Does Gender Influence Access and Utilisation of E-Learning Tools? A Case Study of a South African University

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Abstract

Gendered differences in e-learning technology use can potentially impact student retention of course content and throughput rates of higher education institutions. The South African government has made efforts to increase access to technology for students, including expanding internet connectivity, providing computer labs

in schools, and implementing technology-focused programmes. However, challenges remain, especially within remote areas and low-income communities. Furthermore, there has been limited research to ascertain if gender influences access and utilisation of e-learning tools in higher learning. This study examines this aspect in a case study at a South African university by utilising an explanatory research design in a South African University. Data was analysed through content thematic analysis, simple descriptive statistics, and a non-parametric statistical test, namely the Mann-Whitney U test. The chi-square findings suggested that there were no significant gender differences. The most common challenge reported by both male and female students was large amounts of data shared through discussions and posts (33.5%/50% for females and 39.1%/50% for males). The least common challenge was lack of timely responses for both groups accounting for 4.5%/50% for females and 5.6%/50% for males. Some factors contributing to these limited differences, which existed among male and female students, included cultural and gendered upbringing, digital literacy and confidence, access to resources and the digital divide and learning preferences. Despite the study's finding of no statistically significant difference in e-learning outcomes between male and female students, it is still necessary to recommend a gender-neutral approach. This is to ensure that all students, regardless of gender, have equal access and receive targeted support in overcoming technological difficulties that may affect digital inclusion.

Keywords: *E-learning tools, Gender, Higher learning, South Africa*

Introduction

A Green Paper for post-school education and training was adopted in South Africa in 2012 (Mancotywa, 2023), due to the digital divide that existed between rural and urban areas, which consequently led to wide disparities between these areas (Mhlanga & Moloi, 2020).Pei-yu (2013) also mentioned the regional differences (urban versus rural) in the unequal distribution of digital tools, which also exist across faculties and departments within institutions of higher learning. Recent studies in South Africa show that while approximately between 50% and 80% report access to digital devices, significant gender disparities remain. Women, particularly those in rural and disadvantaged communities, continue to face barriers in both access and effective use of digital technologies, which limits their participation in digitally mediated learning (Bomman, 2016; Mariscal et al., 2019; Mwansa et al., 2025).

Kamal et al. (2020) identified problems among academics and students, which include digital literacy, competence and confidence. Furthermore,

Kamal et al. (2020) mentioned the problem of poor technological infrastructures and technical challenges. To respond to these challenges, the South African government has made efforts to implement technology focused programmes that promote e-learning in educational institutions (Bharuthram and Kies, 2013; Maphalala and Adigun, 2021; Van Staden, 2022). The efforts in South Africa are part of the global move where digital technology has become prominent (Gerber & Eybers, 2021). In the United States changes in the teaching and learning environment led to 243 billion US dollars being used for strengthening digital platforms (Statista, 2023). The change was instigated by the transmission of the coronavirus during the COVID-19 pandemic, thereby necessitating a greater reliance on e-learning modalities.

In a study conducted by Agarwal and Kaushik (2020) among Indian university students, it was concluded that innovativeness and optimism contributed to both male and female students embracing the use of digital platforms. On the other hand, discomfort and anxiety derailed some students from embracing digital tools in the educational context (Agarwal & Kaushik, 2020). Furthermore, in a study by Owusu-Bempah et al. (2022) of Ghanaians students, both male and female students responded favourably to digital platforms that were dependable. Findings also identified female students' preference for systems that were easy to comprehend, as they considered digital platforms as productive tools (Owusu-Bempah et al., 2022).

Chow et al. (2012) and Opoku et al. (2020) argued that there were no statistical gender differences in the use of digital platforms because of the quality of e-learning platforms that were easy to use. Another interesting point raised in literature is that, the stronger sense of male entitlement informs men of their preference and usage of digital platforms and e-learning tools. Conversely, family or societal structural norms do not appear to significantly influence female students' choice and utilization of e-learning tools; rather, their instrumental motivation—the desire to pursue career goals—leads to flexibility in their preference and use of these resources (Almasri, 2022).

Institutions of higher learning have undergone immense traction toward blended learning and electronic learning (Brenya, 2024; Hughes, 2024). Although many studies have examined gender differences in e-learning (Admus et al., 2009; Owusu & Bempah, 2022; Opoku et al., 2020), few studies have been conducted in the South African context. Understanding if gender influences access and utilisation of e-learning tools within the South African context can shape calls for targeted

interventions which consider the cultural, socio-economic and geographical context in a quest to address any gender differences.

