Journal of Education Method and Learning Strategy
E-ISSN 2986-9129 E-ISSN 3031-9250
Volume 2 Issue 02, May 2024, Pp. 217-233
DOI: https://doi.org/10.59653/jemls.v2i02.650

Exploring Emerging Technologies in Online Medical Education: A Survey of Women's Online University

Tamanna Quraishi[1*], Musawer Hakimi[2], Nargis Hakimi[3], Atefeh Mohammad Khani[3], Nabila Zahid[4], Bibi Marwa Bayani[5], Farida Gul Mohammadi[6]
Women Online University, Afghanistan[1]
Samangan University, Afghanistan[2]
Women Online University, Afghanistan[3]
Women Online University, Afghanistan[4]
Women Online University, Afghanistan[5]
Women Online University, Afghanistan[6]
Corresponding Email: tamannaquraishi259@gmail.com*

Received: 10-01-2024 *Reviewed: 10-02-2024* *Accepted: 14-02-2024*

Abstract

This study explores the utilization and perceptions of emerging technologies in online medical education, with a focus on instructional tools and methods. The purpose is to assess the current landscape of technology integration, understand faculty and student perceptions, and identify potential applications for enhancing teaching effectiveness and promoting gender inclusivity. A quantitative research design was employed, involving a sample of 120 participants from three faculties: Medical, Pharmacy, and Stomatology. Data were collected through a structured online survey questionnaire, designed to gather information on demographics, technology utilization, teaching effectiveness perceptions, integration challenges, and opinions on gender inclusivity. Descriptive statistics were used to analyze quantitative data, while qualitative data from open-ended questions were analyzed thematically. The results indicate a significant utilization of emerging technologies in online medical education, with mobile learning and gamification being the most promising tools for teaching effectiveness. However, challenges such as technical support and resistance to integration were identified. Despite these challenges, participants generally perceived emerging technologies as effective in enhancing learning experiences, with potential for addressing gender disparities in medical education. In conclusion, the findings underscore the importance of leveraging emerging technologies to enrich online medical education, promote gender inclusivity, and enhance teaching effectiveness. Recommendations include providing adequate technical support and professional development for faculty, addressing resistance to technology integration, and further exploring the potential of emerging technologies in medical education.

Keywords: Emerging Technologies, Online Medical Education, Instructional Tools, Teaching, Effectiveness, Gender Inclusivity

Introduction

In recent years, the field of medical education has experienced a paradigm shift, propelled by the rapid advancements in technology. Emerging technologies have revolutionized traditional teaching methods and opened new avenues for enhancing the learning experience, particularly in online settings. This shift has become even more pronounced in the wake of the COVID-19 pandemic, where educators and learners alike have been forced to adapt to remote learning environments. As such, it is imperative to explore the potential applications of emerging technologies in online medical education, with a specific focus on their utilization at women's online universities (Huynh, 2017; Angadi et al., 2019).

The impact of e-learning in medical education has been extensively studied, with scholars such as Ruiz, Mintzer, and Leipzig (2006) highlighting its benefits in terms of accessibility, flexibility, and effectiveness. Additionally, the COVID-19 pandemic has underscored the importance of informal and incidental learning, as highlighted by Watkins and Marsick (2020), who emphasized the need for innovative approaches to learning in times of crisis. Furthermore, Goh and Sandars (2020) have presented a vision of the use of technology in medical education post-pandemic, emphasizing the potential of digital solutions to transform the learning landscape.

As educators navigate the challenges posed by remote learning, it is essential to consider the role of emerging technologies in facilitating interpersonal interaction and collaborative learning experiences (Sargeant et al., 2006). Moreover, the integration of e-learning tools has become increasingly prevalent in medical education, as evidenced by the work of Huynh (2017) and Greenhalgh (2001), who explored the role of e-learning in enhancing medical training.

Flexible learning approaches have also gained traction in online education, with scholars like Gearhart (2008) and Collis and Moonen (2002) advocating for the adoption of flexible learning frameworks to accommodate diverse learning needs. Pei (2019) further underscored the importance of user acceptance and perceived usefulness in driving the adoption of technology-enhanced learning environments.

