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# AN INVESTIGATION INTO THE DISPARITY BETWEEN LECTURERS' USE OF TECHNOLOGY IN TEACHING AND STUDENTS' DIGITAL COMPETENCE: A CROSS-SECTIONAL CASE STUDY OF THE BACHELOR OF APPLIED SCIENCE PROGRAM AT MANGOSUTHU UNIVERSITY OF TECHNOLOGY.



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## Abstract

### Background

This study investigates the disparity in technological proficiency between lecturers and students in the Bachelor of Applied Science program at Mangosuthu University of Technology (MUT), focusing on its impact on teaching effectiveness and student engagement.

### Methods

A mixed-methods approach was employed, combining surveys and semi-structured interviews. The study included 80 participants, 60 students, and 20 lecturers from the Faculty of Natural Sciences. It examined levels of digital literacy, access to technology, and perceptions of technology-enhanced learning. Quantitative data were analyzed using descriptive statistics, while qualitative responses underwent thematic analysis.

### Results

Findings revealed a significant digital proficiency gap between students and lecturers. Most students (60%) were aged 18–24, with 85% reporting high familiarity with digital tools such as Google Workspace, Moodle, and mobile apps. In contrast, lecturers, predominantly aged 45 and above, showed limited digital confidence, with only 40% comfortable using tools beyond PowerPoint and email. Students primarily accessed learning content via mobile devices, while lecturers favored traditional teaching methods with minimal technology integration. Qualitative insights highlighted limited training and institutional support as key barriers for lecturers, while students expressed frustration with the lack of interactive digital learning. These results point to a generational and infrastructural divide that hampers effective technology-enhanced teaching.

### Conclusion

The disparity in digital competence between lecturers and students impedes the successful implementation of digital learning within the program. Bridging this gap is essential for inclusive, effective, and future-ready higher education.

### Recommendations

MUT should introduce compulsory digital literacy training for lecturers, strengthen technical support systems, and adopt blended learning strategies. Further research is recommended to explore policy-level reforms that can drive sustainable digital integration in higher education.

***Keywords:*** *Digital competence, Technology integration, Higher Education, Lecturer-Student Gap, Digital Literacy, Online Learning, Instructional Technology, University Teaching, Technology Adoption, Digital Transformation.*
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## Introduction and Background Information

The rapid advancement of technology has significantly reshaped the landscape of higher education, shifting traditional teaching practices toward more interactive, digital-based learning environments. The use of digital tools is increasingly promoted in universities to enhance accessibility, engagement, and learner-centered approaches (Selwyn, 2016). However, a critical concern emerges when there is a noticeable gap between lecturers' capacity to integrate technology and students' digital fluency. While students, often referred to as digital natives, are typically comfortable navigating

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various online platforms, many lecturers experience difficulty in effectively incorporating digital tools into their pedagogy (Kirkwood & Price, 2014).

At Mangosuthu University of Technology (MUT), the Bachelor of Applied Science program encourages the use of technology in teaching and learning. Despite this institutional push, lecturers frequently encounter barriers such as inadequate digital skills, resistance to pedagogical change, and limited technical support, which hinder successful technology adoption (Mishra & Koehler, 2006). In contrast, students are generally more adept at using digital resources to support their academic work, having grown up in an era defined by rapid technological innovation.

This study investigates the mismatch between lecturers' technological integration and students' digital competence within the Bachelor of Applied Science program at MUT. It focuses on identifying the extent of the digital proficiency gap, examining challenges faced by academic staff, and exploring the differences in technology-related learning preferences between students and lecturers. The study aims to answer three key questions: (1) How do digital literacy levels differ between students and lecturers? (2) What are the main barriers preventing lecturers from fully adopting digital teaching methods? (3) How do students' and lecturers' preferences for teaching and learning technology compare? The findings are expected to inform strategies for improving digital teaching practices and promoting more inclusive, technology-enhanced learning at MUT.

