were very unfamiliar. A possible explanation could be that students were not familiar with the term instructor-led but would possibly have responded differently if the words teacher instruction were used. Item 5 is quite important in the modern work-related orientation of students in the light of the lack of

jobs in South Africa. Work-integrated learning (WIL) is central to supporting students to find jobs after completion of their studies. Eleven per cent (11%) strongly agreed, 31% agreed, 25% were undecided, 23% disagreed, and 3% strongly disagreed. It emerged that a large percentage, if one considers the numbers for undecided and disagreed, were not fully aware that they would have to find jobs after their studies. As for Item 6 on simulation, the votes revealed that 6% strongly agreed, 25% agreed, 39% were undecided, 21% disagreed and 8% strongly disagreed on understanding and familiarity with simulation models. Concerning live e-learning in Item 7, it was revealed that 3% strongly agreed, 23% agreed, 36% were undecided, 30% disagreed and 7% strongly disagreed that they were familiar with e-learning.

**Table 2:** Respondents' familiarity with blended learning models (n=185)

| Likert item | Response (%) | | | | | Mean | Item |
|---|---|---|---|---|---|---|---|
| | Very familiar | Familiar | Unsure | Unfamiliar | Very unfamiliar | | |
| 1. E-learning self-study | 19% | 44% | 19% | 12% | 4% | 3.61 | 1 |
| 2. Cooperative learning | 14% | 43% | 23% | 16% | 4% | 3.46 | 2 |
| 3. The learning management system (LMS) | 9% | 36% | 33% | 16% | 5% | 3.29 | 3 |
| 4. Instructor-led (face-to-face) | 14% | 30% | 31% | 16% | 8% | 3.24 | 4 |
| 5. On-the-job training – work-integrated learning | 11% | 31% | 25% | 23% | 8% | 3.14 | 5 |
| 6. Simulation | 6% | 25% | 39% | 21% | 8% | 2.98 | 6 |
| 7. Live e-learning | 3% | 23% | 36% | 30% | 7% | 2.83 | 7 |

***The usefulness of blended learning applications***

Table 3 provides students' experiences with the use of blended learning applications in academic writing. In Item 1 of Table 3, zero per cent (0%) strongly agreed, 5% agreed, 16% were undecided, 59% disagreed, and 21% strongly disagreed that they were satisfied with blended learning. The high number (59%) who disagreed underscores that there is still a long way to go until students are happy to make use of the blended learning approach that incorporates technology, e-learning, and face-to-face learning in combination when studying. The mean for this item was 4.10, and it was ranked first in terms of responses. It is believed that blended learning can aid the development of one's academic writing skills. The usefulness of the blended learning application was prevalent and well-pronounced among the students, with a mean score of 4.10.

Concerning Item 2, 57% disagreed that the sources provided were enough when considering whether The TVET College provides sufficient resources, such as the Internet, computer practice, and assistance with blended coursework and academic writing. It must, however, be noted that students have a huge responsibility to access sources online themselves and cannot expect all sources to be given to them. Respondents' votes for Item 3 indicated some successes of blended learning. However, 52% disagreed, and 35% strongly disagreed. This critical stance is also somewhat surprising as one would expect a vote for agreement. In Item 4 on whether academic learning is essential to expand writing, 55% disagreed, and 28% strongly disagreed. In

responses to Item 5 dealing with encouragement to prepare, 54% disagreed that lecturers encourage preparing for lessons.

**Table 3**: The usefulness of blended learning applications in students' academic writing experiences (n=185)

| Likert item | Response (%) | | | | | Mean | Rank |
|---|---|---|---|---|---|---|---|
| | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | | |
| 1. Overall, I am satisfied with the notion of blended learning/using the Internet/ computers to develop my academic writing skills. | 0% | 5% | 16% | 59% | 21% | 4.10 | 1 |
| 2. The TVET College provides sufficient resources, such as the Internet, and computer practice, and assists with blended coursework and academic writing. | 0% | 9% | 7% | 57% | 26% | 4.00 | 2 |
| 3. The context of online learning is useful | 2% | 4% | 7% | 52% | 35% | 3.98 | 3 |
| 4. Academic writing is essential for TVET students and blended learning practices thus expand writing skills and language progression. | 0% | 4% | 14% | 55% | 28% | 3.95 | 4 |
| 5. My lecturer suggests preparation techniques and information whenever we engage in virtual academic writing activities. | 1% | 9% | 12.% | 54% | 21% | 3.90 | 5 |
| 6. In my opinion, studying writing online is a learner-centred approach and develops my academic writing performance. | 0% | 8% | 17% | 54% | 21.% | 3.88 | 6 |
| 7. The module/assignment for academic writing aligns with blended learning initiatives. | 1% | 4% | 22% | 55% | 19% | 3.86 | 7 |
| 8. The course/programme identifies and clearly explains the section of the online environment that will develop our academic writing. | 1% | 7% | 22% | 50% | 19% | 3.80 | 8 |
| 9. My language competence is used whenever I engage online and during contact learning writing tasks | 1% | 11 % | 16% | 56% | 16% | 3.75 | 9 |

Another salient Item, Item 6, in dealing with studying writing online as a learner-centred approach to develop academic writing performance, 0% strongly agreed, 8% agreed, 17% were undecided, 54% disagreed and 21% strongly disagreed. It emerged that 54% strongly disagreed, which is a concern, as one would expect them to view this as a learner-centred approach as they are

engaged actively when employing online learning platforms (Hoffman, 2006).