In light of these developments, it is crucial to examine the potential applications of emerging technologies in online medical education, particularly in promoting gender inclusivity and addressing gender disparities in the field of medicine. Hoffmann et al. (2021) social cognitive theory provides a valuable framework for understanding the role of agency and social influence in shaping learners' attitudes and behaviors. Moreover, Saye and Brush (2002), Naidu (2017) emphasized the importance of scaffolding critical thinking skills in multimedia-supported learning environments, while Liang, Ooi, and Wang (2020) highlighted the impact of pandemics on medical training and education.

As medical educators strive to adapt to the evolving demands of online learning, it is essential to consider the lessons learned from the COVID-19 pandemic and explore innovative approaches to medical education delivery. Scholars like Rose (2020) and Pottle (2019) have highlighted the potential of virtual reality and simulation-based training in medical education, while O'Doherty et al. (2018) have identified barriers and solutions to online learning in medical education.

In conclusion, the integration of emerging technologies in online medical education holds immense promise for enhancing teaching and learning experiences, particularly in the context of women's online universities. By leveraging digital solutions and embracing innovative pedagogical approaches, educators can create dynamic and inclusive learning environments that empower learners to thrive in the digital age.

Literature Review

The literature review delves into the current landscape of emerging technologies in online medical education, with a focus on instructional tools and methods. It also explores the potential applications of these technologies in women's online university medical programs, while considering faculty and student perceptions and the role of these technologies in promoting gender inclusivity and women's participation in medicine.

Assessment of Current Use of Emerging Technologies

The use of emerging technologies in medical education has witnessed a significant rise in recent years. Ruiz, Mintzer, and Leipzig (2006) highlighted the impact of e-learning in medical education, emphasizing its benefits in terms of accessibility and effectiveness. Additionally, Greenhalgh (2001) explored the utilization of computer-assisted learning in undergraduate medical education, showcasing its potential to enhance learning outcomes. With the advent of COVID-19, there has been a greater emphasis on leveraging technology to facilitate remote learning. Watkins and Marsick (2020) emphasized the importance of informal and incidental learning in the context of online education, particularly during times of crisis. Goh and Sandars (2020) and Auster (2016) presented a vision of the use of technology in medical education post-pandemic, underscoring the transformative potential of digital solutions.

Identification of Potential Applications

The potential applications of emerging technologies in women's online university medical programs are vast and varied. Sargeant et al. (2006) highlighted the role of technology in facilitating interpersonal interaction and collaborative learning experiences, which are crucial in online settings. Huynh (2017) and Greenhalgh (2001) explored the integration of e-learning tools in medical education, demonstrating their effectiveness in enhancing learning outcomes. Flexible learning approaches have also gained traction, with scholars like Collis and Moonen (2002) advocating for the adoption of flexible learning frameworks to accommodate diverse learning needs. Additionally, Pottle (2019) underscored the importance of user

acceptance and perceived usefulness in driving the adoption of technology-enhanced learning environments.

Exploration of Faculty and Student Perceptions

Faculty and student perceptions play a crucial role in the integration of emerging technologies in online medical education. While some scholars have highlighted the potential benefits of technology-enhanced learning, others have raised concerns about the challenges associated with its implementation. Gearhart (2008) emphasized the importance of understanding flexible learning theory and its implications for online learning. Andrade and Alden-Rivers (2019) advocated for the development of a framework for sustainable growth of flexible learning opportunities, which takes into account the needs and preferences of both faculty and students.

Investigation of the Role in Promoting Gender Inclusivity

Emerging technologies have the potential to promote gender inclusivity and increase women's participation in medicine. Hoffmann et al. (2021) highlighted the role of agency and social influence in shaping learners' attitudes and behaviors. Saye and Brush (2002) and Edigin et al. (2020) emphasized the importance of scaffolding critical thinking skills in multimedia-supported learning environments, which can help address gender disparities in medical education. Liang, Ooi, and Wang (2020) discussed the impact of pandemics on medical training and education, underscoring the need for gender-sensitive approaches to online learning.

