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ORIGINAL RESEARCH

Understanding student perspectives on e-assessments in a South African university of technology.

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Abstract

Assessment is a crucial component of the learning process, and with the advent of technology, innovative strategies such as e-assessment have emerged as alternatives to traditional paper-based assessments. While many countries have embraced e-assessment systems due to their numerous benefits, developing economies like South Africa have paid limited attention to the experiences and issues related to e-assessments. This study aims to explore the experiences of South African students who have undergone e-assessments, focusing on the perceived benefits and drawbacks of transitioning from paper-based to online platform-based assessments. A focus group of students took part in the inquiry, with the data interpreted using literature and guided by constructivist educational theory. Findings revealed that students reported experiencing anxiety and concentration issues during e-assessments. However, there was also an appreciation for the value that e-assessments bring to higher education. This study highlights the need for further research to examine the factors that influence the implementation and effectiveness of e-assessments in the higher education sector. By understanding these factors, the educational institution can address challenges and optimize the benefits of e-assessments, enhancing the learning experience for students. Future studies should delve deeper into the specific aspects influencing e-assessments in higher education and provide insights for developing effective strategies and interventions.

Keywords: E-Assessment; Higher Education, Information and Communication technology (ICT), Student experiences. Teaching and Learning

Introduction

The digital revolution has brought significant changes to education, allowing lecturers to use modern information and communication technologies (ICTs) for quality assessments (Kaputa et al., 2022). E-assessments, which utilize ICTs, are becoming more common in higher education for diagnostic, summative, or formative evaluations, often in conjunction with e-learning (Vapiwala & Pandita, 2022). While there is a shift towards computerized assessments due to the rise of e-learning, the effectiveness of e-assessment in improving learning is still under investigation. Although much research exists on lecturers' attitudes towards e-learning, fewer studies focus on students' opinions of e-assessment. Therefore, this study aims to directly explore students' experiences with e-assessment. The growing demand for higher education, particularly among previously disadvantaged groups, has led to a re-evaluation of assessment strategies (Machingambi, 2022). The urgency for digital transformation in education has been highlighted by the onset of the pandemic in 2020 (Kaputa et al., 2022). E-assessment has the potential to address the challenge of enhancing student learning experiences in higher education (Almuhanna, 2023). Effective assessments depend on factors like cost, standardization, administration environment, and adherence to key assessment principles, including authenticity, transparency, and accessibility (Doan et al., 2020; Appiah & Van Tonder, 2018). E-assessments align with many of these principles, offering opportunities to shift pedagogical practices towards student-centered learning.

E-assessments, by aligning with principles of student-centered learning, support constructivism educational theory, which views

learning as an active process where learners construct their understanding through experiences and interactions (Thembane, 2023). In student-centered learning, learners play an active role, with teachers facilitating rather than simply imparting knowledge (Doyle, 2023). E-assessments facilitate student-centered learning by allowing active engagement, providing timely and personalized feedback, supporting collaborative learning, and offering flexibility and autonomy in assessment tasks. By providing opportunities for active engagement, personalized experiences, collaboration, and learner autonomy, e-assessments contribute to the principles of constructivist pedagogy (Doyle, 2023). Overall, e-assessments are seen as valuable additions to the educational process, with the potential to transform teaching and learning practices (Kaputa et al., 2022)

Benefits of e-assessments

E-assessments have become increasingly popular in higher education due to factors such as higher student intake, resource limitations, and advancements in technology (Gamag, 2022). These assessments offer several advantages, including enhanced authentication using sophisticated biometric tools, randomized question allocation for academic integrity, faster turnaround time for results, and increased flexibility for students (Appiah & Van Tonder, 2018; Surahman & Wang, 2022; Diarsini et al., 2022). Moreover, E-assessments promote fairness and consistency in grading, provide detailed performance analysis, and support self-directed learning and reflection, especially in blended learning environments (Kaya-Capocci et al., 2023; Bhandari et al., 2021). Furthermore, E-assessments are cost-effective compared to traditional paper-based assessments and simplify the assessment process by eliminating manual handling and marking of scripts (Shraim, 2019). Importantly, they contribute to inclusivity in higher education by providing accommodations for students with disabilities, such as adjusting font sizes, colours, and providing voice-recorded questions (Cihan, 2021). However, despite the numerous benefits, there is a lack of research capturing students' experiences with E-assessments, which are essential stakeholders in the teaching and learning process (Race, 2019). While academic perceptions of E-assessments are generally positive, it is crucial to consider students' opinions as they directly impact the validity and engagement in assessments (Appiah & Van Tonder, 2018). Therefore, the aim of this study is to investigate students' opinions regarding E-assessments in a higher education institution in Southern Africa.

