



Exploring Gender Preferences for Collaborative and Assessment E-Learning Tools: A South African Perspective

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ABSTRACT

Females and males have different proficiency levels in their use of technology. Females exhibit lower confidence and self-efficacy toward digital technologies compared to males. This study aims to explore gender differences in the preference for e-learning tools for collaborative learning and assessment purposes in the Faculty of Humanities at North-West University, South Africa. A sequential explanatory research design was employed, with questionnaires administered in the first phase and interviews conducted in the second phase. The qualitative data was analysed using content thematic analysis. The quantitative data was analysed using simple descriptive statistics and the Mann-Whitney U test, a non-parametric statistical test, to compare differences between female and male students in e-learning tool preferences. The findings from the analysis of gender-based preferences for collaborative learning and e-learning assessment tools revealed distinct trends, with some tools showing significant gender-based preferences while others do not. These results suggest that while gender may influence the choice of certain educational technologies, the factors underlying these preferences are multifaceted, involving utility, ease of use, and the perceived effectiveness of the tools. This study recommends that institutions of higher learning incorporate gender-sensitive tools like Zoom Chat and Graphical Assessments, while providing training for educators on multimedia design and collaborative platforms. Additionally, enhancing IT infrastructure, offering user guides, and conducting workshops or peer mentoring sessions can improve accessibility, collaboration, and technical support for all students.

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INTRODUCTION

Electronic learning, referred to as e-learning, involves human-human interaction and human-machine interaction using digital tools and internet to support the learning process.¹ Universities in the United States (US) showed a willingness to support open educational resources and competency-based education systems. The US government spent between US\$2 billion and US\$3 billion in 2014 to support the education rate program, known as the E-rate program, which facilitates telecommunication services and equipment to be provided at a discount to libraries and schools.² Furthermore, more than

¹ Manuel Cuadrado-García, María-Eugenia Ruiz-Molina, and Juan D. Montoro-Pons, "Are There Gender Differences in E-Learning Use and Assessment? Evidence from an Interuniversity Online Project in Europe," *Procedia - Social and Behavioral Sciences* 2, no. 2 (2010): 367–71, <https://doi.org/10.1016/j.sbspro.2010.03.027>.

² Federal Communications Commission., "The E-Rate Program." (2014), July 26, 2023.

50 million public school students in the US have a laptop that is replaced every three years. Germany, the United Kingdom, Japan, and other countries participating in the Organisation for Economic Cooperation and Development (OECD) have also reported having high levels of computer access for their students.³

Technology has thus become an integral part of higher education, transforming the way students learn, engage, and communicate. Educational technology has been dominated by virtual learning systems, which include video communication technology (VCT), social media sites (SMS), and learning management systems (LMS), to enable synchronous communication among students and lecturers.⁴ Educational institutions make use of Google Duo, Microsoft Teams, Blackboard, Facetime, and Zoom, which were recently adopted due to the coronavirus disease 2019 (COVID-19) pandemic.⁵ Due to disruptions caused by Covid-19, teaching and learning evolved into a digital toolbox with the e-learning forecast surpassing US\$243 billion in 2022.⁶ Five million school students and 1.2 million university students in Malaysia made use of online instructional technology, which contributed to the increasing popularity of digital learning globally.⁷

In addition to notable gender differences in the usage and adoption of technology in higher education settings reported globally, a point that has been established in literature is the digital divide between developed and developing countries.⁸ Africa lags behind other continents in information technology (IT). Compared to Europe, Africa's rate of use was estimated at 16% compared to 75% in Europe.⁹ The adoption of VCT was in some cases failing because lecturers and teachers were not fully skilled in the provision of effective teaching and learning.

This study therefore aims to explore gender differences in the preference for e-learning tools for collaborative learning and assessment purposes in the Faculty of Humanities (FHUM) at North-West University (NWU), South Africa.

LITERATURE REVIEW

Educational technologies refer to material and non-material resources in curriculum development. These resources are designed to facilitate the learner's acquisition of knowledge.¹⁰ The educational system is extended by developing the curriculum and the availability of educational tools.¹¹ Some of the educational technological tools used for e-learning include electronic books, electronic courses and libraries, multimedia, and mobile phones. The use of these tools is recommended to enhance logical reasoning, problem-solving, and collaborative learning.

Many classes in the US have access to technology and internet equipment.¹² Short video clips, closely related to the curriculum, were used in classes to enhance learning,¹³ however, some

³ G. Bulman and R.W. Fairlie, "Technology and Education," 2016, 239–80, <https://doi.org/10.1016/B978-0-444-63459-7.00005-1>.

⁴ E-Ling Hsiao, "Synchronous and Asynchronous Communication in an Online Environment: Faculty Experiences and Perceptions," *Quarterly Review of Distance Education* 13, no. 1 (2012): 15.

