
Evaluation of Digital Literacy Skills Among First-Year Students in the Department of Business and Information Management Services at Tshwane University of Technology, South Africa

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Abstract: Digital literacy is an essential competency for first-year students in higher education institutions (HEIs), especially as teaching and learning increasingly rely on digital technologies. This study investigates the relationship between digital literacy and the dimensions of the Technology Acceptance Model (TAM) of first-year students within the Department of Business and Information Management Services (BIMS) at Tshwane University of Technology, South Africa. The study adopted a positivist paradigm and employed a quantitative research approach to address the research objectives. Using a purposive sampling approach, data were collected via an online survey administered to 161 first-year students in the BIMS department. Statistical analysis using SPSS revealed varying levels of digital literacy and significant differences associated with demographic variables such as gender, age, geographic location, home internet access and prior computer usage experience. Furthermore, there was a positive relationship between TAM constructs and digital literacy skills. The study highlights the need for tailored digital literacy interventions to support academic success among first-year students. It recommends that higher education institutions implement targeted training initiatives to close digital skill gaps, particularly for students from disadvantaged backgrounds.

Keywords: digital literacy; technology acceptance model; first-year students; higher education; South Africa

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Introduction

In the context of higher education, Information and Communication Technology (ICT) has emerged as a pivotal tool in providing students with autonomous access to digital learning content, thereby expediting the learning process (Gamede 2021; Ndebele & Mbodila, 2022). The South African higher education sector is pressured to incorporate educational technologies into the teaching curriculum (Ndebele & Mbodila, 2022). This is primarily because computers and related technologies are considered crucial tools for academic work in higher learning institutions (Mntuyedwa & Letseka, 2022). South Africa's National Development Plan 2030 envisions accessible, high-quality

education as essential to achieving a more inclusive and equitable society (National Planning Commission, 2012). Similarly, the United Nations (2015) Sustainable Development Goal 4 (SDG4) states that inclusive and equitable quality education must be ensured to promote lifelong learning opportunities for all. The integration of digital literacy in education is considered a key indicator in achieving SDGs (Radovanović et al., 2020). While the data were collected from the respondent

use of educational technology is important for both students and lecturers, concerns arise regarding digital literacy deficits and limited access to ICTs at the secondary school level when students transition from face-to-face pedagogical methods used in schools to online learning methods implemented at higher education institutions (Antee, 2021). Tadesse (2022) argues that institutions serving underprivileged and historically disadvantaged students are most severely impacted when adopting ICTs for teaching and learning. The negative effects of digital inequality are particularly felt by many students from rural backgrounds who struggle to adapt to new learning methods at the tertiary education level (Oyedemi & Mogano, 2017; Tohara et al., 2021). Therefore, the ability of students to use educational technology should not be overestimated when they enroll at higher education institutions for the first time (Mntuyedwa & Letseka, 2022). Moreover, digital technologies play a crucial role in fostering essential 21st-century skills, including problem-solving, cognitive structuring and process comprehension, all of which are vital for professional success (Haleem et al., 2022).

Against this backdrop, digital literacy has emerged as a vital area of study in assessing how first-year students perceive the use of technology for learning purposes in higher education. As such, the primary objective of this study was to evaluate the digital literacy skills among first-year students at the Business and Information Management Services (BIMS) department of Tshwane University of Technology in South Africa. This study assessed first-year students' digital literacy skills to determine their preparedness for digital learning and identify areas that require institutional intervention. The findings of this study, which examined their proficiency in areas such as information literacy, digital communication, online safety and academic software use, could help shape curriculum creation, targeted training programmes and policy suggestions aimed at closing the digital gap. Furthermore, the study was consistent with South Africa's overall goals of improving digital education within the Fourth Industrial Revolution (4IR) and guaranteeing fair access to technical resources in higher education. This study, therefore, addressed this gap by examining the relationship between the Technology Acceptance Model (TAM) and digital literacy, contributing to the discourse on technology adoption and skills development in higher education. The research questions of this study were as follows:

- What are the digital literacy levels of first-year students enrolled in the BIMS department?
- What is the relationship between the TAM dimensions and digital literacy skills of first-year students in the BIMS department?

Literature review

In contemporary academia, digital literacy is a fundamental pillar in fostering active participation in the modern world, encompassing both individual and occupational achievements (Tejedor et al., 2020). In the context of the 21st-century educational landscape, the acquisition of life skills, digital literacy skills and learning skills is considered essential for students (Shuhidan et al., 2021). Digital literacy encompasses various professional computing skills and enables students to engage in social networks for knowledge generation and exchange (Chetty et al., 2018). Moreover, developing digital literacy competencies is a prerequisite for students' success in the 21st century (Tohara et al., 2021). Digital literacy competencies hold a variety of advantages, including the development of critical thinking skills, a fundamental ability in the digital age (Mokhtari, 2023).