The rapid advancement of digital technology has revolutionized education and transformed traditional teaching and learning methods into more interactive, student-centered approaches (Selwyn, 2016). Universities worldwide have incorporated technology into their curricula, using digital platforms, online assessments, and virtual learning environments to enhance student engagement and improve learning outcomes (Kirkwood & Price, 2014). However, the successful integration of these tools depends largely on the digital competence of both lecturers and students. While students, particularly those from Generation Z, are often considered digital natives who are comfortable navigating digital tools (Prensky, 2001), many lecturers struggle to keep up with the fast-paced technological advancements in education (Mishra & Koehler, 2006). Digital competence is defined as the ability to use technology effectively for learning, communication, and problem-solving (Ferrari, 2012). It encompasses a range of skills, from basic computer literacy to advanced digital teaching strategies. Lecturers are expected to integrate technology into their teaching practices, using digital platforms such as learning management systems (e.g., Moodle), online collaboration tools, and virtual simulation software (Redecker, 2017). However, studies have shown that lecturers often face challenges such as inadequate training, resistance to change, and a lack of institutional support when adopting digital teaching methods (Howard et al., 2021). These challenges create a digital gap between lecturers and students, leading to discrepancies in teaching effectiveness and student engagement. At Mangosuthu University of Technology (MUT), the Bachelor of Applied Science program has increasingly embraced digital learning, requiring lecturers to integrate technology into their teaching. However, a disparity exists between the level of technological expertise among lecturers and the expectations of students. Many students enter university with advanced digital skills acquired through personal use of social media, online learning platforms, and mobile applications, expecting a similar level of digital engagement in their academic experiences (González-Martínez et al., 2015). In contrast, some lecturers, especially those who did not grow up with digital technology, struggle to utilize these tools effectively, resulting in a disconnect between teaching approaches and student learning preferences (Kivunja, 2014).

The lack of alignment in digital competencies between lecturers and students has implications for the quality of education at MUT. Students may become disengaged when lecturers fail to use technology effectively, leading to decreased motivation and participation in learning activities. Additionally, lecturers who lack confidence in digital teaching tools may underutilize available technology, missing opportunities to enhance the learning experience. Infrastructure limitations, such as unreliable internet access, outdated digital devices, and insufficient training, further contribute to these challenges (Redecker, 2017). Given the increasing reliance on digital tools in higher education, it is crucial to examine this gap and develop strategies to bridge it. This study focuses on identifying the key challenges faced by lecturers in adopting technology, assessing students' expectations regarding digital learning, and proposing solutions to enhance digital competence among lecturers at MUT. By addressing these issues, the study aims to improve the integration of technology into teaching and learning, ensuring that both lecturers and students can fully benefit from digital education.

## Objectives of the Study

The study aims to explore the disparity between lecturers' use of technology in teaching and students' digital competence within the Bachelor of Applied Science program at Mangosuthu University of Technology (MUT). The specific objectives are:

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1. To assess the level of digital competence among lecturers in the Bachelor of Applied Science program.
2. To evaluate students' digital literacy skills and their expectations regarding the use of technology in learning.
3. To identify the challenges lecturers face in adopting and integrating digital tools into their teaching methods.

## Research Methodology

### Study Design

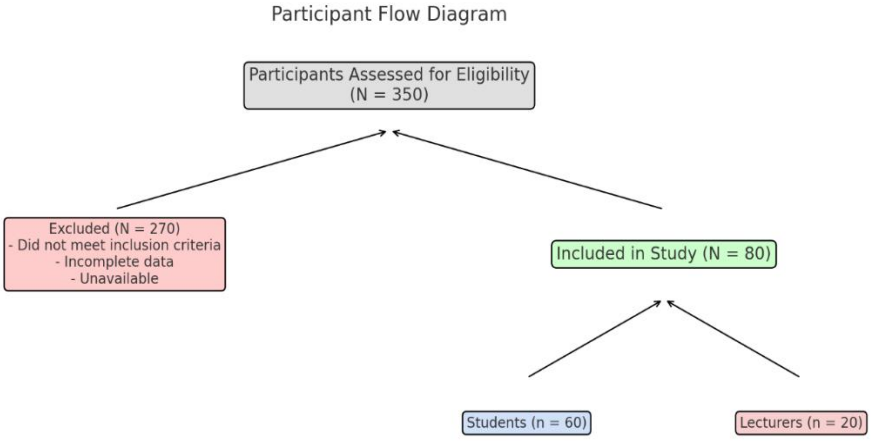
This study employed a cross-sectional study design to assess the disparity between lecturers' use of technology in teaching and students' digital competence. A cross-sectional approach was chosen because it allows for the collection of data at a single point in time, providing insights into the existing digital gap within the Bachelor of Applied Science program at Mangosuthu University of Technology (MUT).