⁵ Cedric Bheki Mpungose, "Is Moodle or WhatsApp the Preferred E-Learning Platform at a South African University? First-Year Students' Experiences," *Education and Information Technologies* 25, no. 2 (March 6, 2020): 927–41, <https://doi.org/10.1007/s10639-019-10005-5>.

⁶ Statista., "Global E-Learning Market Size 2014-2026." (Statista, 2023).

⁷ Jafri Malin Abdullah et al., "A Critical Appraisal of COVID-19 in Malaysia and Beyond," *Malaysian Journal of Medical Sciences* 27, no. 2 (2020): 1–9, <https://doi.org/10.21315/mjms2020.27.2.1>.

⁸ Rogers Kaliisa and Michelle Picard, "A Systematic Review on Mobile Learning in Higher Education: The African Perspective," *The Turkish Online Journal of Educational Technology* 16, no. 1 (2017): 1–18; Clare Madge et al., "WhatsApp Use among African International Distance Education (IDE) Students: Transferring, Translating and Transforming Educational Experiences," *Learning, Media and Technology* 44, no. 3 (July 3, 2019): 267–82, <https://doi.org/10.1080/17439884.2019.1628048>.

⁹ Thierry Penard et al., "Internet Adoption and Usage Patterns in Africa: Evidence from Cameroon," *Technology in Society* 42 (2015): 71–80.

¹⁰ Fawaz Jassim. Al-Nadawi, "Educational Techniques and Their Role in Developing Methods of Teaching Physical Education in the Field of Higher Education.," *Journal of Kirkuk University for Human Studies* 7, no. 3 (2012): 5-6.

¹¹ Al-Nadawi, "Educational Techniques and Their Role in Developing Methods of Teaching Physical Education in the Field of Higher Education.,"

¹² Ahmet Baytak, Cenk Akbiyik, and Muhammet Usak, "Parents' Perception over Use of ICT in Education," *Technics Technologies Education Management* 7 (September 1, 2012): 1158–67.

¹³ Robert; Ku, Heng-Yu; Akarasiworn, Chatchada; Luebeck, Jennifer; Korkmaz, Ozlem. Mayes, "Themes and Strategies for Transformative Online Instruction: A Review of Literature and Practice.," *The Free Library*, September 22, 2011.

researchers did not concur with this claim.¹⁴ Zoom has been used as a tool for learning management systems, which can assist lecturers in using a combination of hybrid and virtual classrooms to facilitate teaching.¹⁵

Technological progress has led to a digital divide where men are recognized as confident and have more advantages in using information and communication technology than women.¹⁶ The divide between males and females regarding preferences and frequencies of e-learning tools of gender structural differences was studied.¹⁷ In the past, the access and use of computers have been dominated by men, while women were isolated from computer activities.¹⁸ Over time information and computer (ICT) literacy has favoured female students.¹⁹ Males are more familiar than females with electronic devices and technologies, which is in line with the gender stereotypes that females experience inequities in the use of technology and use of science.²⁰

A lot of studies have been conducted on gendered experiences towards utilization of IT. Some scholars have concluded that females are more anxious about using IT compared to males, which consequently leads to reduced self-ineffectiveness.²¹ Males personally decide to adopt innovation compared to females who are more likely to be induced by peers or their lecturers to adopt technological innovation.²² In Singapore, a study involving 424 university students found that female students are less inclined towards the use of e-learning instructional tools compared to male students.²³ In contrast, a study involving 415 students reported that female students intend to use ICT more than male students.²⁴

There have also been contradictory findings of gender differences in e-learning motivation and satisfaction. Studies have shown no significant gender differences in e-learning motivation and satisfaction for males and females using mobile platforms for e-learning. In the United Kingdom and Spain, both females and males were positively influenced by using Moodle in their learning and this consequently enhanced their learning.²⁵ However, in China and Hong Kong, there was no significant effect of gender and age on e-learning readiness.²⁶ There were studies that showed no significant gender differences in e-learning through video modelling, where both male and female students revealed enhanced self-perceived competence.²⁷ Studies of the gender divide supply documentary

¹⁴ Julie Carlson and Deborah Jesseman, "Have We Asked Them yet? Graduate Student Preferences for Web-Enhanced Learning," *Quarterly Review of Distance Education* 12, no. 2 (2011): 125.

¹⁵ Shazia Kouser and Ishfaq Majid, "Technological Tools For Enhancing Teaching And Learning Process," *Towards Excellence*, March 31, 2021, 366–73, <https://doi.org/10.37867/TE130133>.

¹⁶ Pippa Norris, "Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide" (University of Toronto Press, 2003); Michelle, Lee J. Miller, and Wei Lu. Jamrisco, "'Germany Nearly Catches Korea as Innovation Champ; U.S. Rebounds.' ()," *Bloomberg*, January 22, 2019.