In addition, the varying preferences and use of e-learning tools can consequently lead to unequal access to educational resources and opportunities. By understanding these differences, universities can develop policies and programmes that ensure equal participation for all students irrespective of gender. Failure to consider such differences could potentially impact technology usage and consequently student retention and graduation rates. Addressing these disparities through targeted policies and programmes can contribute to reducing dropout rates and increasing the likelihood of students successfully completing their programmes of study.

Based on the above, this study aims:

- to ascertain if gender influences access and utilisation of e-learning tools in a South African higher education institution.
- to determine factors influencing gender variations in the access and utilisation of e-learning tools in a South African higher education institution.

Methodology

An explanatory sequential mixed-method approach was applied to ascertain if gender influences access and utilisation of e-learning tools in a South African University. The study was designed to be strengthened by utilising elements from quantitative and qualitative research approaches (Creswell & Clarke, 2017). To establish the trustworthiness of the data collected, this study utilised both survey questionnaires and in-depth interviews (Cresswell & Clarke, 2017). Furthermore, the interviews used in the explanatory design were useful in determining any factors influencing preference and use of e-learning tools between male and female students registered at the Faculty of Humanities in a South African university. The researcher used a survey questionnaire to interview female and male students. Since a sample of this nature is representative, the results of the study at this stage were generalised. The sample size was calculated using a Raosoft calculator http:www.raosoft.com/samplesize.html.

A sample size of 358 students was drawn from the undergraduate and postgraduate student population on the Mafikeng campus of North-West University (NWU). Although the sample was split evenly between males (179) and females (179), this does not reflect the actual gender

composition of the student body, as statistics for NWU in 2024 show a higher proportion of female students (28,875 females compared to 18,569 males), with Mafikeng campus also recording more female than male students (NWU, 2024). The decision to use an equal gender split in the sample was made to ensure balanced comparisons in the analysis, rather than to mirror the overall student population.

Representation across the academic schools was achieved by allocating participants proportionally based on the number of students in each school, which influenced the number of respondents selected per school.

Two sampling techniques were applied. First, stratified random sampling was used to identify 24 students across the schools, ensuring that both male and female perspectives were captured. Second, purposive sampling was employed to select 12 female and 12 male students from this group of volunteers for in-depth interviews. Adopting a purposive approach guaranteed the selection of information-rich cases, thereby allowing for deeper insight into the factors affecting the preference and utilisation of e-learning tools (Bryman, 2007).

A mixed-method approach for data analysis was used. The advantage of the mixed method is the use of straightforward quantitative descriptions and the more detailed exploration of quantitative results. (Morse, 1991). For qualitative research, the researcher used content analysis to bring order, structure, and meaning to the mass of the data collected. According to Cresswell and Piano Clark (2023), qualitative data analysis transforms data into research findings. Through content analysis, this study enabled the researcher to synthesise common themes from the rich qualitative data (thick descriptions) regarding the factors that influence female and male students' preference for and utilisation of online technological tools. The SPSS statistical package was employed to analyse the data from the survey questionnaire.

Hypothesis testing was conducted using simple descriptive statistics and the Mann-Whitney U test, a non-parametric statistical test, to ascertain if gender has an influence on the access and utilisation of e-learning tools. The study received ethical clearance by the Basic and Social Sciences Research Ethics Committee (BaSSREC) of North-West University, Mafikeng, South Africa, and it adhered to required ethical principles, which include maintaining confidentiality of the participants, informed consent, honesty, privacy, responsible publication, minimising risk, and consequently maximising benefits.

Findings and Discussion

Table 1: *Socio-demographic characteristics of respondents*

Variables	Frequency	Percentage (%)
Gender		
Male	179	50.0
Female	179	50.00
Total	358	100.0

Age		
18_25	120	33.48
26-30	90	25.14
31-40	85	23.74
40 and older	63	17.61
Total	359	100.0

School		
Social Science	32	8.95
Communication	55	15.37
Government Studies	65	18.16
Music	72	20.11
Philosophy	75	20.91
Language	59	16.49
Total	358	100.0

Year of Study		
Undergraduate	150	41.91
Honours	90	25.14
Master	75	20.91
Ph.D	43	12.00
Total	358	100.0

The data set presented in Table 1 reflects an equal gender distribution of 179 males (50 percent) and 179 females (50 percent), totalling 358 participants. While this does not mirror the actual gender ratio of students at North-West University, where female students outnumber male students on average, the decision to apply a 50–50 split was intentional. This approach guaranteed an equitable representation of male and female students within the sample, thereby facilitating balanced comparative analysis of gender-related influences on e-learning utilisation. The rationale

was not to reproduce the demographic proportions of the student population but rather to create a dataset that enabled gender-neutral analysis and avoided skewed results due to the predominance of female students in the university's population.