Methodology

Study design

In this study, the experiences of students and their opinions pertaining to E-assessments were studied using mixed method research in a form of a focus group. A group of students were solicited to volunteer to discuss this topic. A series of questions were asked, and the opinions shared were captured and studies to measure a probable reaction of a larger population. This data collection method was selected because it is inexpensive and time saving for acquiring valuable data.

Theoretical application

The methodology employed in this study aligns with constructivist educational theory, emphasizing active student engagement. Through mixed methods including focus group discussions and questionnaire surveys, students actively took part in sharing their experiences and perceptions of E-assessment. This approach acknowledges the importance of understanding student's perspectives in shaping effective educational practices (Drew & Mackie, 2011).

Context of the study

The students were undergraduate students enrolled in a public University of Technology in South Africa. The rapid transitioning of higher education to teaching and learning enabled with digital educational technologies has prompted this investigation.

Research strategy

The research strategy involved eliciting ideas, thoughts, and perceptions of undergraduate students on E-assessments through a questionnaire comprising thematic items. The data collected from a focus group of thirteen students enrolled in

the Department of Biomedical Sciences at a University of Technology in South Africa was tabulated for analysis and interpretation. The sampling strategy utilized targeted potential participants, distributing the questionnaire to form the focus group. Subsequently, the gathered data was analyzed, processed, and quantified using Microsoft Excel.

Ethical Considerations

Ethical clearance was sought from the Institutional Research Committee, authorization bearing the reference number: RDI/08/2022, was granted prior to carrying out the investigation. All participants took part in the study, on voluntary basis, there was no coercion and informed consent was requested prior to participation. All information shared during the focus group discussions was treated with privacy and the data was coded such that none of the information shared was traceable to a specific individual respondent. The researcher maintained a non-biased approach and objectivity during the analysis and presentation of the study findings. As such to prevent subjective biases proper statistical tools, the researcher utilized the constructivist educational theory and relevant scholarly works to interpret and make recommendations in relation to the study. The information garnered from the participants was captured electronically and coded for computing into percentages to enable interpretation.

Limitations of the study

The findings of the current investigation are not generalizable for all institutions of higher education. Furthermore, the findings are only applicable to the University of Technology during the period in which the study was conducted. Conclusions drawn from the study are limited by the unique factors associated with the institution under study so the findings may vary from one university to another.

Results

Table 1: Demographic details of the participants

Gender	Males	33.33 %
	Females	66.67 %
Age	17 – 20	16.66 %
	21 – 25	41.66 %
	26 – 30	25 %
Level of study	Year 1	8.33 %
	Year 2	75.6 %
	Year 3	8.33 %
	Year 4	8.33 %

The data presented suggests that the study includes both male and female participants. Females comprise a larger proportion, representing approximately 66.67% of the participants, while males represent around 33.33%. In terms of age distribution, the study involves participants from different age ranges. Most participants fall within the age range of 21 to 25, accounting for approximately 41.66% of the total. Participants aged 17 to 20 make up around 16.66%, and those aged 26 to 30 account for approximately 25% of the sample. Regarding the level of study, most participants are in Year 2, constituting approximately 75.6% of the total. Year 1 and Year 3 each represent approximately 8.33% of the participants, while Year 4 also comprises around 8.33% of the sample. Overall, this data provides insights into the gender distribution, age distribution, and level of study distribution within the study sample, offering an overview of the demographic characteristics of the participants.

Affective factors

These findings provide insights into the affective factors associated with computer-aided assessments and online assessments in higher education, including anxiety levels, expectations, concentration challenges, and preferences for different assessment modes. The data provided reveals the following information regarding affective factors related to computer-aided assessments and online assessments in higher education:

Anxiety Amplification: Among the students surveyed, approximately 58.33% reported that computer-aided assessments increased their anxiety levels. On the other hand, around 25% disagreed, suggesting that they did not experience heightened anxiety due to such assessments. These findings are in line with those of a more recent

study investigating the correlation of computer-based test anxiety with medical students' performance before, during and after assessments found that there was indeed a significant correlation exists between anxiety levels and the academic performance of female medical students (Shaheen et al., 2022). However, a historical study investigating the effects of computer-based tests on test anxiety and performance concluded that much of what is considered computer anxiety may in fact be a manifestation of test anxiety. It was suggested that giving students perceived control of the exam may reduce stress (Shermis & Lombard, 1998). According to the Technology Acceptance Model (TAM) theoretical framework, the stress from online examinations may be reduced through familiarizing students with the Learning Management System (LMS) for both learning and assessment for and of learning (Shaheen et al., 2022).