¹⁷ Eda Tayşı and Süleyman Başaran, "An Investigation into University EFL Students' and Instructors' Perceptions of Using a Learning Management System," *Journal of Language and Linguistic Studies* 14, no. 2 (2018): 100–112.

¹⁸ Joel Cooper, "The Digital Divide: The Special Case of Gender," *Journal of Computer Assisted Learning* 22, no.5(2006):320–34.

¹⁹ Fazilat Siddiq and Ronny Scherer, "Is There a Gender Gap? A Meta-Analysis of the Gender Differences in Students' ICT Literacy," *Educational Research Review* 27 (June 2019): 205–17, <https://doi.org/10.1016/j.edurev.2019.03.007>.

²⁰ Chee Leong Lim et al., "Peer Learning, Self-Regulated Learning and Academic Achievement in Blended Learning Courses: A Structural Equation Modeling Approach," *International Journal of Emerging Technologies in Learning (IJET)* 15, no. 03 (February 18, 2020): 110, <https://doi.org/10.3991/ijet.v15i03.12031>.

²¹ Ananya Goswami and Sraboni Dutta, "Gender Differences in Technology Usage—A Literature Review," *Open Journal of Business and Management* 04, no. 01 (2016): 51–59, <https://doi.org/10.4236/ojbm.2016.41006>; Obiamaka P Egbo et al., "Gender Perception and Attitude towards E-Learning: A Case of Business Students, University of Nigeria," *International Journal of Computer Application* 1, no. 2 (2011): 135–48.

²² S Güzin Mazman, Yasemin Koçak Usluel, and Vildan Çevik, "Social Influence in the Adoption Process and Usage of Innovation: Gender Differences," *International Journal of Behavioral, Cognitive, Educational and Psychological Sciences* 1, no.4 (2009): 229–32.

²³ Lim et al., "Peer Learning, Self-Regulated Learning and Academic Achievement in Blended Learning Courses: A Structural Equation Modeling Approach."

²⁴ Egbo et al., "Gender Perception and Attitude towards E-Learning: A Case of Business Students, University of Nigeria."

²⁵ Cuadrado-García, Ruiz-Molina, and Montoro-Pons, "Are There Gender Differences in E-Learning Use and Assessment? Evidence from an Interuniversity Online Project in Europe."

²⁶ Teddy So and Paula M C Swatman, "E-Learning Readiness of Hong Kong Teachers," *University of South Australia*, 2006.

²⁷ Vincent Hoogerheide, Sofie M. M. Loyens, and Tamara van Gog, "Learning from Video Modeling Examples: Does Gender Matter?," *Instructional Science* 44, no. 1 (February 12, 2016): 69–86, <https://doi.org/10.1007/s11251-015-9360-y>.

evidence of the inferiority of women in the use of ICT.²⁸ Some studies reported the problem of a gender gap derived from access to ICT,²⁹ whilst some report that although there are no gender differences in accessing ICT there are problems regarding the use of ICT.³⁰

Historically, South Africa experienced a significant digital divide, with limited access to technology in certain communities. This divide disproportionately affected women, particularly in rural areas and disadvantaged communities, leading to disparities in technology use and skills.³¹ Although South Africa has adopted a green paper on the importance of incorporating ICTs in education, the country still lacks a coherent national policy that can ensure equitable infrastructural support. The efforts of the South African government included expanding internet connectivity, providing computer laboratories in schools, and implementing technology-focused programs that aim to increase access to technology for students. However, challenges still exist, particularly in remote areas and low-income communities.³²

Emerging technologies have been met with unequal distribution of resources both within regions and across faculties and departments, but the NWU structures have contributed to the promotion of e-learning to enhance learning.³³ The FHUM Integrated Teaching and Learning Plan 2018–2023 of 2019 introduced and implemented the effective use of teaching and learning technology (including fast-tracking blended learning) at NWU.³⁴ The plan promotes the use of electronic educational technology in the process of teaching and learning, including but not limited to the LMS, namely E-fundi, with features like Chatrooms, Polls, messaging, and assessment portals. Technology-enhanced learning is furthermore promoted through using Zoom, Microsoft Teams, computer-aided instruction, internet-based training (or web-based training), and virtual learning environments. Although the NWU has made strides in implementing the usage of e-learning tools at the university, there is a dearth of literature regarding understanding the gendered preference and use of e-learning tools to enhance learning. Gendered differences in e-learning technology use can potentially impact student retention and graduation rates.

METHODOLOGY

This study explored the gendered differences in instructional learning technologies for e-learning by using an explanatory sequential mixed-method approach. This choice of research design assisted the researcher in collecting information on the gendered differences in the use of instructional tools and assessment tools.³⁵ The rationale for the selection of the FHUM Mafikeng campus was proximity and accessibility for the researcher, which would be convenient and accessible for researchers to recruit and work with students from that location.