The age distribution shows that the majority are in the younger age brackets, with 33.48% aged 18-25 years and 25.14% aged 26-30 years, collectively representing 58.62% of the sample. Participants aged 31-40 years make up 23.74%, while those aged 40 years and older constitute 17.61%.

In terms of academic affiliation, the representation spans diverse schools, with Philosophy (20.91%) and Music (20.11%) being the most dominant. These are followed by Government Studies (18.16%), Languages (16.49%), Communication (15.37%), and Social Sciences (8.95%). This spread highlights a strong presence in the arts and humanities disciplines.

Regarding academic levels, the dataset reveals that 41.91% are undergraduate students, while 25.14% are in honours programmes. Graduate representation includes 20.91% pursuing master's degrees and 12.00% enrolled as PhD candidates. This indicates a focus on early-stage academic pursuits, with undergraduates and honours students comprising over two-thirds of the sample.

The dataset features a balanced gender distribution, a predominantly youthful age demographic, varied academic affiliations centered on the arts and humanities, and a concentration of participants in the nascent phases of their academic careers. These insights provide a comprehensive view of the demographic and educational landscape of the participants.

Test of Hypothesis

H₀ (Null Hypothesis): Gender does not significantly influence access to technology, digital literacy skills, or the challenges faced in using e-learning tools.

H₁ (Alternative Hypothesis): Gender significantly influences access to technology, digital literacy skills, and the challenges faced in using e-learning tools.

Table 2: *Factors related to e-learning challenges by gender*

Challenges	Male	Female	Total
Lack of timely responses from peers or instructors	10 (5.6%)	8 (4.5%)	18 (10.1%)
	20 (11.2%)	30 (16.8%)	
Difficulty in navigating or finding relevant discussions		35 (19.6%)	50
	40 (22.3%)		
Limited engagement or participation from peers			75
Overwhelming number of posts or discussions	70 (39.1%)	60 (35.5%)	130
	39 (21.8%)	46 (25.7%)	
Technical issues or platform stability	179 (100.0%)	179 (100.0%)	85
Total			358
Df = 5; Sig. Level = 0.05; X² = 3.90			

The data provided includes responses from both male and female participants on several factors related to e-learning challenges, such as timely responses from peers or instructors, difficulties in navigating discussions, limited peer engagement, overwhelming discussions, and technical issues with the e-learning platform. The chi-square value for the data is calculated at 3.90, with 5 degrees of freedom and a significance level of 0.05. The critical value of the chi-square statistic at 5 degrees of freedom and a 0.05 significance level is 11.07. In other words, the findings fail to reject the null hypothesis (H**o**).

The qualitative results provide in-depth insights into some of the differences that have been identified through the chi-square test results. Discussing each challenge separately, lack of timely responses from peers or instructors was the least common challenge for both male and female students. The gender differences were not statistically different, with 5.6%/50% for males and 4.5%/50% for females. Feedback using online platforms and tools can be used as a learner tool. Some scholars advance the notion that feedback from both peers and instructors on online platforms can be used as a form of navigation for students receiving this

feedback (Truskowski & VanderMolen, 2017; Cheng et al., 2017). Lack of feedback or delayed feedback can deter the important role of e-learning tools aiming to build peer-peer relations and lecturer-student relations (Thomas et al., 2017).

In terms of navigating e-learning platforms and finding relevant discussions amongst peers and instructors, peers' findings show that more females than males reported this as a challenge, with 16.8%/50% for females and 11.2% of the total 50% that indicated that this was a challenge and a factor deterring them from utilising online tools. In a study conducted by Faza et al. (2024), some of the challenges and factors deterring the preference and use of e-learning tools and platforms included underdeveloped technical skills, difficulty in navigating the e-learning platforms and limited knowledge of multimedia skills. An important factor to consider from these findings is how institutions of learning can support learners through leveraging training opportunities to improve the learners' experiences in the preference and use of online platforms and tools. This study will further this argument by zoning in on the gender differences to ensure that proposed interventions are gender-sensitive and tailored to ascertain optimum use of e-learning tools in this context.

The highest reported factor, accounting for 72.6% of all students deterring both male and female students from utilising e-learning platforms, was managing large volumes of information, although more males (39.1%) compared to females (33.5%). Similarly, Li and Wang (2019) argued that students' enthusiasm is reduced due to long videos and large volumes of work. Furthermore, Knox (2016) also argued that despite being given enough time to complete tasks, it was difficult for students to complete tasks on time because of the large volumes of work.