The rapid expansion of digital technologies necessitates greater attention to how students engage with these tools, to students' modes of online interaction and to the competencies required to navigate digital environments effectively (Reddy et al., 2023). In the context of higher education, the ability of both students and educators to interact meaningfully with digital learning environments has become increasingly critical (Wei, 2024). Digital literacy has thus emerged as a central concept for educators, researchers and educational leaders striving to address the complex and evolving demands placed on institutions and learners in the digital era (Pangrazio et al., 2020). Within this evolving landscape, digital literacy is understood not merely as technical proficiency, but as a multifaceted construct encompassing the social, cognitive and communicative skills required to function effectively in diverse and technologically mediated educational contexts (Wei, 2022, June). It includes an individual's awareness, attitude and ability to use digital tools to access, evaluate, integrate and synthesise

information, generate new knowledge, produce digital content and engage in meaningful communication (Nazzal et al., 2021). In a similar vein, Maphosa and Bhebe (2019) conceptualise digital literacy as the capacity to utilise ICTs to support and enhance learning, while Chetty et al. (2018) emphasise its role in facilitating access to online content and services, thereby promoting educational engagement.

Kavensky (2021) expands on this by framing digital literacy as the ability to interpret and apply information presented in various formats across digital platforms, while Khan et al. (2022) describe digital literacy as the ability to collect and manage information and transform it into actionable knowledge. This broad skillset highlights the imperative of embedding digital literacy within the educational landscape, not only to foster lifelong learning, but also to prepare students for the demands of future employment (Mokhtari, 2023). As noted by Gamede (2021), digital literacy equips students with the tools to leverage electronic resources to address academic tasks and real-world challenges. To guide effective instruction and integration of these competencies, Tohara et al. (2021) propose a digital literacy model that incorporates cognitive skills, technological proficiency and ethical considerations as foundational pillars. Collectively, these perspectives underscore the critical role of digital literacy in shaping educational success and broader societal participation in the digital age.

As digital technologies continue to evolve across various domains, the concept of digital literacy must adapt accordingly. Investigating how different learning environments shape digital literacy development is thus essential (Rui & Attan, 2024). Recent research has shown that digital literacy among undergraduate students influences their engagement with online learning, mediated by the perception of educator support. This highlights the importance of enhancing instructor support mechanisms to foster more positive attitudes towards technology integration (Zheng et al., 2025). Additionally, educators play a critical role in shaping student digital literacy skills. Mardiana (2024) emphasises that educators who improve their own digital competencies can enhance their instructional effectiveness, thereby contributing to improved student learning outcomes. Socio-economic factors are strongly linked to variations in digital literacy skills. Variables such as gender, geographical location, access to digital tools, academic discipline, level of education and prior experience with technology significantly impact digital literacy competencies (Samani et al., 2019).

Supporting this view, Bipasha et al. (2025) found that female students, in particular, demonstrated a high level of digital literacy awareness and proficiency. Additionally, age and type of educational exposure contribute to the broader digital divide, explaining disparities in digital literacy levels across demographic groups (Rui & Attan, 2024). In less developed countries such as South Africa, limited access to technology remains a significant barrier. As institutions increasingly undergo digital transformation, technological disparities must be addressed to overall benefits in enhancing user performance equip graduates with the digital skills required in the modern workforce (Ndibalema, 2025). The integration of digital tools into education goes beyond traditional literacy and requires both students and lecturers to adapt their approaches to teaching and learning (Rui & Attan, 2024). Access to technological infrastructure has thus become a fundamental factor in enabling the development of digital literacy in higher education. Beyond basic digital navigation, digital literacy entails the ability to critically apply technological knowledge in real-world contexts to support academic success and future career development (Ngoc & Chong, 2023). As such, embedding technology within the curriculum is increasingly recognised as a strategic approach to fostering students' ability to navigate, evaluate and create digital content (Soufghalem, 2024).

Theoretical framework

In the 1980s, researchers explored the connection between cognitive and emotional variables and technology usage, leading to the development of the Technology Acceptance Model (TAM) based on social psychology theory. TAM is widely recognised as a useful tool for determining user acceptance or rejection of new technology (Aburbeian et al., 2022). The model aims to examine how technology usage affects users' beliefs, attitudes and intentions by utilising variables observed externally. Among the four essential components of TAM (depicted in Figure 1), two fundamental components are behavioral intent, which refers to a user's willingness to try new technologies, and perceived usefulness, which relates to a user's subjective views on technology usage (Su & Li, 2021; Tambun et al., 2020). According to Hong et al. (2021), perceived usefulness and perceived ease of use significantly influence people's behavioural intentions to accept technology. This model posits that the acceptability of an information system is determined by these two key factors, which, in turn, shape attitudes towards technology use, influence behavioural intentions and ultimately lead to actual system usage (Davis et al., 1989). Figure 1 below depicts the Technology Acceptance Model (TAM).