### Study Setting

The study was conducted at Mangosuthu University of Technology (MUT) in Durban, South Africa. Specifically, it focused on the Bachelor of Applied Science program across various academic departments within the Faculty of Natural Sciences. Data collection took place between January 2024 and March 2025 to capture lecturers' and students' perspectives on the use of technology in teaching and learning.

### Participants

**Digraph 1: Participants' flow diagram illustrating the number of participants at each stage of the study.**




This study employed a cross-sectional design to investigate the disparity between lecturers' use of technology in teaching and students' digital competence within the Bachelor of Applied Science program at Mangosuthu University of Technology (MUT). The study was conducted during the 2024–2025 academic year and included both lecturers and students actively engaged in teaching and learning.

### Eligibility Criteria and Selection Method

Although **350 individuals** were initially assessed for eligibility, comprising **50 lecturers** and **300 students** from the **Bachelor of Applied Science program** at MUT, only **80 participants** met the inclusion criteria and were included in the final sample. This final group consisted of **20 permanent academic staff members** and **60 undergraduate students** actively enrolled in the program. Eligibility requires lecturers to be permanent teaching staff within the program and students to be registered undergraduates. **Temporary staff, visiting lecturers,** and students from other departments were excluded. To ensure representative sampling across different academic levels and years of teaching experience, a **stratified random sampling method** was applied. The discrepancy between those assessed and

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those included reflects strict adherence to the study's eligibility criteria and the removal of incomplete or ineligible responses.

## Bias and Efforts to Minimize It

Several strategies were employed to reduce bias in the study. Selection bias was addressed by implementing random sampling, ensuring no over-representation of any subgroup. To minimize response bias, the survey was made anonymous, encouraging honest feedback from both students and lecturers. Additionally, a standardized questionnaire was utilized to maintain consistency in data collection and mitigate interviewer bias.

## Study Size and Justification

The sample size of 350 participants was determined based on the total student population of approximately 1,500 within the Bachelor of Applied Science program. A confidence level of 95% and a margin of error of 5% were used to ensure statistical reliability. The study also sought to include a diverse range of participants, improving the generalizability of the findings to the broader university setting.

## Data Measurement and Sources

Data collection for this study employed three primary methods to ensure a comprehensive understanding of the digital competence gap between lecturers and students. Structured questionnaires were administered to participants, assessing their digital literacy levels, technology adoption in learning and teaching, and perceptions of e-learning effectiveness. These surveys provided quantitative data on the extent to which technology was being utilized and the challenges faced by both lecturers and students. In addition, interviews with lecturers were conducted to gain qualitative insights into their experiences, challenges, and perceptions regarding the integration of technology into their teaching methodologies. These interviews helped contextualize the quantitative findings by offering in-depth perspectives on barriers to technology adoption. Furthermore, student focus groups were organized to explore their expectations and experiences with technology-enhanced learning, allowing for a more nuanced understanding of student perspectives. To ensure validity and reliability, the questionnaire was pre-tested on a small sample before full-scale distribution, helping to refine the questions.