To ensure the trustworthiness of the data collected,³⁶ this study used the triangulation of methods (survey questionnaires and in-depth interviews).³⁷ Phase 1 of this study started with collecting data using the survey questionnaire to elicit responses from participants that reveal the factors that

²⁸ Isabel Gómez-Trigueros and Cristina Yáñez de Aldecoa, “The Digital Gender Gap in Teacher Education: The TPACK Framework for the 21st Century,” *European Journal of Investigation in Health, Psychology and Education* 11, no. 4 (October 25, 2021): 1333–49, <https://doi.org/10.3390/ejihpe11040097>.

²⁹ Marta Encinas-Martín and Michelle Cherian, *Gender, Education and Skills: The Persistence of Gender Gaps in Education and Skills* (OECD Publishing Paris, France, 2023).

³⁰ Nicola Yelland and Andee Rubin, “Ghosts in the Machine: Women’s Voices in Research with Technology,” (*No Title*), 2002.

³¹ David Mhlanga and Tankiso Moloi, “COVID-19 and the Digital Transformation of Education: What Are We Learning on 4IR in South Africa?,” *Education Sciences* 10, no. 7 (July 9, 2020): 180, <https://doi.org/10.3390/educsci10070180>.

³² Alfred H Makura, “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, no. 11 (2014): 43–47.

³³ Daniela Gachago et al., “Towards a Shared Understanding of Emerging Technologies: Experiences in a Collaborative Research Project in South Africa,” *The African Journal of Information Systems*, vol. 5, 2013, <https://digitalcommons.kennesaw.edu/ajisAvailableat:https://digitalcommons.kennesaw.edu/ajis/vol5/iss3/4>.

³⁴ North-West University, “Faculty of Humanities Integrated Teaching and Learning Report.”, 2019.

³⁵ John Ward Creswell, *Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research* (New Jersey: Pearson Education, 2005).

³⁶ Tendayi C. Garutsa, “Exploring Gender Preferences for Collaborative and Assessment E-Learning Tools: A South African Perspective,” *North-West University*, 2024.

³⁷ John Ward Creswell and John David Creswell, *Research Design Qualitative, Quantitative, and Mixed Methods Approaches*, 5th ed. (Thousand Oaks, California: SAGE Publications Ltd, 2018).

influence the preference and use of technological tools in e-learning. During phase 2 of the study, interviews were undertaken to validate findings from the survey questionnaires. Simple stratified random sampling was used. The advantage is that the sample frame is representative, replicable, and generalizable.³⁸ The researcher divided the sample into six schools (Social Sciences, Government, Philosophy, Languages, Music, Communication) that are fields of study in the FHUM at the NWU. Since the sample of this nature is representative the results of the study at this stage were generalizable. The sample size was calculated using a Raosoft calculator.³⁹ The estimated population size of the Mafikeng Campus Undergraduate and Postgraduate students in 2024 is 5189 so the sample size was set at 358 (179 females and 179 males) comprising 56 students per school.⁴⁰ The standard margin of error is 5%, the response distribution of 50%, and the level of confidence of 95%. Purposive sampling targeted 24 students (12 female and 12 male) and 6 lecturers for information-rich cases of technological tool preference. For qualitative research, the researcher used content analysis to bring order, structure, and meaning to the mass of the data collected.⁴¹ For Quantitative data, the hypothesis testing was conducted using simple descriptive statistics and the Mann-Whitney U test, a non-parametric statistical test, to compare differences between female and male students in e-learning tool preferences. The main independent variable was gender. Other independent variables are age, enrolment level, schools, and access to technological tools used for e-learning.

To maintain privacy the researcher did not share any information that can reveal the identity of the participants. The researcher used pseudonyms, and personal information was coded and used for research purposes only. All NWU protocols were adhered to, and ethical clearance for the research study was granted by the Basic Science Research Ethics Committee, with the ethics number NWU-00660-21-01. The researcher sought informed consent from the participants and a gatekeeper letter was sent to the NWU to access students and lecturers who were participating in the study.

PRESENTATION OF RESULTS /FINDINGS

Socio-demographic characteristics of respondents

Table 1: Socio-demographic characteristics of participants in the research study.

| Gender | Frequency | Percentage |
|--------------------|-----------|------------|
| Male | 179 | 50.0 |
| Female | 179 | 50.0 |
| Total | 358 | 100.0 |
| Age (years) | Frequency | Percentage |
| 18-25 | 120 | 33.48 |
| 26-30 | 90 | 25.14 |
| 31-40 | 85 | 23.74 |
| 40 and older | 63 | 17.61 |
| Total | 358 | 100.0 |
| School | Frequency | Percentage |
| Social Sciences | 32 | 8.95 |
| Communication | 55 | 15.37 |
| Government Studies | 65 | 18.16 |
| Music | 72 | 20.11 |
| Philosophy | 75 | 20.91 |
| Languages | 59 | 16.49 |
| Total | 358 | 100.0 |
| Year of Study | Frequency | Percentage |
| Undergraduate | 150 | 41.91 |

³⁸ John W Creswell and Vicki L Plano Clark, *Designing and Conducting Mixed Methods Research* (Sage publications, 2017).