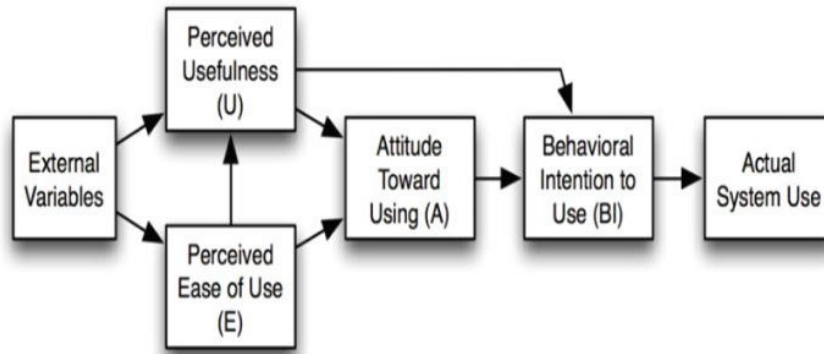


Figure 1. Technology Acceptance Model (TAM).
Source: Davis et al. (1989)

According to Su and Li (2021), TAM suggests that both the ease of use and usefulness of technology have an impact on behavioural intentions, which subsequently influence the overall user experience. The literature highlights that perceived usefulness and perceived ease of use are two crucial factors that predict the acceptance and usage of information technology (Chen & Aklikokou, 2020). Furthermore, this model indicates that when users are introduced to new technologies, various factors come into play in their decision-making process regarding usage (Tahar et al., 2020). Studies have shown that students with higher digital literacy skills are more likely to recognise the benefits of technology in learning, thereby increasing their perceived usefulness (Hatlevik et al., 2015; Ng, 2012). Conversely, students with low digital literacy may struggle to see the advantages of technology, leading to resistance to adoption (Scherer et al., 2019).

Perceived ease of use refers to the extent to which individuals believe that a particular information technology system is easy to operate (Siagian et al., 2022). On the other hand, perceived usefulness is related to the system's productivity, effectiveness and overall benefits in enhancing user performance (Tahar et al., 2020). The Technology Acceptance Model (TAM) theory has proven applicable across various industries when it comes to the adoption of modern technology, as evidenced by previous studies (Siagian et al., 2022). Information technology readiness is primarily measured in terms of the readiness of the users and the technology itself (Tahar et al., 2020). Digital literacy skills have a significant effect on perceived ease of use, because students who are skilled in digital tools find them more intuitive and less burdensome. Teo (2019) found a strong link between digital literacy and perceived ease of use, showing that students with prior familiarity with digital technologies find them easier to use. Calisir et al. (2014) established that students with limited digital abilities frequently became frustrated with e-learning systems, reducing their perceived ease of use.

Methods

This study adopted a quantitative research methodology and the methodological principles of positivism. A validated research instrument on digital literacy adapted by Gie and Fenn (2019) was used to collect data from the respondents through a self-administered questionnaire consisting of four sections. The first section focused on the demographic details of the respondents. The second section focused on the perceived ease of use (PEU). The third and fourth sections focused on perceived usefulness (PU) and digital literacy, respectively.

The study involved first-year students enrolled in the BIMS department at Tshwane University of Technology, Pretoria campus. According to the university's institutional Management Information System (MIS) data, there were a total of 323 first-year students in the BIMS department. The following inclusion criteria were applied to select respondents:

- Students were required to be registered for the Diploma in Administrative Information Management as first-year entrants in 2024.
- Only students who were not repeating any module offered in the first year of study were included.

A non-probability sampling technique was employed in this study. Non-probability sampling refers to a sampling approach where the probability of selecting a subject is unknown (Acharya et al., 2013). Purposive sampling

was used to select respondents from the first-year students enrolled in the BIMS department. This technique was chosen because it was convenient for the researchers, aligned with the research study's objectives and goals and would improve the reliability of the study findings. Moreover, the respondents were selected based on the specific purpose of the study (they were in their first year of study). The sample size for this study was 161 first-year students, calculated using the Raosoft sample calculator. These students were registered for a Diploma in Administrative and Information Management in the BIMS department of Tshwane University of Technology. Given the nature of the research objectives and the targeted population, purposive sampling was deemed the most appropriate approach for this study.