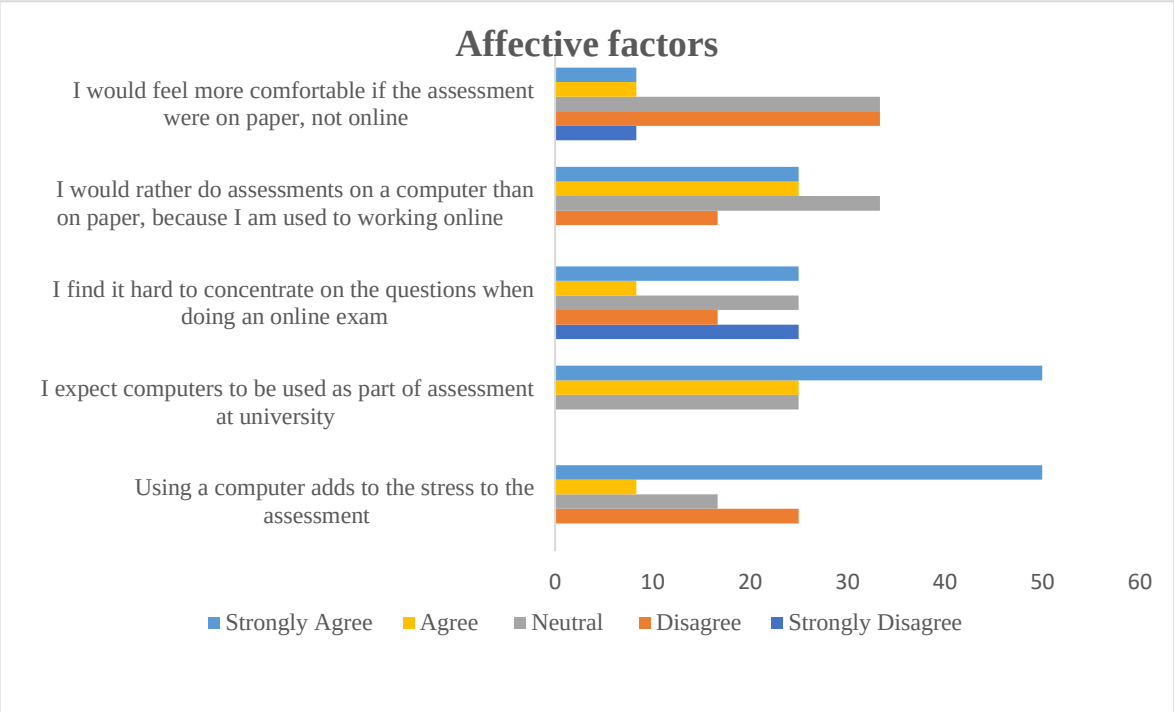

Figure 1: Student's responses to the affective factors in E-assessments.

Expectations of Computer Use: Around 75% of the students agreed that they anticipated computers to be involved in the assessment process in higher education. This indicates that a significant majority of the students expected computer-based assessments to be part of their educational experience as previously found in other studies by Okocha (2020).

Concentration Challenges: When it came to concentration during online assessments, approximately 41.67% of the students disagreed, indicating that they did not face concentration challenges during online assessments. However, around 33.33% reported experiencing difficulties with concentration during online assessments. A study found that the e-assessment increased students' engagement through interactive learning in a non-competitive environment (Tsakiridis & Photopoulos, 2022). The digital evolution in higher education has arrived and will be with us for a long time, therefore educationists and educational technologists have a task of skilling students with the relevant competencies for effective participation in the E-assessments. Although there is a considerable number of students that do not experience concentration issues during E-assessments. Accordingly, studies have shown that students are likely to uptake ICT implementation in their education if they understand its usefulness and ease of its use. In fact, according to the TAM explains this as linked to an individual's behavioral intention to use the online system (Shaheen et al., 2022).

Preference for E-Assessments: Approximately 50% of the students expressed a preference for E-assessments due to their familiarity with working online. This suggests that a massive portion of the students felt comfortable and confident in conducting assessments through online platforms. A study conducted in the same university concluded that students prefer computer-based assessments to paper-based assessments (Thembane, 2023).

Preference for Assessment Modes: In terms of overall preference for assessment modes, approximately 41.66% of the students favored online assessments, while 33% remained neutral. The remaining 16.66% expressed a preference for paper-based assessments, indicating a preference for traditional assessment methods. A pilot study conducted by Thembane (2023), demonstrated that these E-assessments had a positive impact on students' engagement, motivation, and self-reflection.