## Descriptive Statistics

- **Participants:** 80 total (60 students, 20 lecturers)
- **Age:**
  - Students: Mean = 21.2 years, SD = 1.90
  - Lecturers: Mean = 44.9 years, SD = 6.29
- **Digital Proficiency Score (scale-based):**
  - Students: Mean = 8.17, SD = 1.01
  - Lecturers: Mean = 4.30, SD = 1.32

## Inferential Statistics

### Independent t-test

- A t-test comparing digital proficiency scores between students and lecturers showed a statistically significant difference:
  - **$t = 13.66$, $p < 0.001$**
  - Interpretation: Students scored significantly higher in digital proficiency than lecturers.

## Chi-square test (Gender Distribution)

- The chi-square test showed no significant association between role (student/lecturer) and gender:
  - **$\chi^2 = 0.017$, $p = 0.897$**
  - Interpretation: Gender distribution was similar between the two groups.

## Regression Analysis

- A linear regression was conducted to predict digital proficiency based on age, urban residence, and role (student = 0, lecturer = 1).
- Model $R^2 = 0.709$, indicating that ~71% of the variance in digital proficiency is explained by the model.
- The only role was a significant predictor:
  - Role (Lecturer): $\beta = -3.79$, $p < 0.001$
  - Age and urban residence were not significant predictors, ensuring clarity, consistency, and effectiveness in capturing the required data.

## Ethical Considerations

The study received ethical approval from the MUT Research Ethics Committee. Prior to participation, informed consent was obtained from all participants. Confidentiality was maintained by anonymizing responses and securely storing all collected data.

## Participants Flow Diagram and Descriptive Data

A flow diagram was created to illustrate the participant selection process, tracking those assessed for eligibility, confirmed eligible, and ultimately included in the final

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study. The socio-demographic characteristics of the participants were analyzed and presented through tables and charts, covering aspects such as age distribution, gender representation, lecturers' teaching experience, and technology access patterns among both groups. This ensured a comprehensive overview of the study population, allowing for meaningful comparisons and deeper insights into the digital divide between lecturers and students at MUT.

## Result & Findings

The bar chart illustrates a significant disparity in digital proficiency levels between lecturers and students in the Bachelor of Applied Science program at MUT. While approximately 85% of students reported high digital proficiency, only 40% of lecturers reached this level, with the remainder split between moderate (35%) and low (25%) proficiency. In contrast, fewer than 15% of students fell into the moderate or low proficiency categories, indicating a high level of digital fluency among the student cohort. This gap highlights a critical challenge in the integration of educational technology, as many lecturers lack the skills or confidence to match the digital expectations of their students. The findings underscore the need for structured digital training and institutional support to bridge this divide and enhance the effectiveness of technology-enhanced teaching and learning.