The data for this study were collected through the survey method using an existing questionnaire developed and validated by Gie and Fenn (2019). The research instrument had also been found to be reliable by other scholars such as (Fleming and Stanway, 2014; Hussein et al., 2014). Data were collected from the respondents through an online questionnaire survey. Ethical clearance was obtained from the Research Ethics Committee of the Tshwane University of Technology prior to the commencement of data collection (REF: REC2023/12/010). The services of the instructional designer were engaged to distribute the survey link via the university's Learning Management System (LMS) platform. The use of the LMS allowed students to complete the survey at their own pace and in their preferred location, using various smart devices. Conducting the data collection online ensured confidentiality and anonymity for the participants. Furthermore, the survey instrument did not include questions related to personal identifiers, ensuring that no identifiable information was collected from respondents. The survey instrument consisted of four sections. Section A covered demographic variables and Section B used the Perceived Ease of Use (PEOU) scale to measure students' perceptions of the effort required to use technology. Section C applied the Perceived Usefulness (PU) scale to assess students' beliefs regarding the impact of technology use on their academic performance. Finally, Section D used the Digital Literacy Scale to determine the respondents' perceived level of digital literacy. The collected data will be stored for a period of five years or until all researchers involved in the project have confirmed the completion of the project, analysis of data and publication of reports.

The study used the latest version of the Statistical Package for the Social Sciences (SPSS) to analyse the collected data. The collected data were captured on Microsoft Excel and then imported into SPSS version 29. The categorical variables in this study were summarised in terms of frequencies and percentages. The continuous variables used in this study were summarised as mean and standard deviation. Multiple linear regression served to estimate the relationship between the dimensions of the TAM and the digital literacy skills of first-year students. When assessing the internal consistency of a questionnaire or survey, the most commonly used measure is Cronbach's alpha coefficient (Bujang et al. (2018)). This coefficient is particularly suitable for surveys or questionnaires that include multiple Likert-type scales, as was the case in this study. The questionnaire selected for this study was found to be reliable by its developers. Gie and Fenn (2019) reported moderately high Cronbach's alpha coefficient values for the three sections: perceived ease of use (0.88), perceived usefulness (0.90) and digital literacy skills (0.91). In their study, Gie and Fenn (2019) eliminated six items with Cronbach's alpha coefficients below 0.70 to ensure a high level of reliability, ultimately resulting in an overall alpha value of 0.90. Additionally, the factor analysis results demonstrated satisfactory construct validity, with the questionnaire reaching a significant level of 0.05 (Gie & Fenn, 2019).

Findings

The demographic profile of the participants in Table 1 shows that most student respondents were female and were from 18 to 21 years of age. Unsurprisingly, 68% of the students had access to a computer and the internet at home, and about 78% of the students had been using a computer from 0 to 6 months.

The evaluation of perceived usefulness regarding digital literacy skills among first-year students gives insight into how students saw the benefits of using computer systems for their learning. The data include mean scores and standard deviations for various statements about perceived usefulness (refer to Table 2). Analysing perceived usefulness among first-year students using TAM provides a comprehensive view of how students perceived the benefits of using computer systems in their learning processes. The average mean for perceived usefulness was 3.45 (see Table 2), indicating that most students found digital platforms helpful in their educational endeavours. The results reflect that students acknowledged that having a computer system made learning more efficient and productive, improved learning quality and potentially contributed to institutional competitiveness.

Table 1. Descriptive statistics.

Variables	Frequency	Percentage
Gender		
Male	46	71
Female	115	29
Age category (years)		
18-21	126	78
22-29	34	21
30-39	1	1
> 39		
Do you have access to a computer at home?		
Yes	109	68
No	52	32
Do you have access to the internet at home?		
Yes	109	68
No	52	32
How long have you been using a computer?		
0-6 months	125	78
6-12 months	8	5
>12 months	28	17

Table 2. Aspects relating to perceived usefulness and perceived ease of use.

	Mean	SD	Cronbach's alpha
Aspects relating to perceived usefulness	3.45	0.08	0.878
Using a computer system enables me to learn in an efficient way	3.52	1.12	
Using a computer system enables me to increase my learning productivity	3.51	1.17	
Using a computer system enables me to learn more quickly	3.32	1.18	
Using a computer system improves the quality of my learning	3.48	1.17	
Using a computer system advances school competitiveness	3.41	1.16	
Aspects relating to perceived ease of use	2.61	0.13	0.870
My interaction with the computer system is clear and understandable	2.79	1.16	
Interacting with the computer system does not require a lot of my mental effort	2.47	1.18	
I find the computer system to be easy to use	2.55	1.23	
I find it easy to get the computer system to do what I want it to do	2.68	1.20	
My interaction with the computer system is clear and understandable	2.55	1.20	