Responses to Item 7 were also a concern as many students were undecided (22%), and 55% disagreed whether they think the course material is aligned with blended learning approaches. Concerning Item 8 on whether the course programme explains online learning engagement, 50% disagreed. It emerged that the course programmes had to be clear on how technology is incorporated. Item 9, ranked ninth, with a mean of 3.75, states that language competence is involved when engaging online during writing tasks. Regarding language competence whenever engaging online and during contact learning writing tasks, 1% strongly agreed, 11% agreed, 16% were undecided, 56% disagreed, and 16% strongly disagreed. This finding is also surprising since using language in writing involves a sound knowledge of grammar

## Discussion of findings

The purpose of this study was to examine the usefulness of blended learning concerning first-year students. The findings of this study concerning the usefulness of blended learning applications showed that the acceptance is low, and students were resistant to new technology. Blended learning cannot be ignored and undermined because of its usefulness in teaching and learning. Schools in South Africa, especially TVET College should not be left behind regarding the tremendous impact of blended learning models. The eagerness with which students embrace opportunities to use and learn about new technologies presents an antithesis when compared with their low level of motivation in college, particularly in academic underachievement and challenges in learning literacy skills (Li, Snow & White, 2015).

The findings of this study align with a recent study stating that acceptance of new technology is somewhat low and may face some resistance, yet everyone will embrace the technology as soon as the benefits are known such as increasing students' understanding and activity. In the same vein, the usefulness of blended learning superseded that of asking for information about learning online to help them with writing, which is the least common in inquiring about how helpful blended learning technology has become (Nuryatin et al., 2023). Integrating online learning into blended learning in the English Language class can benefit students, especially first-year students at TVET College in South Africa. The Experiential Learning Theory, as mentioned in the theoretical framework echoed instructors' engagement with blended learning, highlighting how their hands-on experiences, reflections, and applications contribute to professional growth (Kolb, 1984; Moon, 2004). Furthermore, the Cognitive Load Theory provides a lens for discussing the effectiveness of instructional strategies within blended learning environments, particularly in balancing cognitive load to optimise learning outcomes (Sweller et al., 2011). The combined use of these theories will allow for a nuanced discussion of how blended learning can be develop instructors' career development by ensuring experiential learning opportunities while also designing instructional materials that do not exceed intellectual capability.

Researchers cannot rule out the impact of social interaction on learning. This may be why the acceptance of online learning is not entirely favoured. Quality interaction in learning gives the learner and instructor a platform to communicate in real-time. The feedback one gets is essential in any learning method one subscribes to learning. The convenience brought about by online learning is not possible due to power disruptions, costs of equipment, and the unfamiliarity of students and lecturers with online lesson etiquette. It seemed both lecturers and students endured until the pandemic passed.

The findings of the study showed that there is still room for upgrading e-learning awareness. Thus, this statistic is surprising as one would expect everyone to be very well-informed about e-learning platforms as a form of live learning. Almaiah, Al-khasawneh, and Athunibat (2020) researched e-learning and found that there are many challenges in the adoption of e-learning. They found that factors influencing e-learning were technological aspects, e-learning system quality aspects, self-efficacy, and trust among the interactive parties. Furthermore, financial support additionally played a role in this regard.

Abdullah and Ward (2016) also investigated factors influencing e-learning acceptance. Their findings revealed that self-efficacy, enjoyment, fear and inexperience with using computers impacted students' acceptance of e-learning. Familiarity and fear of technology, including the operation of computers, are thus aspects that must be considered. Students need to be trained in the use of computers and online skills.

An important issue is the fact that Higher Education in South Africa has not considered taking advantage of online learning to benefit students. Online learning provides students with various learning activities using diverse kinds of social media platforms, like Facebook, Twitter, and WhatsApp, which are available on current mobile phones (Simbolon, 2021). The contributions of participants in this study are illustrative of a missed opportunity to benefit students with blended learning.

## Recommendations

Blended learning approaches provide students the opportunity to communicate and share their views and feelings with the students all over the world; thus, it makes the teaching learning process multicultural. Furthermore, it improves students' skills, enhances their learning experience and fosters their approach to teaching and learning. Although blended learning provides students with face-to-face interaction as well as interaction in virtual space, there exist some limitations. Hence, the current study recommends careful and in-depth design, proper training, and adequate implementation and evaluation of blended learning to ensure the sustainability and adoption of blended learning in all educational formats.

### *Critical observation*

While the study aimed to contribute to understanding blended learning's impact, it should also explore the long-term implications of blended learning in diverse educational settings and its adaptability to evolving digital tools and pedagogical approaches.

## Conclusion

Blended learning presents both opportunities and challenges in higher education. While it enhances instructional delivery, fosters active engagement, and improves digital literacy among first-year students, its effectiveness is hindered by resistance to technology, digital literacy gaps, and self-discipline challenges. This study, grounded in Experiential Learning Theory and Cognitive Load Theory, highlights the importance of peer interaction, instructor guidance, and digital tools in shaping student learning outcomes. Findings suggest that while students benefit from the flexibility and accessibility of blended learning, institutional support is essential to bridge digital literacy gaps and increase acceptance. To move forward, higher education institutions should implement targeted interventions, including e-learning awareness programmes and structured computer training for new students. These initiatives will equip students with the necessary digital and literacy skills to effectively engage with modern learning technologies. By addressing these barriers, institutions can optimise blended learning models, ensuring that future generations of learners are not left behind in an increasingly digital academic environment. This research contributes to the broader discourse on blended learning integration in higher education and provides practical recommendations for educators and policymakers to enhance student learning experiences.

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### *Data availability*

The authors confirm that the data supporting the findings of this study are available within the article.

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