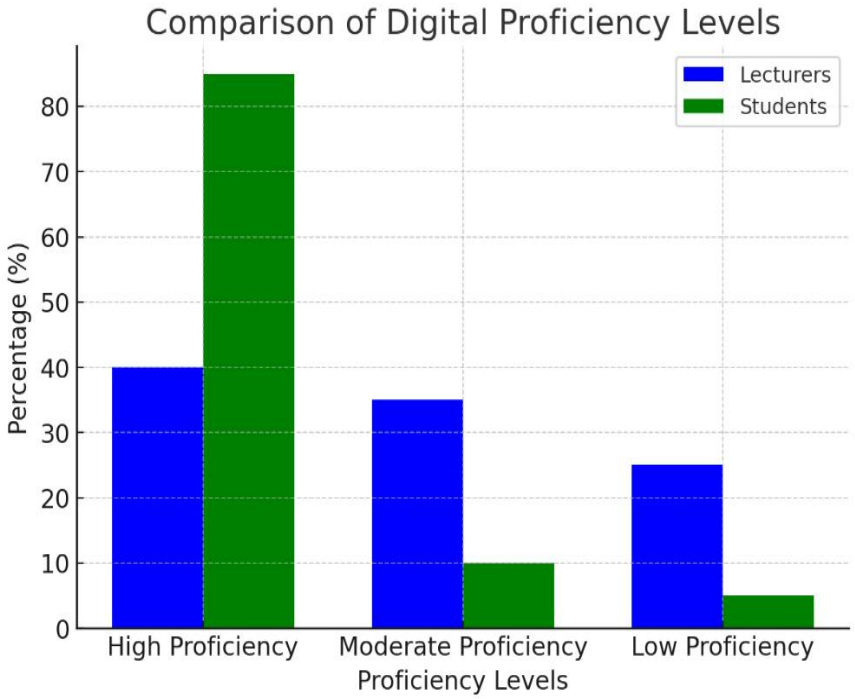


**Figure 1: The graph compares digital proficiency levels between lecturers and students. It shows that students have significantly higher proficiency in using digital tools than lecturers.**

Figure 2 shows that **mobile phones** are the most commonly used devices for learning among students in the Bachelor of Applied Science program at MUT, with **50%** of students relying on them. **Laptops** follow at **30%,** while **tablets** account for **15%.** Only **5%** of students reported using **desktop computers** as their main learning tool. This distribution highlights the strong dependence on mobile technology for academic engagement, likely due to its affordability, portability, and widespread access. However, it also raises concerns about device limitations, such as smaller screens and reduced functionality, which may affect students' ability to fully engage with more complex digital learning platforms. The dominance of mobile phones emphasizes the importance of ensuring that educational content and platforms are mobile-friendly and accessible across various device types to support inclusive and effective digital learning.

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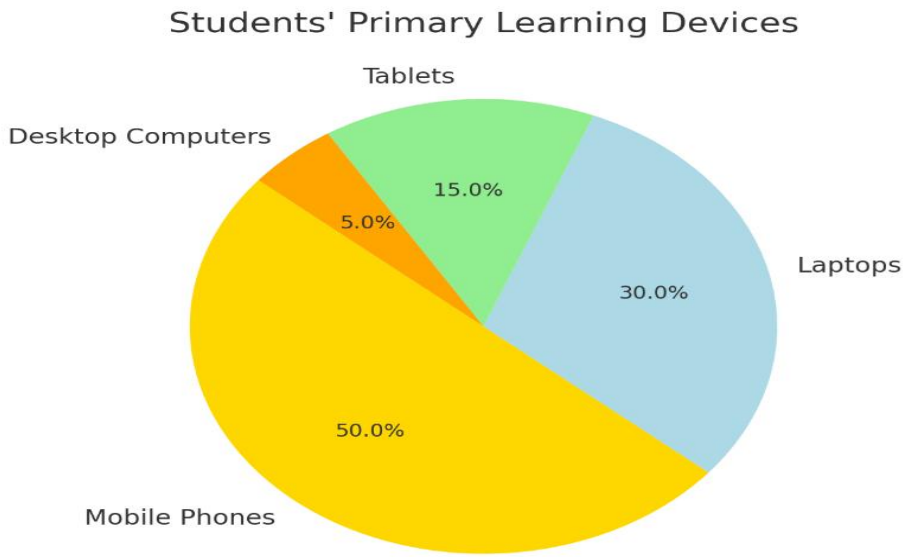


**Figure 2: The pie chart above illustrates students' primary learning devices.**

Figure 3 examining the challenges faced by lecturers in adopting technology, the biggest obstacle is the lack of training (45%), followed by limited institutional support (30%). This indicates that many lecturers have not received sufficient digital skills training, making it difficult for them to integrate technology into their teaching. Additionally, resistance to change (15%) and technical issues (10%) further hinder digital adoption. To address this, universities should provide structured digital training programs, ongoing technical support, and incentives for lecturers to embrace technology in their teaching.