Despite the chi-square test noting no statistical differences between males and females, males reported limited participation from peers as a factor that might deter them from utilising some e-learning tools. The results indicated that more male student (22.3%/50%) than female students (19.6%/50%) were struggling slightly due to limited engagement of participation on the e-learning platforms. In a study by Morante et al. (2017), female students in math and history participated more than male students. Morante et al. (2017) interpreted the results to be an indication of female students having less confidence than the male students in the subject, and that is the reason they had to seek help, leading to more participation.

Lastly, more female students (27.7%/50%) indicated they experienced technical problems than male students (21.8%/50%). This is consistent

with other research indicating that technical issues constitute a significant barrier preventing students from effectively utilising e-learning platforms. These findings are similar to Pazilah et al. (2019) and Halim and Hashim (2019), who argued that students, irrespective of gender, face technical challenges, such as video and audio disruptions, that impede them from having optimum experience with e-learning platforms, tools and resources.

The findings of the hypothesis provide corroborating evidence for the hypothesis analysis finding: that there is no statistically significant difference in the usage of e-learning instructional tools between male and female students. These responses provide additional insight into how cultural and gendered upbringing may influence access to technology and digital literacy, yet do not indicate a direct gender-based disparity in the actual use of e-learning tools.

One participant mentioned how historical gender roles shaped technology access during childhood, stating,

> It has to do with upbringing and the history of the two genders, or rather the gender roles; growing up as a male ideally my parents would get me a laptop or smartphone and get my sister a toy

(Male, 21 years, developmental studies, second year).

This response indicates that early technological exposure may be influenced by gender roles, potentially affording males greater access to devices like laptops and smartphones. However, this does not necessarily translate into differences in the actual use of these technologies in academic settings.

Another male participant elaborated on this idea, saying,

> Yes there are, it goes down to history of gender roles, growing up the belief was that as a male I would need to work for my family and my wife be a housewife, but now as I am going up and in an institution of higher learning, both males and females are equal in the lance of academic performance, employment and anything else, so yes there was an impact on that, you will find that females are not ahead in terms of usage and access of technological tools

(Male, 21 years, developmental studies, second year).

This participant not only acknowledges a historical gender imbalance in access to technology but also recognises the shift in academic and professional equality between genders as they grow older. Again, this

response emphasises the evolving role of gender in technology access but does not point to a significant difference in the use of e-learning tools.
A female participant also addressed the impact of early exposure to technology, noting,

> I think it is the language used on the devices, if you haven't been familiar from a young age as you know that, males are more exposed to technology, so they know the terminology used in technological spaces and females are not making it harder for them to understand the terminology in e-learning especially with access to the tools... I think there are cultural based on how our parents buy smartphones/laptops and anything electronic for males but as for females they buy dolls and they are not exposed to technology

(Female, 27 years, Psychology, third year).

This response reinforces the idea that early exposure to technology, particularly through devices, can influence familiarity with the terminology and concepts used in e-learning tools. However, it does not indicate that this lack of exposure leads to a substantial gap in the ability to use these tools effectively in an academic context.

Similarly, a female participant shared her perspective on gendered experiences growing up, stating,

> I feel like our upbringing is the mature issue in this context, because from where I grew up a lot of males grew up playing with computers and play stations and it was seen as odd if a female playing with play stations and all that, so males got the technical experience from TV games and all that and females did not get them thus they struggle... We need to challenge stereotypes of females are not supposed to play with TV games, a female can do this and that and also, we need to engage in our kids' upbringing (Female, 22 years, Arts in Communication, third year).

This highlights the cultural and gender-based stereotypes that influence early exposure to technology, which could affect comfort and familiarity with digital tools. However, like the previous responses, it does not suggest that this results in significant gender-based differences in the use of e-learning tools in higher education.
   Other responses further illustrate the diverse ways in which individuals approach learning. A female participant explained,

> I prefer studying with music on and I prefer studying with more graphic images it enhances my understanding, and every student has their own style

of studying some prefer visuals, others listening and so forth males and females prefer different methods and that is the factor influencing learning …. No that I am aware of but taking a wild guess when coming to culture females are taught by doing, so most females might prefer using e-learning tools that foster them to work in a certain manner the same way as males, and cultural upbringing influences how people use tools

(Female, 25 years, Sociology, Extra year).

This response suggests that individual preferences and cultural influences shape how both males and females engage with e-learning tools. Although gender may correlate with different learning preferences, this distinction does not translate into a statistically significant disparity in the overall utilisation of e-learning tools.