Validity factors

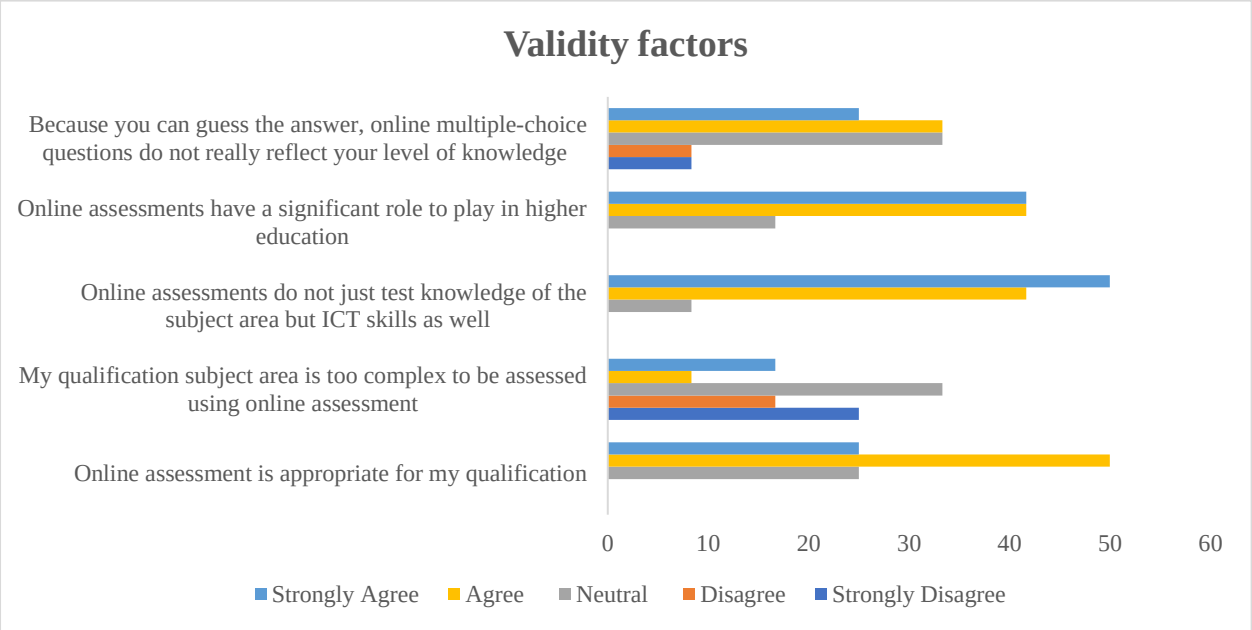

Figure 2: Student's responses to the validity factors in E-assessments.

Based on the interpretation of the statements, the findings can be summarized as follows:

Validity of online assessments for qualification: Seventy-five percent (75 %) of students agreed that the assessments they have been subjected to are appropriate for their qualification. This finding corresponds with assertions made by Sutadji et al. (2021) who emphasized that assessments online should be authentic in online education. Ideally, assessment practices in higher education must support student learning, as such it is essential that educational practitioners select appropriate assessment measures for examining the learning outcomes. The appropriateness of assessment is important, in that it determines whether the educational outcomes are met. Assessment affects grade progression, placement, teaching requirements, curriculum development and funding allocation. Therefore, appropriateness of an assessment requires that it be reliable. In another study on appropriateness of E-assessments involving medical science students the student's reported satisfaction regarding the suitability and appropriateness of the assessment methods (Mailizar et al., 2021).

Complexity of qualification subject area for online assessment: Twenty-five percent (25 %) agreed that the subject of their qualification was complex to be assessed using online assessments. 41.67% disagreed, indicating that they did not consider the subject area to be too complex for online assessment.33.33% were neutral on this

item, suggesting that they neither agreed nor disagreed regarding the complexity of the subject area for online assessment. Understanding, the complexity of subjects in students' qualifications, there is a shared sentiment that online assessments may not fully capture their depth of knowledge. It is crucial to address this concern by adopting innovative assessment strategies that effectively evaluate their expertise. This serves as an opportunity to explore diverse approaches for a comprehensive evaluation of complex subjects.

Assessment of learning content and ICT skills competency: A total of 91.67% of students agreed that online assessments test both the learning content and ICT skills competency. This implies the requirement for universities to integrate and prioritize the development of ICT skills alongside subject-specific knowledge in their assessment practices as previously articulated by Thembane (2023).

Importance of online assessments in higher education: The results show 83.34% perceived online assessments to be important for higher education. This finding is similar to that reported by Salhi (2021), where university students held a positive attitude and appreciated online assessment for higher education.