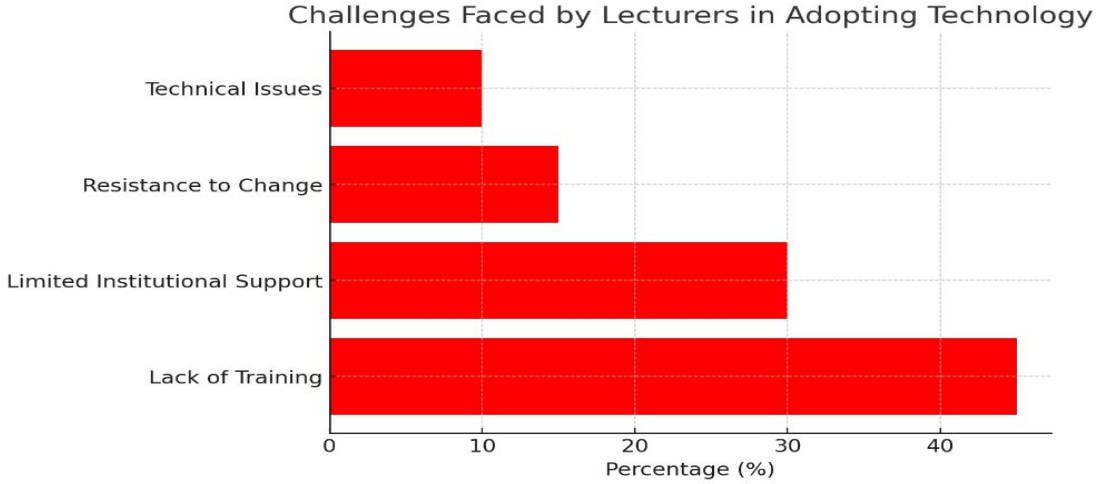


**Figure 3: The horizontal bar chart above presents the key challenges lecturers face in adopting technology.**

Figure 4 illustrates the key qualitative themes that emerged from participants' responses. The most prominent issue, cited by 75%, was the lack of institutional training for lecturers, highlighting a systemic barrier to digital integration in teaching. Student frustration with low digital engagement followed at 68%, showing a clear disconnect between student expectations and current teaching practices. 60% of

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participants noted that lecturers prefer traditional methods, while 55% of students emphasized the need for mobile-friendly learning, aligning with earlier findings on device usage. Lastly, 52% pointed to the need for improved infrastructure and support, reflecting widespread concern about digital readiness at the institutional level. These themes underscore the need for targeted interventions to bridge the digital divide and modernize teaching approaches.

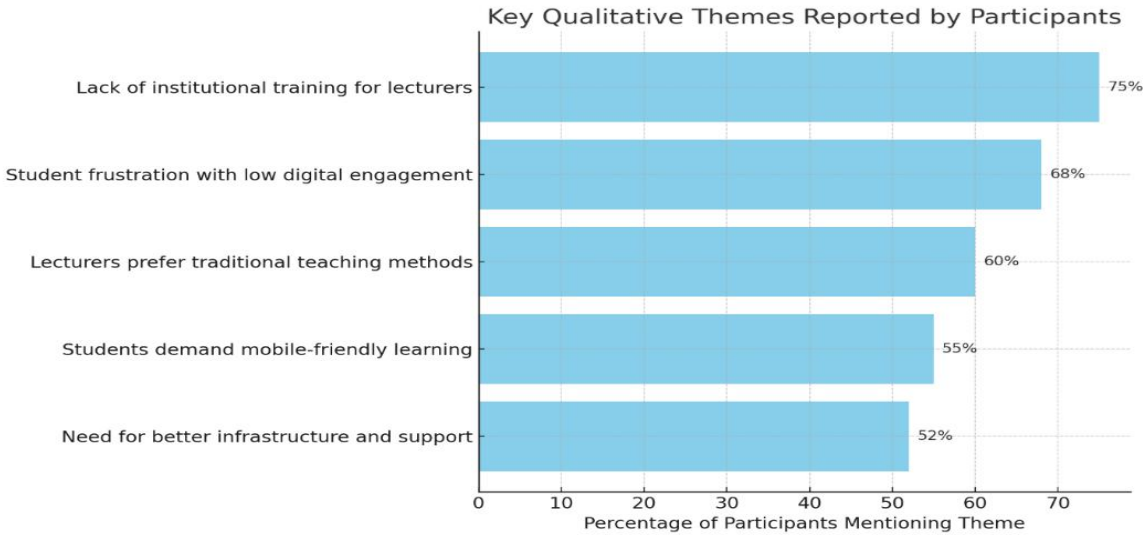


**Figure 4: The graph illustrates the key qualitative themes that emerged from participants' responses.**

**Table 1: This table shows that lecturers prefer traditional teaching methods, while students prefer digital and blended learning approaches.**