A male participant also emphasised the importance of digital literacy in shaping confidence with e-learning tools:

I feel like digital literacy influences how one is confident with using a specific tool, this also depends on one's digital literacy skills

(Male, 20 years, Communication, third year). This response supports the premise that digital literacy skills are a primary determinant of an individual's engagement with e-learning platforms, irrespective of their gender.

Finally, another male participant focused on the role of access to resources in determining engagement with e-learning tools, stating,

I think access to resources because different factors impact access to resources, so not having computers, internet connectivity or not having the right devices so other households or communities that have no resources people might not prioritize or want to learn/ engage in the e-learning tools

(Male, 20 years, Communication, third year).

This response highlights the importance of access to technology and resources, which can be a more significant factor in the use of e-learning tools than gender itself.

In essence, while the interview responses highlight gender-based differences in early exposure to technology and cultural stereotypes that may influence comfort with digital tools, they do not indicate a significant gender gap in the actual usage of e-learning tools in academic settings. This supports the findings of the hypothesis test, which showed no significant difference in e-learning tool usage by gender. The interviewees

acknowledge that early exposure, digital literacy, and access to resources are influential factors, but these do not create a clear-cut gender divide in e-learning engagement. Therefore, the null hypothesis (H₀) is supported, suggesting that gender does not significantly influence the usage of e-learning tools.

Discussion of Findings

The findings of this study suggest that there is no significant difference between males and females in terms of access to technology, digital literacy skills, and the use of instructional tools for e-learning. Findings found the larger implications within contextual and cultural factors. And While the hypothesis testing indicated no statistically significant gender-based differences, both the survey and the qualitative responses provide deeper insights into the factors influencing e-learning engagement. These insights are crucial in interpreting the findings in the context of gender roles, upbringing, and access to resources.

Cultural and Gendered Upbringing

One of the most significant themes that emerged from the interview responses is the role of cultural and gendered upbringing in shaping early access to technology. For example, male participants reported early technological exposure, citing the tendency of being given devices such as laptops and smartphones, in contrast to female participants who were more often given traditional toys. This aligns with existing research that has shown that traditional gender roles significantly shape early access to and engagement with technology. Studies have suggested that boys are more likely to be encouraged to explore technical gadgets, while girls may be directed towards other forms of play or social activities (Torres et al., 2021; Panjeti-Madan & Ranganathan, 2023; Ottemo et al., 2023). These early patterns of technology exposure can create disparities in digital literacy, with males often having a more hands-on experience with technological tools.

However, while such cultural patterns may influence initial exposure, the findings of this study suggest that by the time students reach higher education, these gender differences in access to technology are not significantly affecting their use of e-learning tools. This points to a broader trend where technological access becomes more equitable as individuals mature and enter educational environments, which promote equal

opportunities for both genders to engage with technology. Thus, the current study corroborates prior research emphasising the capacity of educational environments to mitigate early gender-based disparities in technological access (Lechman & Popowska, 2022).

Digital Literacy and Confidence

Another factor discussed by both male and female participants is the importance of digital literacy. Several participants noted that confidence with using digital tools is closely tied to one's level of digital literacy. This resonates with existing literature that emphasises the role of digital literacy as a key determinant in the successful use of e-learning platforms. According to Hussain and Phulpoto (2024), individuals with higher digital literacy are more likely to confidently engage with e-learning platforms and benefit from their full potential. The study found that digital literacy skills are integral to using instructional tools effectively, as they allow learners to navigate platforms, understand the terminology, and troubleshoot technical issues.

While this study found no gender-based differences in the overall usage of e-learning tools, digital literacy could still play a role in the way males and females engage with these tools. Historically, male students have often demonstrated higher levels of digital literacy, frequently attributed to familial technology exposure, which subsequently enhances their capacity to engage effectively with e-learning platforms. In contrast, females tend to face barriers related to limited exposure to technology from an early age, compounded by socio-cultural expectations. As noted by one female participant, males may have an advantage in understanding the technical jargon associated with digital tools due to their early exposure to technology. This observation aligns with research suggesting that language and terminology used in digital environments can present barriers for those less familiar with technology (Chee, 2024).

The study also highlights that both males and females face challenges such as difficulty in navigating e-learning platforms, technical issues, and overwhelming numbers of discussions, though these issues are not necessarily gender-specific. However, the lack of significant differences in e-learning tool usage between genders may suggest that higher education institutions provide sufficient support to bridge these gaps, perhaps through training programmes or user-friendly platforms that help all students become proficient in using e-learning tools.