For perceived ease of use (PEU), the average mean was 2.61 (see Table 2), indicating that most students found the platform easy to use. Furthermore, the low standard deviation of 0.08 suggests that there was a high level of agreement among students regarding the usefulness of computer systems. The Cronbach alpha value of 0.878 signifies excellent internal consistency, indicating that the items used to measure perceived usefulness reliably captured the underlying construct. The efficiency in learning construct received the highest mean score, suggesting that students strongly agreed that computer systems enhanced their learning efficiency (refer to Table 2). However, the relatively high standard deviation (1.12) indicates variability in individual perceptions, implying that while many students found computer systems efficient, there was a significant range in how much they valued this aspect.

The assessment of digital literacy skills among first-year students reflects how effectively they engaged with and utilised computer systems for academic purposes. Table 3 presents the data – mean scores, standard deviations and Cronbach's alpha, offering insight into students' experiences and perceptions. The average

mean score for communicating digital content was 3.40, indicating that most students found digital platforms effective for communication. Students reported a positive experience with writing responses to assignments and participating in discussions on online forums. The mean score suggests a slightly favourable view, although the standard deviation (1.03) indicates significant variability in how students engaged with online discussions, with some finding it easier or more effective than others. The mean score for actively providing feedback in online discussions was lower (3.20), showing that students might find this aspect less engaging or challenging. Furthermore, there were higher mean scores (3.84) for writing and uploading assignments onto the Learning Management System (LMS), suggesting that they found this process easier or more effective than other digital communication tasks.

Table 3. Mean scores of digital literacy.

	Mean	SD	Cronbach's alpha
Communicating digital content	3.40	0.29	0.782
I write positive responses regarding assignments/discussions regarding information in online discussion forums	3.50	1.03	
I respond to discussions by actively providing feedback in online discussion forums	3.20	1.11	
I write responses to assignments through online discussion forums	3.14	1.09	
I write assignments or assessments to be uploaded into the Learning Management System ((i.e.)MyTutor)	3.84	0.94	
I am able to share information through online discussion forums	3.29	1.12	
Exploring digital content	3.53	0.19	0.863
I use presentation software (MS PowerPoint, Canva and the like) to do assignments and support learning	3.24	1.22	
I use writing software (MS words, MS Excel and the like) to do assignments and support learning	3.71	1.01	
I read important information from digital contents (online newspapers, research publications, blogs or videos)	3.38	1.14	
I know how to use cell phones and computers/laptops in order to read e-books, journals or news portals	3.43	1.07	
I am able to find digital content from various sources (example: YouTube, Google, Research Gate, Sage etc.)	3.69	1.01	
I look for all the learning materials I need through the internet	3.61	1.06	
I download course materials (ppt, pdf, word) via the Learning Management System (MyTutor) or search engines	3.78	1.01	
I am able to evaluate digital information	3.38	1.01	
Creating and using digital content	3.31	0.35	0.824
I use special software for academic purposes (for example: Microsoft Teams, Zoom and the like)	3.69	0.944	
I use referencing software (MS Word, EndNote, Mendeley and the like) to do assignments	3.48	1.06	
I use drawing software (Ms Paint, Photoshop, CorelDraw and the like) to do assignments supporting lectures	2.79	1.14	
I have an email that I use to facilitate the communication process	3.69	0.98	
I have specific software knowledge through the internet to organise assignments or to convey my ideas	3.06	1.16	
I am able to create content using the computer and the internet	3.02	1.16	
Digital content helps me learn	3.44	1.13	

The second part of the Digital Literacy Scale focused on exploring digital content. The average mean for exploring digital content was 3.53, suggesting strong agreement among students on the ease of exploration. Evaluating students' abilities and practices related to exploring digital content gave insight into their proficiency in using various digital tools and sources for learning. This includes their use of presentation and writing software, their ability to access and evaluate digital information and their engagement with online material. There was a lower mean score (3.24) for using presentation software ((e.g.) MS PowerPoint, Canva) for assignments, while the use of writing software ((e.g.) MS Word, MS Excel) had a higher mean score (3.71), reflecting a more positive perception of students' ability to use these tools for assignments and learning. The standard

deviation (1.01) indicates moderate variability, suggesting that while most students were comfortable with writing software, there were differences in individual proficiency.