Perception of multiple-choice questions in online assessments: The data shows 53.33% of students believed that multiple-choice questions did not truly reflect a student's level of knowledge because the answers could be guessed. 16.66% disagreed with this notion, suggesting that they believed multiple-choice questions accurately reflect a student's knowledge level. With regards to the complexity of implementing E-assessment in education for science education requires that academics make modifications to their teaching methods to integrate inquiry learning with modified assessment techniques. They must understand how students' progress in their learning. Such professional decisions are difficult since it is still difficult for teachers and researchers to perform formative and summative evaluations in a complimentary way (Redecker & Johannessen, 2013). We place focus on how teacher engagement with researchers enables teachers to alter their professional knowledge, convictions, and instructional strategies. A paper on the perceptions of medical students regarding MCQ's as a form of assessment. Majority of the students were comfortable with the online assessment mode. They perceived that the use of MCQs was sufficient to evaluate knowledge during their course (Ranganath et al., 2017). Assessments that are based on MCQ can fulfil the parameters of authentic, valid, and reliable assessment, provide timely feedback to students and instructors, and improve efficiencies in large undergraduate classes. Multiple-choice testing with dichotomous scoring is one of the most common assessment methods utilized in undergraduate education (Williams et al., 2021). However, the current findings emphasize the necessity for academics to adopt a diverse range of assessment methods to ensure a comprehensive evaluation of students' knowledge and address the concerns raised by students regarding the limitations of multiple-choice questions. It also emphasizes the importance of promoting critical thinking and application skills and maintaining a balanced assessment approach that combines various formats.

The findings provide insights into students' perspectives on the validity and appropriateness of online assessments, the complexity of the subject area, the assessment of learning content and ICT skills, the importance of online assessments in higher education, and the perception of multiple-choice questions in online assessments.

Practicality factors

Environmental consideration: 33.33% of students agree that online assessments are important to them because they use less paper, highlighting their concern for reducing environmental impact. Literature records that one of the leading benefits to utilizing E-assessments in higher education is due to online exams being more environmentally friendly (Eltahir et al., 2022).

Technical challenges: 50% of students find online assessments impractical due to technical problems, indicating the requirement for reliable and stable technical infrastructure to ensure a smooth assessment experience. With

regards to strategic implementation of ICT in assessment, there ought to be careful planning to ensure that the online platform assessment meet the principles that are fundamental to successful assessment strategy. The poor technical infrastructure particularly in developing economies poses a significant challenge that hampers the practicality of E-assessments (Alruwais et al., 2018). To illustrate, in the African context - Loadshedding negatively impact sectors such as education, industry, shops and ordinary households. South African energy challenges can be traced as far back as the year 2008 (Mabunda, 2021). As such technical issues with online learning have lingered on in its higher education section. Although there are several avenues and research strategies being explored to rectify, the load-shedding challenge is not unique to South Africa only (Mabunda, 2021). For instance, nations like Pakistan, reported the impact of electricity loadshedding. The study reported that electricity load shedding negatively affects the overall performance of students including their punctuality, concentration during classes, and preparation of assignments, examinations, and results (Malik et al., 2022).

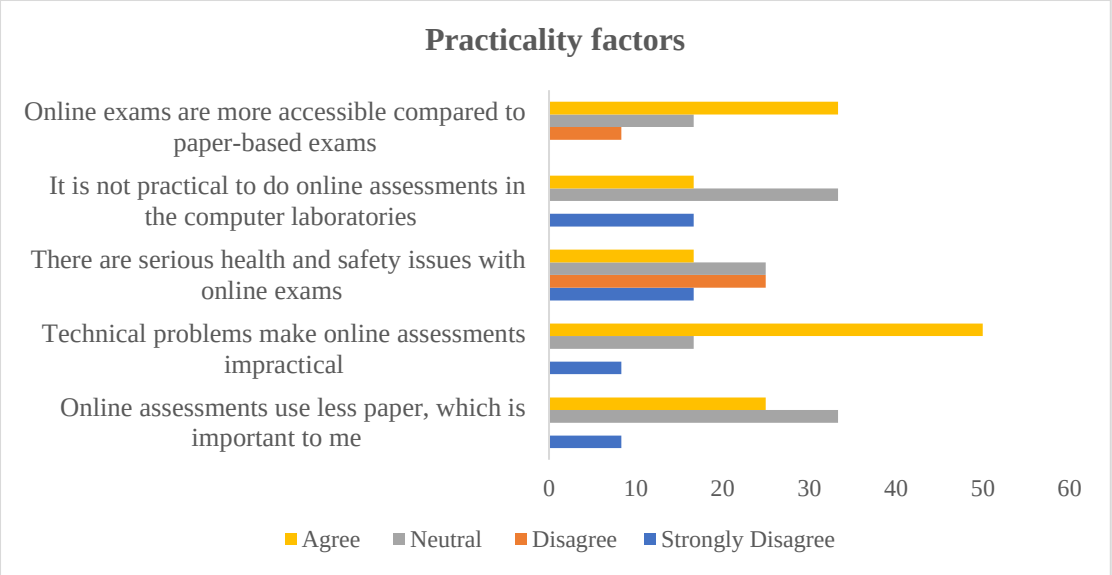

Figure 3: Depicts the student's responses to the practicality factors in E-assessments.