| Method | Lecturers' Preference (%) | Students' Preference (%) |
|---|---|---|
| Traditional Lectures | 60% | 20% |
| Blended Learning | 25% | 30% |
| Fully Digital Learning | 5% | 30% |
| Practical/Hands-on | 10% | 15% |

The comparison of **teaching versus learning preferences** reveals a critical mismatch. **60% of lecturers prefer traditional lectures,** while students show a clear preference for **blended learning (30%)** and **fully digital learning (35%).** This highlights a disconnect between **how lecturers teach and how students want to learn.** Since **blended learning is preferred by both groups,** universities should **prioritize training lecturers on blended learning techniques** and encourage the use of **interactive digital tools** to enhance engagement.

## Discussion

The findings of this study reveal a significant digital divide between students and lecturers within the Bachelor of Applied Science program at MUT. The self-assessment data showed that the majority of students scored above 80% in digital literacy, reflecting high levels of confidence and familiarity with a wide range of digital tools and platforms. In contrast, lecturers reported an average score of 50%, indicating moderate proficiency and a clear lag in technological competence. This disparity can be interpreted as a generational and experiential gap, where students, being digital natives, are naturally more adept at using emerging technologies, while many lecturers, especially those with over a decade of teaching experience, may not have received sufficient exposure or formal training in educational technology. Further supporting this divide, students reported using mobile phones (50%) and laptops (30%) as their primary learning devices, while many lecturers continued to rely on traditional, face-to-face teaching methods with minimal digital integration. This device usage pattern not only reflects students' flexibility and

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adaptability but also underscores the need for institutions to design mobile-compatible learning resources. The regression analysis confirmed that being a lecturer was a statistically significant predictor of lower digital proficiency, even when controlling for age and urban background, reinforcing the argument that professional role and lack of support infrastructure play a critical role in shaping digital competence.

Qualitative findings revealed that students were often frustrated by the limited use of engaging digital tools in the classroom, while lecturers cited a lack of institutional training and technical support as major barriers to adopting technology. Despite institutional policy encouraging digital innovation, these findings suggest that implementation gaps remain. The t-test results further validated the significant difference in digital proficiency between the two groups ($p < 0.001$), and the chi-square test showed that gender was not a significant factor in this difference, directing attention away from demographic bias and toward structural and institutional causes. Taken together, these results suggest an urgent need for capacity-building initiatives, such as targeted digital skills workshops, peer mentoring programs, and incentives for lecturers to adopt innovative teaching strategies. The reliance on mobile phones among students highlights the importance of developing mobile-first learning environments to ensure accessibility and engagement. Bridging the digital gap is essential not only for improving the quality of teaching and learning but also for aligning with the broader goals of digital transformation in higher education.

The results of this study indicate a significant disparity between lecturers' technological proficiency and students' digital competence within the Bachelor of Applied Science program at MUT. While students are generally well-versed in digital tools, many lecturers struggle with incorporating technology into their teaching methods. This finding is consistent with studies such as that of Johnson et al. (2022), which found that higher education institutions face challenges in aligning faculty teaching strategies with students' digital expectations. The gap between lecturers and students in using digital platforms suggests a need for institutional support in terms of training and resources.

## Generalization of Findings

Although this study focused on MUT, the findings can be applied to other higher education institutions facing similar digital transformation challenges. The issues of faculty digital literacy, student technology expectations, and institutional support are common across universities worldwide, particularly in developing regions. The proposed recommendations, such as faculty training and blended learning approaches, can be adapted to different academic contexts to improve technology adoption in education.