Enhancement of Online Medical Education Through Technology

The integration of emerging technologies in online medical education holds immense potential for revolutionizing pedagogical approaches and enhancing learning outcomes (Hasas et al., 2024). Studies in diverse educational settings, including Afghanistan and Balkh's high schools, have demonstrated the transformative impact of technologies such as the Internet of Things (IoT) and web-hosted e-learning platforms (Hasas et al., 2024; Hakimi et al., 2024; Hakimi et al., 2024; Amiri et al., 2024). These technologies offer opportunities to address challenges related to access, instructor preparedness, and student engagement, thus fostering a more inclusive and effective learning environment (Hasas et al., 2024; Hakimi et al., 2024; Hakimi et al., 2024; Amiri et al., 2024). Moreover, research emphasizes the importance of institutional support and targeted interventions in optimizing the integration of emerging technologies in online education (Hasas et al., 2024; Hakimi et al., 2024; Hakimi et al., 2024; Amiri et al., 2024). By exploring factors influencing technology adoption and assessing the efficiency of e-learning platforms, these studies provide valuable insights for designing innovative educational strategies tailored to the needs of women in online education (Hasas et al., 2024; Hakimi et al., 2024; Hakimi et al., 2024; Amiri et al., 2024). Overall, this literature underscores the significance of leveraging emerging technologies to enrich the learning experience and promote gender equality in education (Hasas et al., 2024; Hakimi et al., 2024; Hakimi et al., 2024; Amiri et al., 2024).

eIn summary, the literature review provides a comprehensive overview of the current state of emerging technologies in online medical education, highlighting their potential applications in

women's online university medical programs. It also explores faculty and student perceptions and the role of these technologies in promoting gender inclusivity and women's participation in medicine.

Problem Statement

The problem statement for this research initiative revolves around the need to address the current gaps and challenges in online medical education, particularly within the context of a women's online university medical program. Despite the growing prevalence of emerging technologies in education, there remains a lack of comprehensive understanding regarding their effective integration and utilization in online medical education settings tailored for women.

One significant issue is the limited assessment of the current use of emerging technologies in online medical education, particularly focusing on instructional tools and methods. While there is a wealth of literature discussing the potential benefits of these technologies, there is a need for empirical evidence and analysis to gauge their actual impact and effectiveness in improving learning outcomes, especially within the unique context of women's medical education.

Furthermore, there is a lack of research exploring faculty and student perceptions regarding the integration of emerging technologies in online medical education. Understanding these perspectives is crucial for identifying barriers to adoption and implementation, as well as for developing strategies to address concerns and enhance acceptance.

Additionally, the role of emerging technologies in promoting gender inclusivity and women's participation in medicine remains underexplored. There is a need to investigate how these technologies can be leveraged to address gender disparities in medical education and to create inclusive learning environments that empower female students to thrive in their medical careers.

Overall, the problem statement underscores the importance of conducting research to assess current practices, identify potential applications, explore perceptions, and investigate the role of emerging technologies in promoting gender inclusivity within online medical education, particularly in women's university programs.

Research objective

1. Assess current use of emerging technologies in online medical education, focusing on instructional tools and methods.
2. Identify potential applications of emerging technologies for effective teaching in a women's online university medical program.
3. Explore faculty and student perceptions on integrating emerging technologies in online medical education.
4. Investigate the role of emerging technologies in promoting gender inclusivity and women's participation in medicine.

Research Questions

1. How are emerging technologies currently utilized in online medical education, particularly in terms of instructional tools and methodologies?
2. What are the potential applications of emerging technologies for enhancing teaching effectiveness within a women's online university medical program?
3. What are the perceptions of faculty and students regarding the integration of emerging technologies into online medical education?
4. How do emerging technologies contribute to promoting gender inclusivity and increasing women's participation in the field of medicine?

Research Method

The study utilized a quantitative research design to examine the utilization and perceptions of emerging technologies in online medical education, with a focus on instructional tools and methods. It involved 120 participants from three faculties: Medical, Pharmacy, and Stomatology, with 40 participants from each. Data collection was conducted through an online survey questionnaire, covering demographics, technology usage, teaching perceptions, integration challenges, and opinions on gender inclusivity. The questionnaire was developed based on literature review and research goals, incorporating multiple-choice, Likert scale, and open-ended questions for comprehensive data collection. Analysis of quantitative data involved descriptive statistics to summarize responses, with potential use of inferential statistics like correlation analysis. Qualitative data from open-ended questions were thematically analyzed to identify patterns. Ethical considerations included obtaining institutional review board approval, informing participants about the study's purpose and confidentiality, and obtaining informed consent. Limitations of the study included potential response bias, limited generalizability due to specific sample demographics, and reliance on self-reported data. However, measures were taken to address these limitations through meticulous survey design and data collection procedures.