Health and safety concerns: 16.67% of students believe there are serious health and safety issues with online exams, suggesting the importance of addressing potential risks and ensuring a secure and comfortable assessment environment.

Practicality of computer laboratories: 33.33% of students feel that it is not practical to conduct online assessments in computer laboratories, indicating the need for efficient utilization of resources and alternative solutions. Conducting E-assessments on the computer laboratories situated in the premises of the University was reported to be impractical. As such, state support becomes a principal factor in ensuring seamless implementation of E-assessments (Alruwais et al., 2018). Recent work on considerations and strategies for effective online assessment with a focus on the biomedical sciences, emphasized that all students, regardless of their individual background and circumstances, should be provided with the opportunity to demonstrate their learning (Mate & Weidenhofer, 2022).

Accessibility advantages: 41.67% of students agree that online exams are more accessible compared to paper-based exams, emphasizing the potential benefits for students with disabilities or diverse needs. The accessibility of online assessments allows for flexibility for students with busy schedules, and they can work remote areas. Therefore, this means students in both remote and urban area can participate in assessments and receive an education. Moreover, online assessments allow for inclusivity for students that may have mobility issues, such

students can work from home instead of having to navigate through inaccessible campuses and classrooms. Additionally, students can maintain their privacy should they opt not to report their disability. In sum E -assessments allows for inclusivity.

Overall, the findings reveal the environmental advantages of online assessments, the importance of addressing technical challenges, the need for considering health and safety factors, the practicality of assessment venues, and the accessibility advantages of online exams. These insights can inform decisions and improvements in implementing online assessment practices.

Security factors

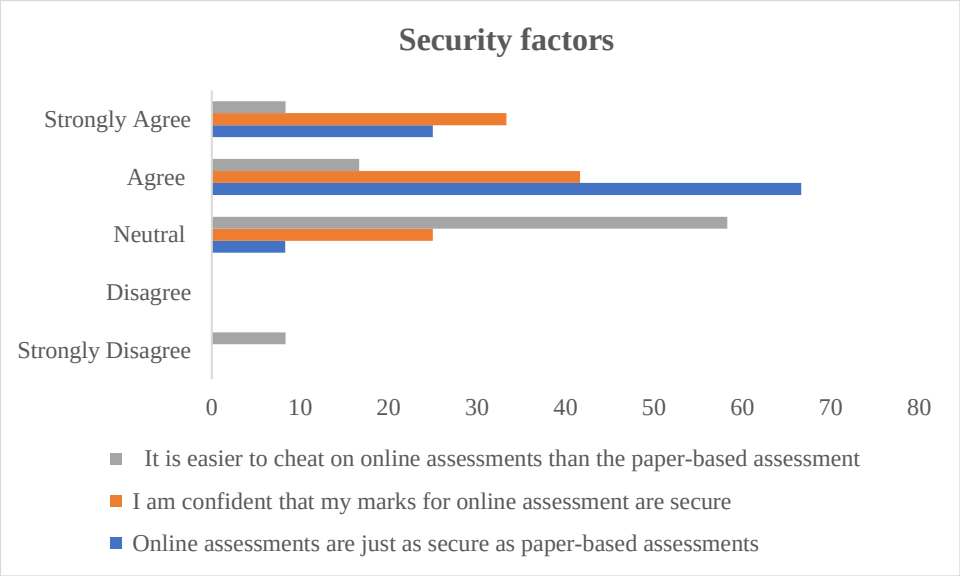

Figure 4: Student's responses to the security factors in E-assessments.

Security Perception: 91.67% of the respondents perceived E-assessments to be as secure as paper-based assessments. This indicates that a large majority of the participants felt that the electronic assessments were just as secure in terms of protecting the integrity and confidentiality of the assessment process.

Security of Marks: 75% of the students believed that the marks awarded for E-assessments were secure. This suggests that a sizable portion of the students had confidence in the accuracy and reliability of the grading system used in electronic assessments.