Access to Resources and the Digital Divide

The findings also highlight the influence of access to resources on the usage of e-learning tools. One participant mentioned that lack of access to resources such as computers, internet connectivity, and proper devices can impact the ability to engage with e-learning tools. This factor is crucial and extends beyond gender, given that socioeconomic constraints can restrict the access of both male and female students to necessary technology. Literature has consistently shown that the digital divide, unequal access to technology based on socioeconomic status, can hinder the effective use of e-learning tools, regardless of gender (Chikwe et al., 2024; Khasawneh, 2021; Badiuzzaman et al., 2021). Access to technology is not only a function of gender but also of economic background, geographical location, and institutional support. Thus, ensuring equitable access to resources is a key element in facilitating equal engagement with e-learning tools for all students, irrespective of gender.

The response of one participant, who noted the challenges of navigating technological platforms due to unfamiliarity with the terminology and device functions, underscores the importance of contextualising digital literacy within the broader social and cultural contexts. While males may be more familiar with certain technical terms, this study suggests that such barriers do not necessarily translate into disparities in the overall usage of e-learning tools. This is consistent with studies that highlight how the institutional context can play a significant role in diminishing the effects of early socialisation and exposure to technology (Gupta et al., 2022; Lafton et al., 2022). Therefore, educational institutions play a crucial role in ensuring that both male and female students receive the support needed to develop digital literacy skills.

Learning Preferences and Gendered Approaches to E-learning

A recurring theme in the responses was the preference for different learning styles among males and females, including preferences for graphic images, auditory stimuli, and interactive features. These preferences can influence how students interact with e-learning tools and may affect their engagement levels. While the study did not find significant differences between males and females in their use of e-learning tools, it is possible that gendered preferences could manifest in the types of tools or features that students find most effective. This aligns with studies on learning styles, which suggest that males and females may have different

preferences for visual, auditory, and kinaesthetic learning (Aprilisia, 2023). For instance, females may prefer tools that are more interactive or that incorporate elements of social learning, while males may gravitate towards more competitive or task-oriented platforms (Marantika, 2022).

Conclusion

Findings of this study suggest that while historical gender roles, cultural upbringing, and early exposure to technology may influence students' familiarity with digital tools, these factors do not create significant barriers to the use of e-learning tools in higher education. Several participants highlighted that digital literacy and resource accessibility constitute the most significant factors influencing the effective utilisation of e-learning platforms. This supports the argument that gender differences in technology usage are becoming less pronounced in academic contexts, particularly in environments where access to resources and institutional support are prioritised. Thus, the null hypothesis is supported, indicating that gender does not significantly influence the usage of e-learning tools in higher education.

Recommendations

The study on the factors influencing gender differences in the knowledge and utilisation of e-learning tools reveals significant disparities rooted in gender roles, digital literacy, and access to technology. To address these disparities at higher educational institutions, the following are recommended:

- Expanding digital literacy programmes tailored to all students by focusing on bridging the gap in digital skills and technical knowledge.
- Improving access to technological resources is crucial, as students from economically disadvantaged backgrounds often lack the necessary tools for e-learning.
- Fostering a more inclusive e-learning environment, platforms should incorporate diverse learning styles, with features that cater to both visual and auditory learners.
- Promoting collaborative learning and peer support, particularly among mixed-gender groups, can help overcome barriers like delayed responses from peers or instructors.

- Challenging gender stereotypes around technology use and providing targeted support for students facing technological difficulties can ensure equal opportunities for both genders.
- Regular evaluation of e-learning tools will also help institutions monitor progress in achieving gender equality in digital education.

References

Agarwal, S., & Kaushik, J. S. (2020). Student's Perception of Online Learning during COVID Pandemic. *Indian Journal of Pediatrics*, *87*(7), 554. https://doi.org/10.1007/s12098-020-03327-7

Almasri, F. (2022). The impact of e-learning, gender-groupings and learning pedagogies in biology undergraduate female and male students' attitudes and achievement. *Education and Information Technologies*, *27*(6), 8329-8380.

Aprilisia, D. (2023). *Male and Female Student's Perceptual Learning Style Preferences in Language Class*. (Doctoral dissertation, UIN Ar-Raniry Banda Aceh).

Badiuzzaman, M., Rafiquzzaman, M., Rabby, M. I. I., & Rahman, M. M. (2021). The latent digital divide and its drivers in e-learning among Bangladeshi students during the COVID-19 pandemic. *Information,12*(8), 287.

Bharuthram, S., & Kies, C. (2013). Introducing e-learning in a South African Higher Education Institution: Challenges arising from an intervention and possible responses. *British journal of educational technology*, *44*(3), 410-420.