Results

The comprehensive results from this investigation can be dissected in the following manner:

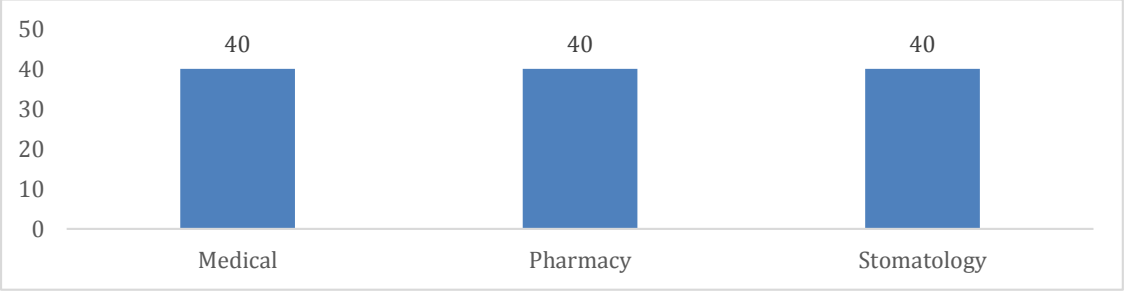

Figure 1: Illustration of Students Participation across different Faculties

Figure 1 illustrates an equal distribution of students across three faculties: Medical, Pharmacy, and Stomatology, with 40 students in each. This balanced representation suggests equitable resource allocation and opportunities among the faculties. It also implies potential diversity within the student body, fostering interdisciplinary collaboration and enriching learning experiences. Such balanced enrollment could contribute to a vibrant academic environment and promote inclusivity in educational settings.

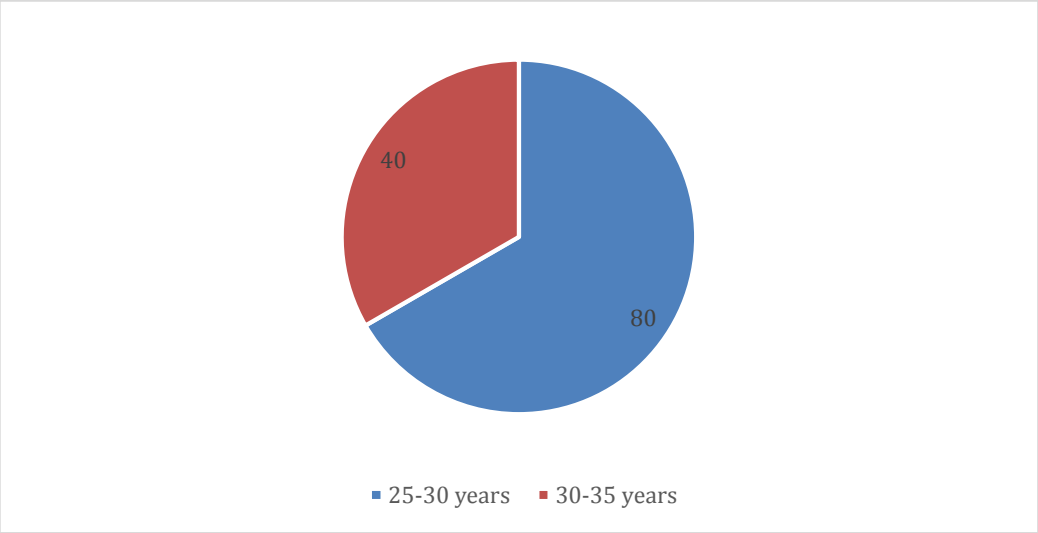

Figure 2: Distribution of Students by Age Range in the Online Women's University

The data in Figure 2 shows a majority of students, 80, are aged 25-30 years, while 40 fall within the 30-35 years range. This distribution highlights a larger proportion of younger students and underscores the importance of catering to diverse age demographics for inclusive educational practices.