Cheating Perception: 25% of the respondents believed that it was easier to cheat on E-assessments. This implies that a quarter of the participants felt that the electronic format provided more opportunities or avenues for academic dishonesty compared to traditional paper-based assessments. Neutral Stance: 58.33% of the participants remained neutral regarding their perception of cheating on E-assessments. This indicates that more than half of the respondents did not have a strong opinion about the ease of cheating in electronic assessments and did not lean towards either agreement or disagreement. Disagreement: 8.33% of the participants disagreed with the statement that it was easier to cheat on E-assessments. This suggests that a small percentage of the respondents felt that electronic assessments were not particularly prone to cheating or were even more secure in terms of preventing dishonest practices.

The interpretation of these results suggests that a majority of the participants perceived E-assessments to be secure, both in terms of the assessment process itself and the security of the marks awarded. However, there was a notable portion of the respondents who believed that it was easier to cheat on E-

assessments, indicating a potential concern regarding academic integrity in the electronic format. The fact that a substantial portion of the participants remained neutral indicates that there might be varying perspectives or experiences influencing their views on cheating in E-assessments. In recent times., it became evident that the emergence of the COVID -19 pandemic was instrumental in sparking interest in E-assessments. In recent times, E - authentication has been a key topic in educational technologies and E-assessments. There is myriad of continuous studies aimed at improving the safety and security features of E-assessments in higher education. Additionally, studies on academic cheating have been on the rise. Institutions of higher learning have adopted a range of measures to prevent academic misconduct. There is yet to be a full-proof method of preventing academic dishonesty in E-assessments. However, it has been recommended that using complex assessment designs may assist in deterring cheating from E-assessment candidates (Bjelobaba, 2021). Previous studies have recommended with regards to the integrity during E-assessments the online platform-based assessments allows for using an invigilation applications, randomization and timing of the questions which may preventing academic dishonesty (Appiah & Van Tonder, 2018; Thembane,2023). Although, there is progress with this, there are issues borderline infringements on student's right to privacy.

Teaching and learning factors

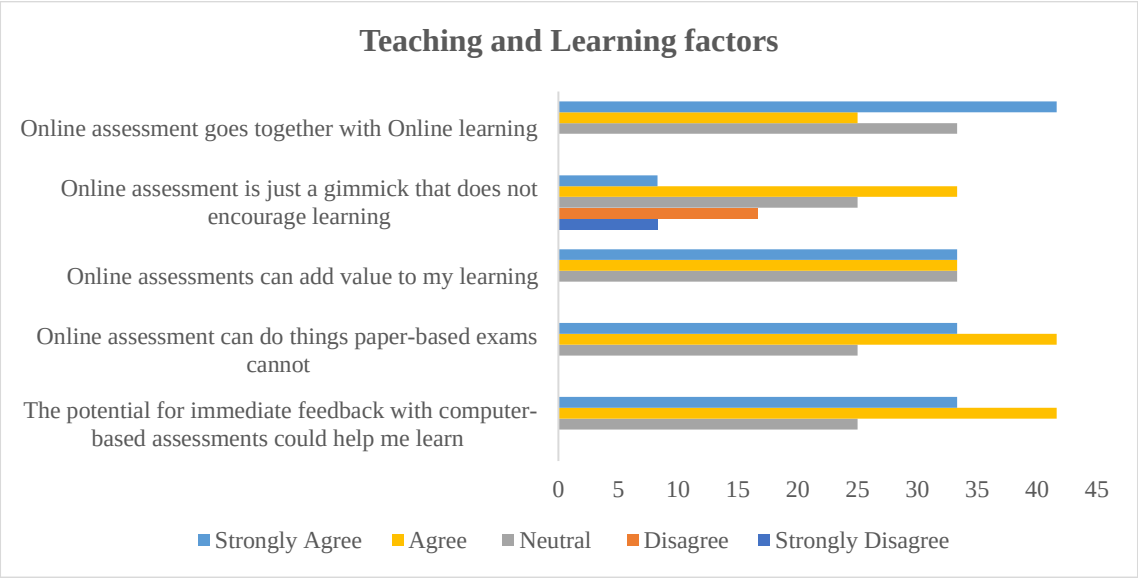

Figure 5: Depicts the student's responses to the teaching and learning factors in E-assessments.

Based on the responses provided, we can infer the following factors related to teaching and learning:

Feedback: 75% of the students reported that immediate feedback in E-assessments helps them learn more effectively compared to paper-based exams. This indicates that the timely feedback provided in electronic assessments is seen as beneficial for the learning process. It allows students to receive feedback on their performance promptly, enabling them to identify areas of improvement and adjust in their learning. Feeback is essential to teaching and learning, the students reported that the instantaneous feedback from E-assessments improves their learning, adding value to their learning. Correspondingly, according to a recent review on assessment of students' performance during the e-teaching and learning it was noted that using assessments on online platform helps teachers in giving direct feedback, encourages students to participate, and maximizes learning by enhancing students' performance and achievement (Al-Hattami, 2020).