The average mean for creating and using digital content—the third construct of the Digital Literacy Scale—was 3.31, showing that most students agreed on the effectiveness of digital platforms for these activities. The standard deviation of 0.35 reflects relatively low response variability, showing some consensus among students regarding their digital content creation skills. The lowest mean score (2.79) was for using drawing software such as MS Paint and Photoshop for assignments. This indicates that students were less comfortable with or found less use for these tools for supporting lectures. The high standard deviation (1.14) shows significant variability in students' use of and experience with drawing software. Conversely, there was a relatively high mean score (3.69) for using special software (e.g.) Microsoft Teams, Zoom) for academic purposes, suggesting comfort with and proficiency in these tools. The standard deviation of 0.944 indicates some variability in how frequently or effectively students used these platforms. Interestingly, a similar mean score (3.69) was reported for using email to facilitate communication. This suggests that email was a commonly used and effective tool for academic communication. The standard deviation (0.98) reflects some variation in the extent of use of email.

In order to determine the relationship between the dimensions of the TAM and the digital literacy of first-year students, multiple regression was conducted, with age; gender; have access to a computer/laptop and internet at home; and perceived usefulness and ease of use as the predictors, and digital literacy (communicating digital content, exploring digital content and creating and using digital content) as the dependent variables (Table 4). The results showed that perceived usefulness and ease of use were significant positive predictors of digital literacy (communicating digital content, exploring digital content and creating and using digital content). All other variables (age; gender; have access to a computer/laptop and internet at home) were not significant predictors of digital literacy. As such, the actual value on the x-axis and the predicted value on the y-axis can be plotted and compared to see how close the points are. If the actual plot and the predicted values lie around the diagonal line, it means that the model has good performance in predicting the values. Figure 1 shows the plot of actual value on the x-axis and the predicted value on the y-axis and compares the two plots to see how close the points are. The results indicate that the actual plot and the predicted values lie around the diagonal line, which means that the models had good performance in predicting the values, except for the model for exploring digital contents with perceived ease of use (Figure 2(b)).

Table 4. Multiple regression models for digital literacy.

Multiple regression models	Communicating digital content		Exploring digital content		Creating and using digital content	
	$\beta \pm SE$	P-value	$\beta \pm SE$	P-value	$\beta \pm SE$	P-value
Gender	0.07 ± 0.12	0.521	0.01 ± 0.12	0.998	0.06 ± 0.12	0.627
Age	-0.23 ± 0.12	0.060	-0.19 ± 0.12	0.114	-0.13 ± 0.12	0.306
Have access to a computer/laptop at home	-0.05 ± 0.12	0.706	0.15 ± 0.12	0.201	0.04 ± 0.12	0.743
Have access to the internet at home	0.12 ± 0.12	0.330	0.08 ± 0.12	0.498	0.07 ± 0.12	0.549
How long have you been using a computer?	-0.08 ± 0.08	0.309	-0.05 ± 0.08	0.471	-0.07 ± 0.12	0.373
Perceived usefulness	0.33 ± 0.05	< 0.001	0.30 ± 0.05	< 0.001	0.23 ± 0.05	< 0.001
Perceived ease of use	0.18 ± 0.06	0.005	0.19 ± 0.06	0.002	0.25 ± 0.06	< 0.001

Discussion

The findings of this study offer a comprehensive view of first-year students' demographics, their perceptions of digital literacy and their engagement with various digital tools. By examining these aspects, this study generated valuable insights into how first-year students interact with digital platforms and the implications for their academic experience and performance. The study first sought to assess the demographic profile of the