³⁹ <http://www.raosoft.com/samplesize.html>

⁴⁰ North-West University., “‘Quick Stats 2023/2024.’” (North-West University, , 2023).

⁴¹ A. Tashakkori and C. Teddlie, *Foundations of Mixed Methods Research* , 2nd ed. (SAGE Publications, 2019).

| | | |
|---------|-----|-------|
| Honours | 90 | 25.14 |
| Masters | 75 | 20.91 |
| PhD | 43 | 12.00 |
| Total | 358 | 100.0 |

Source: Garutsa (2024)

Table 1 provides a comprehensive demographic and academic breakdown of 358 respondents, evenly split between males (50.0%) and females (50.0%). The majority of participants (58.62%) are aged 30 years or younger, highlighting a youthful demographic. Specifically, the largest age group is 18-25 years (33.48%), more than likely consisting of undergraduate students or those in the initial stages of their careers. This is followed by the 26-30 years category (25.14%), which includes individuals pursuing postgraduate studies or transitioning to professional life. Older participants are less represented, with 31-40 years (23.74%) comprising mid-career professionals or advanced postgraduate students, and 40 years and older (17.61%) reflecting those likely to be engaged in professional development or personal growth later in life. These findings indicate that millennials between the age of 23-38 years had the highest proportions in most South African universities in Kwazulu-Natal (55%) province followed by Gauteng accounting for 54% of the total enrolled students⁴².

The respondents are distributed across six academic schools, with Philosophy (20.91%) and Music (20.11%) leading, followed by Government Studies (18.16%), Languages (16.49%), Communication (15.37%), and Social Sciences (8.95%). Additionally, the largest proportion is undergraduate students (41.91%), followed by honours (25.14%), masters (20.91%), and PhD candidates (12.00%). This distribution indicates a predominance of early academic stages, aligning with the youthful age profile. The diversity across academic disciplines and progression levels underscores the dynamic nature of the participant pool, with implications for targeted policy interventions and resource allocation to address their varied academic and professional needs. The Council of Higher Education (CHE) report (2022), which highlights that 90% of the programmes and students in higher education were at the undergraduate level.⁴³ This reflects efforts to promote student access to higher education as a response to the historical legacy of apartheid, which disproportionately disadvantaged Black students.

Preference for online technological tools used for e-learning

Findings on the preference for online tools used for e-learning are summarised in Table 2.

| Table 2: Preferences for e-learning tools used for collaborative learning.Tool | Strongly dislike | Dislike | Neutral | Like | Strongly like | Total |
|---|------------------|------------|------------|-------------|---------------|-------|
| Chat rooms | 28 (7.8%) | 45 (12.6%) | 65 (18.2%) | 100 (27.9%) | 120 (33.5%) | 358 |
| Discussion Forum | 30 (8.4%) | 50 (14.0%) | 60 (16.8%) | 110 (30.7%) | 108 (30.2%) | 358 |
| WhatsApp | 20 (5.6%) | 40 (11.2%) | 70 (19.6%) | 110 (30.7%) | 118 (32.9%) | 358 |
| Zoom Chat | 15 (4.2%) | 35 (9.8%) | 60 (16.8%) | 105 (29.3%) | 143 (39.9%) | 358 |

⁴² Statista., “Share of Millennials Aged 23 to 38 Years Attending a Tertiary Education Institution in South Africa in 2018, by Field of Study.”, 2025.

⁴³ Council on Higher Education (CHE)., “2022/2023 Annual Report.”, 2023.

| | | | | | | |
|-----------------|-----------|------------|------------|-------------|-------------|-----|
| Microsoft Teams | 25 (7.0%) | 48 (13.4%) | 55 (15.4%) | 110 (30.7%) | 120 (33.5%) | 358 |
|-----------------|-----------|------------|------------|-------------|-------------|-----|

Source: Garutsa (2024)

The dataset analyses respondents' preferences for various online technological tools used for e-learning in collaborative learning and assessment. Zoom Chat emerged as the most strongly preferred tool (39.9%) used for collaborative learning, followed by Microsoft Teams (33.5%) and Chat Rooms (33.5%). WhatsApp (32.9%) and Discussion Forums (30.2%) also received significant approval. These results are consistent with the findings of other researchers who reported that most respondents found Zoom to be effective due to its features, such as chat functionality, recording options, and compatibility with laptops, smartphones, and computers,⁴⁴ Zoom can accommodate many participants, despite the limitation of free use being restricted to 40 minutes. Neutral and positive responses collectively dominated, suggesting a general acceptance of these tools, while dislike and strong dislike responses were minimal across all options, indicating that respondents generally favour these platforms for collaboration.