Bornman, E. (2016). Information society and digital divide in South Africa: results of longitudinal surveys. *Information, Communication & Society*, *19*(2), 264-278.

Brenya, B. (2024). Higher education in emergency situation: blended learning prospects and challenges for educators in the developing countries. *Journal of Applied Research in Higher Education*, *16*(4), 1015-1028.

Bryman, A. (2007). Barriers to Integrating Quantitative and Qualitative Research. *Journal of Mixed Methods Research,1*, 8-22. http://dx.doi.org/1 0.1177/2345678906290531

Chee, S. Y. (2024). Age-related digital disparities, functional limitations, and social isolation: unraveling the grey digital divide between baby

boomers and the silent generation in senior living facilities. *Aging & mental health*, *28*(4), 621-632.

Cheng, M.T., Rosenheck, L., Lin, C.Y., & Klopfer, E. (2017). Analyzing gameplay data to inform feedback loops in *The Radix Endeavor*. *Computers & Education, 111*, 60-73. https://doi.org/10.1016/j.comped u.2017.03.015

Chikwe, C. F., Dagunduro, A. O., Ajuwon, O. A., & Ediae, A. A. (2024). Sociological barriers to equitable digital learning: A data-driven approach. Research and Reviews in Multidisciplinary Studies, *2*(01), 027-034.

Chow, M., Herold, D. K., Choo, T. M., & Chan, K. (2012). Extending the technology acceptance model to explore the intention to use Second Life for enhancing healthcare education. *Computers & education*, *59*(4), 1136-1144.

Creswell, J. W., & Clark, V. L. P. (2017). *Designing and conducting mixed methods research* (3rd ed.). SAGE.

Creswell, J. W., & Plano Clark, V. L. (2023). Revisiting mixed methods research designs twenty years later. *Handbook of mixed methods research designs*, *1*(1), 21-36.

Faza, A., Santoso, H. B., & Putra, P. O. H. (2024). Navigating online learning challenges and opportunities: Insights from a small group of lecturers during the pandemic. *Procedia Computer Science, 234*, 1164-1174. https://doi.org/10.1016/j.procs.2024.03.112

Gerber, A., & Eybers, S. (2021). Converting to inclusive online flipped classrooms in response to Covid-19 lockdown. *South African Journal of Higher Education, 35*(4), 34–57. https://doi.org/10.20853/35-4-4285

Gupta, P., Prashar, A., Giannakis, M., Dutot, V., & Dwivedi, Y. K. (2022). How organizational socialization occurring in virtual setting unique: A longitudinal study of socialization. *Technological Forecasting and Social Change*, *185*, 122097.

Halim, M. S. A. A., & Hashim, H. (2019). Integrating Web 2.0 technology in the ESL classroom: A review on the benefits and barriers. *Journal of Counseling and Educational Technology, 2*(1), 19-26. https://doi.org/10.32 698/0381

https://doi.org/10.20944/preprints202004.0195.v1.

https://doi.org/10.4236/ce.2019.1012244

Hughes, N. (2024). *Blended learning solutions in higher education: History, theory and practice*. Routledge.

Hussain, N., & Phulpoto, S. (2024). Digital literacy: Empowering individuals in the Digital Age. *Assyfa Learning Journal*, *2*(2), 70-83.

Kamal, A. A., Mohd Shaipullah, N., Truna, L., Sabri, M., & Junaini, S. (2020). Transitioning to online learning during the COVID-19 pandemic: Case study of a pre-university centre in Malaysia. *International Journal of Advanced Computer Science and Applications, 11*(6). https://doi.org/10.14569/IJACSA.2020.0110628

Khasawneh, S. (2021). Investigating the socioeconomic factors influencing access and equity in online learning. *Tuijin Jishu/Journal of Propulsion Technology, 44*(3), 2023.

Knox, J. (2016). Posthumanism and the MOOC: Opening the subject of digital education. *Studies in Philosophy and Education, 35*, 305–320. https://doi.org/10.1007/s11217-016-9516-5

Lafton, T., Holmarsdottir, H. B., Kapella, O., Sisask, M., & Zinoveva, L. (2022). Children's vulnerability to digital technology within the family: A scoping review. *Societies, 13*(1), 11.

Lechman, E., & Popowska, M. (2022). Overcoming gender bias in the digital economy. Empirical evidence for European countries. *Gender, Technology and Development, 26*(3), 404-436.