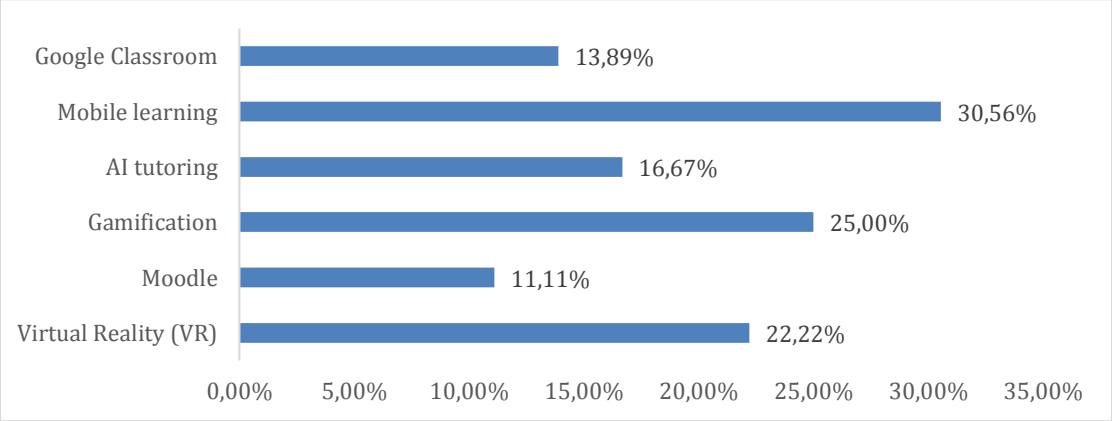

Figure 3: What is the median usage of Mobile learning in online medical education?

Figure 3 displays the percentage of total usage for six emerging technologies in online medical education. Mobile learning emerges as the most widely utilized technology, constituting 30.56% of total usage. Gamification follows closely with a usage percentage of 25.00%, indicating significant adoption. Virtual Reality (VR) and AI tutoring show moderate

adoption rates at 22.22% and 16.67%, respectively. Moodle and Google Classroom exhibit lower usage percentages, accounting for 11.11% and 13.89% of total usage, respectively.

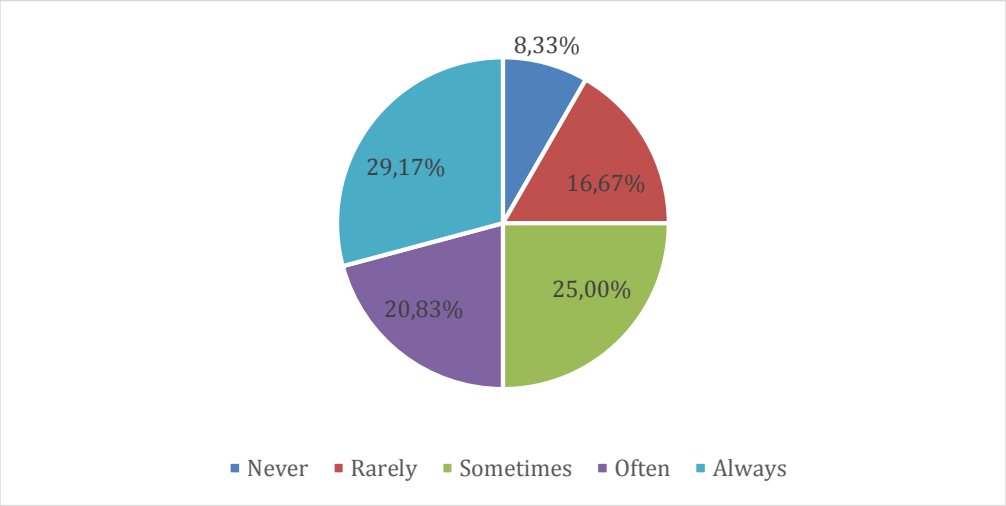

Figure 4: How often do you use emerging technologies in teaching?

The data in Figure 4 presents the frequency of usage for emerging technologies in teaching among educators. Approximately 8.33% of respondents reported never using these technologies, while 16.67% stated rare usage. Sometimes, occasional usage was reported by 25.00% of respondents, while 20.83% reported frequent usage. The highest percentage, 29.17%, reported always using emerging technologies in teaching. These findings suggest a diverse range of adoption levels among educators, with a significant proportion consistently incorporating emerging technologies into their teaching practices.