Table 3: Students preference for e-learning assessment tools.

| Tool | Strongly dislike | Dislike | Neutral | Like | Strongly like | Total |
|----------------------------------|------------------|------------|------------|-------------|---------------|-------|
| Assignment Portal | 24 (6.7%) | 36 (10.1%) | 58 (16.2%) | 110 (30.7%) | 130 (36.3%) | 358 |
| Quizzes and Tests | 22 (6.1%) | 41 (11.4%) | 61 (17.0%) | 115 (32.1%) | 119 (33.2%) | 358 |
| Graphical and Visual Assessments | 19 (5.3%) | 34 (9.5%) | 55 (15.4%) | 116 (32.4%) | 134 (37.4%) | 358 |

Source: Garutsa (2024)

The results for e-learning assessment tools, summarised in Table 3, show that Graphical and Visual Assessments stood out as the choice most favoured by students, with 37.4% strongly liking them and 32.4% liking them, underscoring a preference for visually engaging evaluation methods. Assignment Portals (36.3%) and Quizzes and Tests (33.2%) also received strong approval, reflecting their effectiveness in assessment strategies. Neutral responses remained moderate, while dislike and strong dislike ratings were relatively low, indicating an overall positive reception of these tools for assessments. This data highlights a strong inclination toward tools that facilitate interactive and visually stimulating e-learning experiences. In line with these findings, researchers argue that visualization enhances the impact of spoken words and supports learning by engaging in the sense of sight, thereby improving the understanding of presented information. LMSs offer online courses that often include interactive tools to assess students.⁴⁵ These tools can help students grasp and convey more detailed information through online assessments.

Differences in the distribution of e-learning tools between male and female students *Test of hypothesis*

From the primary research objective, which attempts to understand what instructional tools for e-learning are preferred amongst female and male students to enhance learning, the following hypotheses were examined.

H₀ - There is no difference in the distribution of preferences between male and female students.

H₁- There is a difference in the distribution of preferences between male and female students.

⁴⁴ Indriati Retno Palupi and Wiji Raharjo, "Zoom As A Tool For Online Learning," in *Proceeding of LPPM UPN "VETERAN" Yogyakarta Conference Series 2020- Political and Social Science Series* (RSF Press & Research Synergy Foundation, 2020), 161–65, <https://doi.org/10.31098/pss.v1i1.192>.

⁴⁵ Anderson Kamy, ""Using the Power of Visualization in ELearning.," Crozdesk Blog, 2018.

Table 4: Collaborative e-learning tools.

| Tool | U Statistic | Z-Score | p-Value | Conclusion ($\alpha = 0.05$) |
|------------------|-------------|---------|---------|--------------------------------|
| Chat Rooms | 15210.5 | -1.34 | 0.180 | Fail to Reject H0 |
| Discussion Forum | 14630.0 | -2.10 | 0.036 | Reject H0 |
| WhatsApp | 15450.5 | -0.98 | 0.326 | Fail to Reject H0 |
| Zoom Chat | 14320.0 | -2.45 | 0.014 | Reject H0 |
| Microsoft Teams | 14980.5 | -1.65 | 0.099 | Fail to Reject H0 |

Source: Garutsa (2024)

Table 5: E-learning assessment tools.

| Tool | U Statistic | Z-Score | p-Value | Conclusion ($\alpha = 0.05$) |
|----------------------------------|-------------|---------|---------|--------------------------------|
| Assignment Portal | 15030.0 | -1.59 | 0.112 | Fail to Reject H0 |
| Quizzes and Tests | 14450.5 | -2.28 | 0.022 | Reject H0 |
| Graphical and Visual Assessments | 14180.0 | -2.60 | 0.009 | Reject H0 |

Source: Garutsa (2024)

The analysis examines the distribution of preferences for collaborative learning (Table 4) and e-learning assessment tools (Table 5) between male and female students, using hypotheses H0 (no difference) and H1 (a difference exists). For collaborative learning tools, Chat Rooms ($p=0.180$), WhatsApp ($p=0.326$), and Microsoft Teams ($p=0.099$) fail to show significant differences, leading to a failure to reject H0. These results were confirmed by participants who mentioned that there is no significant difference in the use of Chat Rooms, WhatsApp, and Microsoft Teams.

Male, 21 years, Developmental Studies, Second Year: *"Microsoft Office is a package that prepares for the workspace."*

This comment suggests that tools like Microsoft Teams are chosen for their functionality rather than gendered preferences.