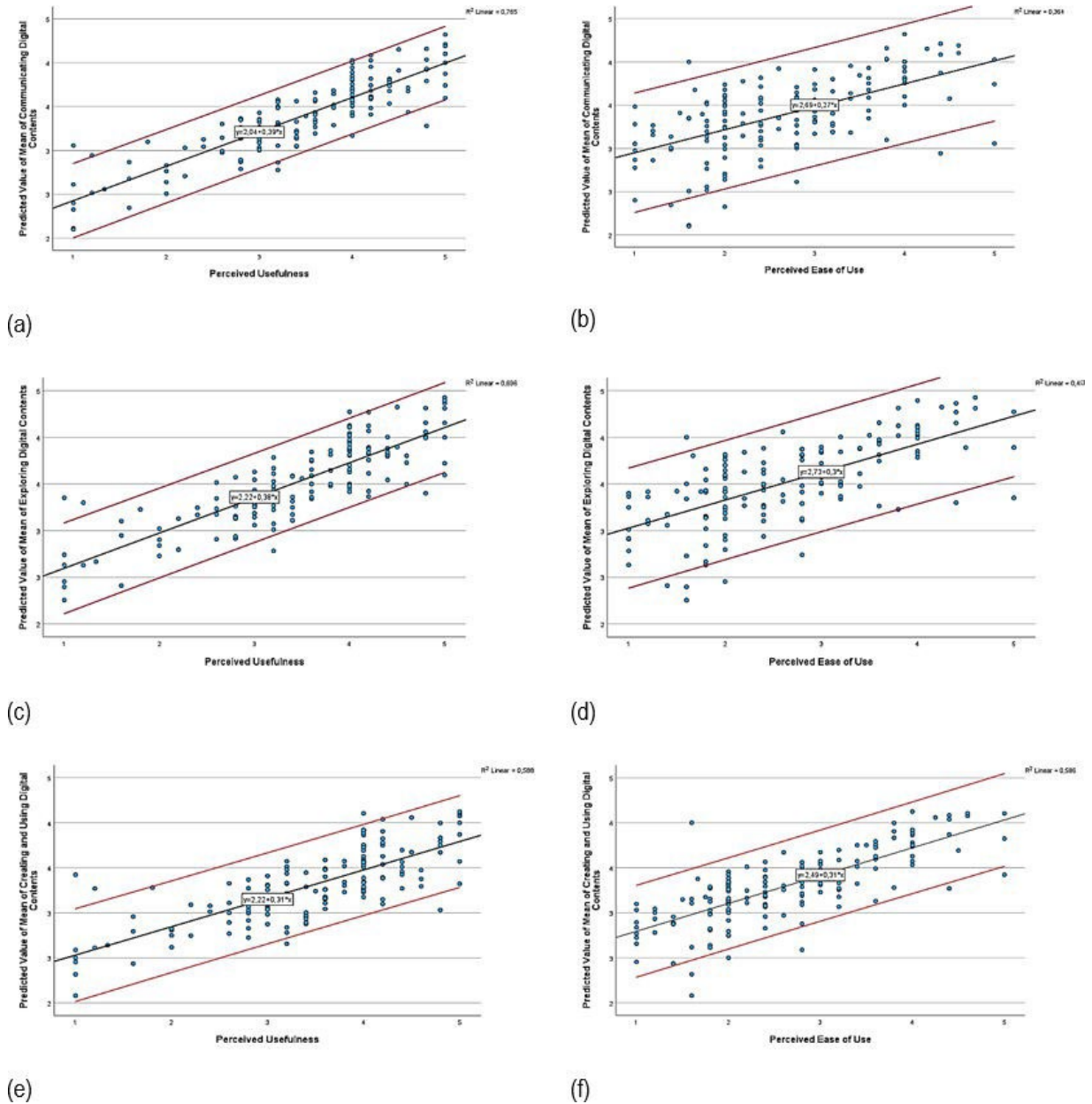


Figure 2. Plots of the predicted values versus the observed values for digital literacy.

respondents, who were predominantly young, female and between 18 and 21 years old. This aligns with typical university demographics across South African universities, reflecting a standard first-year student population (Department of Higher Education and Training (DHET), 2023). The high proportion of students with access to computers and the internet at home (68%) suggests a robust foundation for engaging with digital learning tools. However, the 32% of students without such access highlights a significant disparity that could affect equitable learning opportunities. This underscores the necessity for institutions to address digital inequality and ensure that all students have the necessary resources to participate fully in digital learning environments (Hoffman & Roos, 2022). The data on computer usage indicate that 78% of students had used computers for 0 to 6 months, which suggests an emerging familiarity with digital technology among first-year students. This limited experience could impact students' confidence and proficiency with digital tools, potentially affecting their ability to leverage these resources effectively in their studies. Providing additional support and training for first-year students could enhance their digital literacy and overall academic performance (Hanna et al., 2022).

This study also assessed students' perceptions of digital literacy skills using TAM dimensions. The evaluation of perceived usefulness (PU) using TAM had an average mean score of 3.45, indicating that students generally found digital tools beneficial to their learning. The high mean score for perceived efficiency in learning (3.52) suggests that students recognised the value of digital platforms in enhancing learning productivity and efficiency. This finding was consistent with previous research that highlighted the positive impact of digital tools on learning outcomes (Rafiq et al., 2024). However, the variability in perceptions, as reflected by the relatively high standard deviations, points to diverse experiences among students. While many found digital tools effective, there were notable differences in how students valued these resources. This variability in the use of digital tools for learning purposes suggests that while digital tools were broadly perceived as valuable, individual experiences and needs varied significantly, warranting a more personalised approach to digital tool integration and support (Major et al., 2021). The average mean score for perceived ease of use (PEU) was 2.61, indicating that students found the digital platforms relatively easy to use. The lower mean score compared to PU suggests that while students saw the benefits of digital tools, there were challenges in their usability. The variability in responses regarding ease of use, as shown by the standard deviations, indicates that some students might struggle with the user interface or functionality of these platforms. This finding highlights the need for more intuitive and user-friendly digital tools to accommodate varying levels of user proficiency and reduce cognitive load (Weinerth et al., 2014). In addition, the results from the regression model showed that perceived usefulness and ease of use were significant positive predictors of digital literacy (communicating digital content, exploring digital content and creating and using digital content).