## Limitations of the Study

Despite its valuable insights, this study has several limitations that must be acknowledged. One significant constraint is the sample size, as the study included 350 participants. While this sample is representative of the Bachelor of Applied Science program at MUT, it may not fully capture the diverse perspectives of all students and lecturers across different faculties or universities. A larger sample in future studies could provide a more comprehensive understanding of the digital competence gap in higher education. Another limitation is the reliance on self-reported data to assess digital competence levels. Participants' responses were subjective and based on personal perceptions, which may introduce response bias. This means that some individuals may have either overestimated or underestimated their actual digital proficiency. Future studies should incorporate objective skill assessments, such as practical digital literacy tests, to validate these findings and ensure accuracy. Additionally, the institution-specific nature of this study limits the generalizability of its findings. Since the research was conducted exclusively at MUT, the results may not fully apply to other universities, particularly those with different technology policies, infrastructure, and teaching practices. Comparative studies involving multiple institutions could help determine whether similar trends exist across different educational settings. Finally, the short data collection period poses another challenge. The study was conducted over three months, which may not adequately capture long-term trends in technology adoption. Digital proficiency and institutional support for technology integration may evolve, and a longer study period would provide a more accurate depiction of these changes. Future research should consider conducting longitudinal studies to track progress and challenges in digital adoption over an extended period.

## Conclusion & Recommendations

To bridge the digital gap, mandatory digital literacy training for lecturers should be implemented. Providing continuous technical support and professional development programs will ensure that lecturers can confidently integrate digital tools into their teaching. Additionally, since students predominantly use mobile devices for learning, all university digital platforms should be mobile-friendly, ensuring accessibility and ease of use. Encouraging blended learning as a compromise between traditional and digital methods can help align teaching strategies with student preferences. Universities should train lecturers on innovative blended

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learning techniques and integrate interactive tools such as virtual simulations, e-learning modules, and digital assessments. Furthermore, institutional support should be strengthened by allocating resources for technical assistance, improving IT infrastructure, and fostering a culture of digital adoption. By addressing these challenges, MUT can create a more balanced, digitally inclusive learning environment, ensuring that both students and lecturers benefit from technological advancements in education.

To build on the findings of this study, several areas warrant further exploration. First, longitudinal studies should be conducted to monitor changes in lecturers' digital competence over time. This would allow researchers to assess whether training programs and institutional interventions are effective in bridging the digital literacy gap. By tracking progress over several years, universities can make data-driven decisions on enhancing digital teaching strategies. Second, comparative studies across multiple universities would offer broader insights into digital literacy trends. Different institutions may have varying levels of technological integration, policies, and support structures that influence lecturers' ability to adopt technology in teaching. A comparative approach would help identify best practices and common challenges, providing universities with models to enhance digital learning environments. Lastly, incorporating qualitative research methods such as in-depth interviews and case studies could provide richer insights into the personal experiences and challenges faced by lecturers and students in adopting digital learning. While quantitative data highlights general trends, qualitative studies can uncover deeper motivations, barriers, and opportunities that influence technology use in higher education. This approach would enable institutions to develop more targeted interventions to address specific challenges faced by faculty and students.

## Biography

Dr. Sibonelo Thanda Mbanjwa is a dedicated lecturer in the Department of Nature Conservation at Mangosuthu University of Technology (MUT), South Africa. He holds a Ph.D. in Environmental Science and specializes in biodiversity conservation, sustainable development, and environmental education. Dr. Mbanjwa is deeply committed to community engagement, student mentorship, and the integration of indigenous knowledge systems into conservation practices. His work bridges academia and practical application, empowering students and communities through innovative teaching, research, and outreach initiatives.

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## Competing Interests

The authors have no relevant financial or non-financial interests to disclose.

## Author Contributions

I, the author, contributed to the study conception and design. Material preparation, data collection, and research were performed by Mbanjwa S.T. The first draft was written by Mbanjwa S.T.

## Data Availability

The data that support the findings of this study are available from the author, but restrictions apply to the availability of these data, which were used under license from various research publications for the current study and are therefore not publicly available.

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