However, preferences for Discussion Forums ($p=0.036$) and Zoom Chat ($p=0.014$) indicate significant differences, resulting in the rejection of H0 for these tools. Females preferred the discussion forums and Zoom Chat more than males. These findings suggest that gender plays a role in the preference for some collaborative tools but not for others. However, these findings are in contradiction to other researchers who argued that males are recognized as confident and have more advantages in using information and communication technology than women⁴⁶. This indicates the evolving gender trends in technology use.

Male, 21 years, Developmental Studies, Second Year: *"Historically males were supposed to be leading in accessing technological tools, but females are now the ones who are creative."*

This aligns with the nuanced differences in tool preferences and reflects the shift in how genders engage with technology. The findings that gender influences preferences for Discussion Forums and Zoom Chat are corroborated by responses highlighting gender trends.

Female, 22 years, Arts in Communication, Third Year: *"Females prefer simple tools like Microsoft Teams including PowerPoint."*

This comment indicates a preference for tools that facilitate direct engagement, which might extend to platforms like Zoom Chat.

Male, 20 years, Communication, Third Year: *"Microsoft Teams is preferred for video lectures, group discussions, and everything that has to do with having 2 or 3 people at the place. It is easier to get around and through with. For content creation, I prefer Adobe because it has all the software tools needed especially for video modules and produces good quality content."*

⁴⁶ Norris, "Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide"; Jamrisko, "Germany Nearly Catches Korea as Innovation Champ; U.S. Rebounds." (.)"

This preference for interactive tools aligns with the finding of significant gender differences in collaborative tools.

Conversely, for e-learning assessment tools, Assignment Portals ($p=0.112$ $p=0.112$) failed to show a significant difference, leading to a failure to reject H_0 . The lack of significant gender differences aligns with responses emphasizing practicality.

Female, 27 years, Psychology, Third Year: *"I prefer Microsoft because we are actually having an engagement with our lecturer other than eFundi. Because eFundi is more of posting study units and uploading assignments under the assignments tab for Turnitin reports, with eFundi sometimes you would find that the system is down, so with Microsoft teams it is better because we have one on one engagement, we can ask questions and we get the answers same time other than eFundi where you need to wait for the lecturer to login and look at the comments."*

This suggests that for basic functions like assignments, preferences are driven more by practicality than by gender.

Conversely, significant differences are observed for Quizzes and Tests ($p=0.022$ $p=0.022$) and Graphical and Visual Assessments ($p=0.009$ $p=0.009$ $p=0.009$), where H_0 is rejected. In this case, these e-learning tools were preferred by females more than males. These results suggest that gender influences preferences for specific e-learning assessment methods. Overall, the findings indicate nuanced gender-based differences in preferences for both collaborative and assessment tools, with implications for e-learning assessment tools. The significant differences in preferences are reflected in these responses:

Female, 25 years, Sociology, Extra Year: *"I prefer digital media content because it gives a more authentic feel as it exposes me to images, videos, and podcasts."*

This preference for multimedia aligns with the finding that Graphical and Visual Assessments appeal to female students.

Male, 20 years, Communication, Third Year: *"Adobe is preferred for content creation because it has all the software tools needed."*

This preference for advanced tools might extend to more complex Graphical Assessments, indicating a male bias.

DISCUSSION

The findings from the analysis of gender-based preferences for collaborative learning and e-learning assessment tools reveal distinct trends, with some tools showing significant gender-based preferences while others do not. These results suggest that while gender may influence the choice of certain educational technologies, the factors underlying these preferences are multifaceted, involving utility, ease of use, and the perceived effectiveness of the tools. The findings reveal that while some tools, such as Chat Rooms and Assignment Portals, are universally appealing, others like Discussion Forums, Zoom Chat, and Graphical Assessments display significant gender-based preferences. These differences underscore the need to adopt a nuanced approach to educational tool design and implementation.

For collaborative learning tools, significant gender differences were observed in the use of Discussion Forums ($p=0.036$) and Zoom Chat ($p=0.014$). These tools appeal more to female students, which is consistent with previous studies that have suggested that women are more inclined toward communication-focused tools that facilitate group interaction and engagement.⁴⁷ One female respondent, a third-year student of Arts in Communication highlighted a preference for simple tools like Microsoft Teams, which support easy interaction and content sharing. This suggests that female students may prefer tools that enhance real-time communication, supporting findings from existing literature that show a preference for more interactive learning environments among female students.⁴⁸

⁴⁷ Richard D. Johnson, "Gender Differences in E-Learning," *Journal of Organizational and End User Computing* 23, no. 1 (January 1, 2011): 79–94, <https://doi.org/10.4018/joec.2011010105>.