The assessment of digital literacy skills offered several key insights. The mean score for communicating digital content was 3.40, indicating a generally positive experience of digital communication tasks, such as writing and uploading assignments. However, the lower mean score for actively providing feedback (3.20) suggests that students might find this aspect less engaging or more challenging. This discrepancy could be addressed by enhancing training and support for interactive digital communication. The high mean score for exploring digital content (3.53) reflects strong student proficiency in accessing and evaluating digital information. Students showed particular competence in using writing software (3.71) and finding digital content from various sources (3.69). Conversely, lower scores for presentation software (3.24) and creating digital content (3.31) indicate areas where students might benefit from additional support and resources. The variability in responses suggests that while many students were comfortable with certain digital tools, there were differing proficiency levels among students that should be addressed through targeted training (Morgan et al., 2022).

In assessing the relationship between TAM, demographic variables and digital literacy skills, this study found that perceived usefulness and perceived ease of use were significant positive predictors of digital literacy abilities among first-year students, which is consistent with TAM (Davis et al., 1989). This implies that students who saw digital technologies as useful to their learning and easy to use had greater skills in digital communication, exploration and content creation. These findings support previous research by Teo (2019) and Hatlevik et al. (2015), that established that positive attitudes to technology increased digital engagement and proficiency. In this study demographic and access-related attributes (such as age, gender, computer/laptop ownership and home internet connection) did not significantly predict digital literacy levels. This finding contradicts most of the previous work, which stresses the persistence of the digital divide, particularly concerning socio-demographic and infrastructure disparities (Colom, 2020; Helsper & Reisdorf, 2017). According to the prevailing digital divide concept, people from poor origins are more likely to lack access to digital technologies and the skills required to use them effectively, which can lead to larger disparities in education, employment and social participation. However, the findings of this study may suggest a shifting dynamic within higher education contexts. Once students are enrolled in a university environment, the institutional support, access to digital infrastructure and targeted digital skills training may help to mitigate initial disparities in access and usage. This aligns with a recent report by Selwyn (2021) to the effect that institutional environments can play a key role in narrowing digital literacy gaps among students from diverse backgrounds.

Conclusion

This study entailed a comprehensive analysis of first-year students' demographics in the BIMS department at Tshwane University of Technology, their perceptions of the usefulness and ease of use of digital tools and their digital literacy skills. The results indicated that students generally perceived digital tools as beneficial for enhancing learning efficiency and productivity. However, there was notable variability in their experiences, particularly concerning the ease of use of these tools. While students acknowledged the advantages of digital

resources, they faced challenges with usability, suggesting that some tools might not be as intuitive or accessible as needed. Two significant limitations of this study must be addressed. First, the respondents were predominantly female and concentrated in the 18–21 age group, which might affect the generalisability of the findings. To better represent a diverse student population, future research should strive for a more balanced demographic mix. Second, the reliance on self-reported data introduces the possibility of bias, as students' perceptions of their digital literacy and the usefulness of digital tools may not always align with their actual abilities. Future studies should incorporate objective measures of digital proficiency for a more accurate assessment of students' skills and experiences. Based on the findings, several recommendations are proposed. Institutions should enhance digital training and support to address the variability in students' ease of use and proficiency. Targeted training programmes on digital literacy skills can help students become more familiar with underused tools, such as presentation and related digital programmes for learning purposes, and offer additional support for those experiencing difficulties with digital platforms. Moreover, addressing digital inequality by higher education institutional managers and academics is crucial. The study highlights a digital divide that affects a significant portion of students, suggesting that institutions should explore solutions, such as technology loan programmes or increased campus resources, to ensure equitable access to digital learning tools. Furthermore, future research should integrate objective assessments of digital literacy alongside self-reported data. This approach will provide a more accurate picture of students' actual digital skills and identify specific areas for further development. By recognising these limitations and implementing the proposed recommendations, educational institutions can better support students' digital literacy development and enhance the effectiveness of digital learning environments.

Declarations

Interdisciplinary Scope: The article adopts an interdisciplinary approach by incorporating insights on the role of digital literacy skills among first-year students at a higher education institution in South Africa.

Author Contributions: Maluleke conceptualised the study, facilitated data collection and collated inputs to enable the authorship of the study. Maake conducted the literature review and authored the discussion section. Mphekgwana conducted the statistical analysis and wrote the findings of the study. All authors read and approved the final manuscripts.

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