Li, X., & Wang, Q. (2019). Research on blended teaching mode based on Internet Plus. In G. Sun, J. Gan, F. Lang, & Z. Lu (Eds.), *Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering.* Cham: Springer.

Makura, A. H. (2014). Students' perceptions of the use of ICT in a higher education teaching and learning context: The case of a South African university. *Mediterranean Journal of Social Sciences, 5*(11), 43.

Mancotywa, Y. L. (2023). *Repurposing rural technical vocational education and training in South Africa* (Doctoral dissertation, University of Nottingham).

Maphalala, M. C., & Adigun, O. T. (2021). Academics' Experience of Implementing E-Learning in a South African Higher Education Institution. *International Journal of Higher Education, 10*(1), 1-13.

Marantika, J. E. R. (2022). The relationship between learning styles, gender and learning outcomes. *Kıbrısh Eğitim Bilimleri Dergisi, 17*(1), 56-67.

Mariscal, J., Mayne, G., Aneja, U., & Sorgner, A. (2019). Bridging the gender digital gap. *Economics, 13*(1), 20190009.

Mhlanga, D., & Moloi, T. (2020). COVID-19 and the digital transformation of education: What we are learning in South Africa. *Preprints*, 2020040195.

Morante, A., Djenidi, V., Clark, H., & West, S. (2017). Gender differences in online participation: Examining a history and a mathematics open

foundation online course. *Australian Journal of Adult Learning, 57*(2), 266–293.

Morse, J. M. (1991). Approaches to qualitative-quantitative methodological triangulation. *Nursing research,40*(2), 120-123.

Mwansa, G., Ngandu, M. R., & Mkwambi, Z. (2025). Bridging the digital divide: exploring the challenges and solutions for digital exclusion in rural South Africa. *Discover Global Society*, *3*(1), 54.

North-West University. (2024). NWU Quick Stats 2024-25. **Retrieved from** https://www.nwu.ac.za/sites/www.nwu.ac.za/files/files/quickstats/NWU-Quick-Stats-2024-25.pdf

Opoku, D., Pobee, F, & Okyireh, R. O. (2020). Determinants of E-Learning System Adoption among Ghanaian University Lecturers: An Application of Information System Success and Technology Acceptance Models. *American Journal of Social Sciences and Humanities*, *5*(1), 151-168.

Ottemo, A., Berge, M., Mendick, H., & Silfver, E. (2023). Gender, passion, and 'sticky'technology in a voluntaristically-organized technology makerspace. *Engineering Studies*, *15*(2), 101-121.

Owusu-Bempah, E., Opoku, D., & Sam-Mensah, R. (2022). Gender Differences in E-Learning Success in a Developing Country Context: A Multi-Group Analysis. *European Journal of Education and Pedagogy*, *3*(4), 61–69. https://doi.org/10.24018/ejedu.2022.3.4.410

Panjeti-Madan, V. N., & Ranganathan, P. (2023). Impact of screen time on children's development: cognitive, language, physical, and social and emotional domains. *Multimodal Technologies and Interaction*, *7*(5), 52.

Pazilah, F. N. P., Hashim, H., & Yunus, M. M. (2019). Using technology in the ESL classroom: Highlights and challenges. *Creative Education, 10*(12), 3205.

Pei-Yu, W. (2013). Examining the digital divide between rural and urban schools: Technology availability, teachers' integration level, and students' perception. *Journal of Curriculum and Teaching, 2*(2), 127–139. https://doi.org/10.5430/jct.v2n2p127

South Africa. (2012). Green paper for higher education.

Statista. (2023). "Global E-Learning Market Size 2014-2026." Statista. Accessed January 16, 2025.https://www.statista.com/statistics/501104/worldwide/elearning-market-size/.

Thomas, R. A., West, R. E., & Borup, J. (2017). An analysis of instructor social presence in online text and asynchronous video feedback comments. *The Internet and Higher Education, 33*, 61-73. https://doi.org/10.1016/j.iheduc.2017.01.003

Torres, P. E., Ulrich, P. I., Cucuiat, V., Cukurova, M., De la Presa, M. C. F., Luckin, R., ... & Lawson, S. (2021). A systematic review of physical–digital play technology and developmentally relevant child behaviour. *International Journal of Child-Computer Interaction, 30*, 100323.

Truskowski, S., & Van der Molen, J. (2017). Outcomes and perceptions of annotated video feedback following psychomotor skill laboratories. *Journal of Computer Assisted Learning, 33*(2), 97-105.

Van Staden, W. (2022). Supporting the Successful Implementation of E-Learning in the South African Public Sector. *International Journal of Distance Education and E-Learning, 7*(2), 1-20.