Value Addition: 66.66% of the students agreed that E-assessments add value to the learning experience. This suggests that a

significant majority of the students believe that electronic assessments contribute positively to their learning outcomes. E-assessments may provide additional benefits such as interactive features, multimedia content, or adaptive learning techniques that enhance the overall learning experience. Assessment is the bridge between teaching and learning. Therefore, assessment is at the core of the teaching and learning practice. E - assessments when effectively applied may have multiple learning benefits (Thembane, 2023).

Perception of Gimmicks: On the other hand, 41.63% of the students reported that E-assessments are considered to be merely gimmicks that fail to enhance learning. This indicates that a portion of the students hold a negative view, considering electronic assessments as superficial or lacking in educational value. However, it is worth noting that 24.97% of the students disagreed with this perception, suggesting that they find E-assessments to be effective in enhancing learning. Additionally, 25% remained neutral, indicating a lack of strong opinion on the matter.

Integration with Online Learning: 66.67% of the students agreed that E-assessments are strongly associated with online learning. This implies that a significant majority recognizes the synergy between E-assessments and online learning methodologies. Electronic assessments are often used in online educational environments, allowing for seamless integration of assessment practices into digital learning platforms. On the other hand, 33.33% of the students remained neutral on this statement, suggesting a lack of strong agreement or disagreement. The findings from the current focus group study indicate that a significant majority of the students perceived E-assessment as a gimmick that has no value in advancing learning. Academics in the current university may benefit form amalgamating assessments to clearly defined learning objectives. When assessment is linked to learning outcomes and feedback received may be used for improvement. Effective E-assessment goes together with E-learning. However, researchers have highlighted the lack of proper tools and guidelines for e-assessment (Wongvorachan et al., 2023). In summary, the provided responses showed the following factors related to teaching and learning: the importance of immediate feedback in E-assessments, the perceived value addition of electronic assessments to the learning process, varying opinions regarding E-assessments as gimmicks that fail to enhance learning, and the association of E-assessments with online learning methodologies. These factors showcase the diverse perspectives and experiences of students regarding the impact of E-assessments on their learning outcomes.

In accordance with constructivist educational theory, student responses to affective factors in E-assessments illustrate the importance of considering individual experiences and perceptions in the learning process (Shah & Kumar, 2019). The diverse anxiety levels, expectations, concentration challenges, and preferences for assessment modes emphasize the active role of learners in shaping their educational experiences. These findings underline the significance of creating a supportive and engaging learning environment where students feel at ease and confident when conducting assessments through online platforms. Furthermore, the insights into validity factors accentuate the necessity for assessments to align with educational objectives and effectively evaluate students' knowledge and skills (Maki, 2023). Additionally, the practicality, security, and teaching-learning factors emphasize addressing technical challenges, ensuring academic integrity, and leveraging technology benefits to enhance the learning experience. In sum, these findings underscore the need for academics to adopt student-centered approaches and integrate technology effectively to support meaningful learning experiences.

Conclusion

This study explores students' experiences and perceptions of E-assessments in higher education, revealing both positive and negative viewpoints across affective factors, validity, practicality, security, and teaching and learning. Students reported increased anxiety during computer-aided assessments but recognized the importance of integrating computers in higher education assessments. Preferences for E-assessments and familiarity with online work varied among students. Validity concerns were raised, yet students found the assessments appropriate for their qualifications. The majority

appreciated the value and immediate feedback of E-assessments, although some viewed them as gimmicks, associated with online learning. The findings emphasize the demand for further research in designing effective E-assessment strategies, addressing concerns related to cheating, and maximizing the benefits for student learning experiences, stressing the challenges faced by resource-limited nations. Integrating teaching, learning, and assessment strategies is important for enhancing the educational experience and outcomes for students, bridging the gap between ICT integration and teaching practices. Ongoing research and innovation in E-assessments are crucial for promoting effective learning and fair evaluation in higher education.

Future studies

Future research in E-assessments should prioritize the investigation of factors impacting student anxiety and performance, including mental health considerations and unique challenges faced by resource-limited nations. Strategies to ensure quality assessments, such as video invigilation technologies, should be implemented for preferred off-campus E-assessments. It is recommended that teaching and learning outcomes be tied to assessment strategies to maximize learning benefits. Future research should focus on reducing anxiety, enhancing validity, minimizing technical challenges, addressing health and safety concerns, improving security measures, evaluating the impact on learning outcomes, investigating student preferences, and designing interventions to enhance the value of e-assessments. By addressing these areas, researchers can refine and improve e-assessment practices, leading to enhanced educational experiences and outcomes for students.

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