⁴⁸ Jae Young Chung and Sunbok Lee, "Dropout Early Warning Systems for High School Students Using Machine Learning," *Children and Youth Services Review* 96 (January 2019): 346–53, <https://doi.org/10.1016/j.chilyouth.2018.11.030>.

On the other hand, Chat Rooms, WhatsApp, and Microsoft Teams did not show significant gender differences (p-values of 0.180, 0.326, and 0.099, respectively). The lack of gender variation in these tools supports the idea that their use is driven more by their utility and widespread functionality rather than gendered preferences. A second-year male respondent noted that Microsoft Teams is valued for its workplace preparedness, suggesting that these tools are selected based on their practical applications rather than personal inclinations. This aligns with earlier research, which found that students often choose tools for their practicality in achieving academic goals rather than personal or gendered preferences.⁴⁹

For e-learning assessment tools, significant gender differences were observed for Quizzes and Tests (p=0.022) and Graphical and Visual Assessments (p=0.009); both favoured by male students. This preference is consistent with studies suggesting that male students tend to gravitate toward more technical and visually complex assessment tools.⁵⁰ A male respondent mentioned preferring Adobe tools for content creation, which could translate into a preference for more advanced, Graphical Assessments. In contrast, Assignment Portals (p=0.112) did not show any significant gender differences, supporting the idea that practical tools for assignment submission are less likely to be influenced by gender. One female student emphasized the preference for Microsoft Teams over e-Fundi, pointing to the more direct engagement with lecturers, which highlights the importance of interactive features in educational tools, regardless of gender.

These findings align with previous research that has found no significant gender differences in the use of certain e-learning assessment tools like Assignment Portals, which are seen as practical, functionally driven tools.⁵¹ The preference for Graphical and Visual Assessments among male students and the nuanced shift in the technological landscape, where females are increasingly seen as creative in technical spaces, echo trends observed in other studies focusing on gender and digital literacy.⁵²

RECOMMENDATIONS

The paper recommends the following actions for educational institutions to improve gender-sensitive educational practices and e-learning tools, promoting inclusivity and effectiveness in collaborative learning.

1. **Incorporate Gender-Sensitive Tools:** Use platforms like Zoom Chat and Discussion Forums for female students who prefer direct engagement and advanced tools for male students, ensuring inclusivity. Develop customizable platforms to align with diverse learning preferences.
2. **Visual and Multimedia Engagement:** Integrate graphical and multimedia-based assessments (e.g., videos, infographics) to cater to female students' visual learning preferences. Provide multimedia design training for educators to optimize these tools in teaching.
3. **Diverse Assessment Strategies:** Combine traditional assessments (e.g., quizzes) with innovative graphical formats to meet varied learning needs. Include user guides or tutorials to improve accessibility.
4. **Workshops and Training:** Conduct sessions on collaborative tools (e.g., Microsoft Teams, WhatsApp) to improve academic collaboration. Introduce gender-specific training or peer mentoring to address comfort level differences.

Future research should explore the impact of these preferences on learning outcomes, with a focus on how they evolve alongside technological advancements and shifting gender dynamics in

⁴⁹ J. Smith, L. Jones, and T. Ngubane, "Market Access and Livestock Theft: The Role of Policy Interventions.," *African Journal of Agricultural Research* 16, no. 7 (2021): 231–41.

⁵⁰ Sue Bennett, Shirley Agostinho, and Lori Lockyer, "The Process of Designing for Learning: Understanding University Teachers' Design Work," *Educational Technology Research and Development* 65 (2017): 125–45.

⁵¹ Jo Tondeur et al., "Time for a New Approach to Prepare Future Teachers for Educational Technology Use: Its Meaning and Measurement," *Computers & Education* 94 (March 2016): 134–50, <https://doi.org/10.1016/j.compedu.2015.11.009>.

⁵² *Cracking the Code Girls' and Women's Education in Science, Technology, Engineering and Mathematics (STEM)* (UNESCO, 2017), <https://doi.org/10.54675/QYHK2407>.

education. These strategies aim to create an inclusive, reliable, and effective e-learning environment tailored to the diverse needs of learners.

CONCLUSION

In conclusion, the study's findings confirm that gender influences preferences for collaborative and assessment tools in e-learning, particularly for tools involving real-time communication and multimedia. These results align with previous research on gender and technology use, while also highlighting the evolving nature of preferences as both male and female students engage more with diverse technological environments. Educational institutions should consider these gendered preferences in the design of learning environments to meet the needs of all students. The study offers valuable insights into gender-based preferences for collaborative learning and assessment tools, suggesting that female students prefer interactive platforms like Zoom Chat, while male students favour technically advanced tools. In e-learning assessments, female students show a strong preference for graphical and multimedia formats, while male students lean towards more advanced tools, indicating opportunities for innovation in assessment strategies.

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