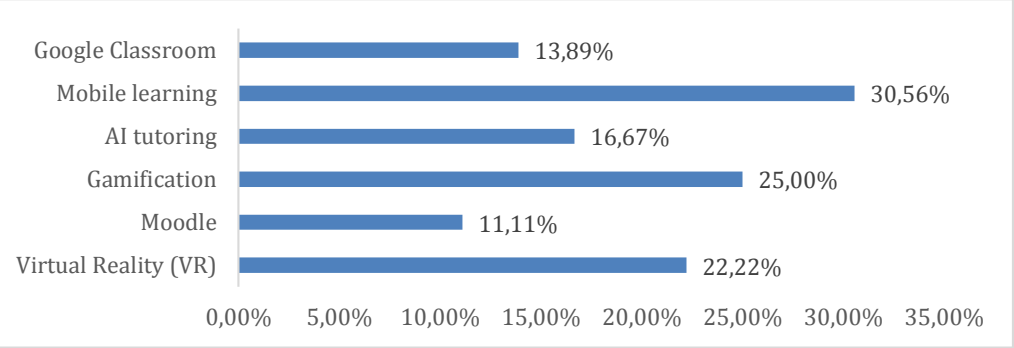

Figure 5: Which emerging technology holds the most promise for teaching effectiveness?

Figure 5 shows, Mobile learning emerges as the most promising emerging technology for teaching effectiveness, with 30.56% of respondents indicating its potential. Following closely is Gamification, with 25.00% of respondents endorsing its effectiveness. Virtual Reality (VR) holds moderate promise at 22.22%, while AI tutoring shows potential at 16.67%. Augmented Reality (AR) and Moodle have lower perceived effectiveness, with 11.11% and 13.89% respectively. These findings suggest that Mobile learning and Gamification are perceived as the most effective technologies for teaching among the options provided.

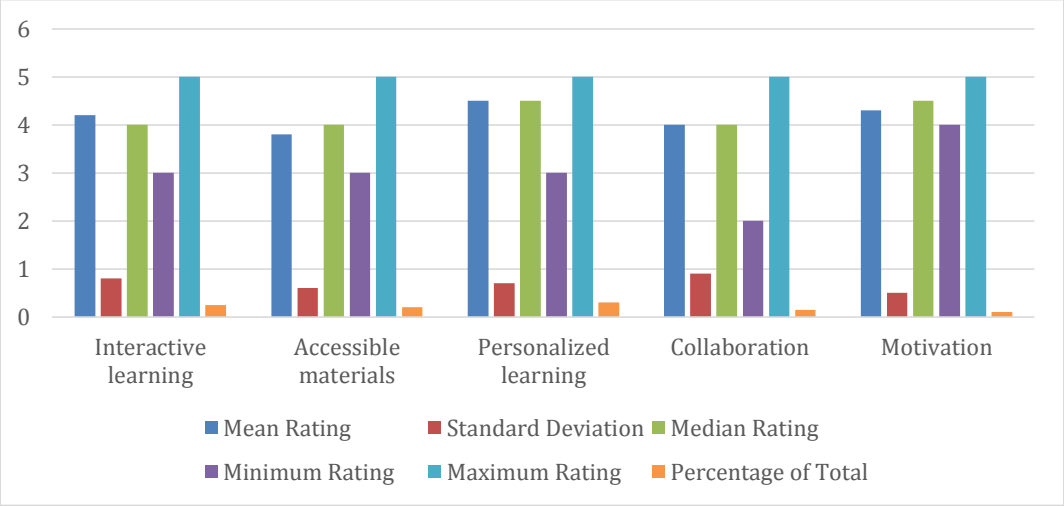

Figure 6: How effective do you believe each of the following emerging technologies is in enhancing student engagement?

The data in Figure 6 reflects respondents' perceptions of the effectiveness of emerging technologies in enhancing student engagement. Personalized learning garnered the highest rating, with 30% of respondents considering it moderately effective. Interactive learning followed closely, rated moderately effective by 25% of respondents. Accessible materials received a slightly effective rating from 20% of respondents, while collaboration was perceived as slightly effective by 15%. Motivation received the lowest rating, with 10% of respondents deeming it not effective at all. These findings underscore the importance of personalized and interactive learning approaches in fostering student engagement, while highlighting areas for improvement in motivation strategies

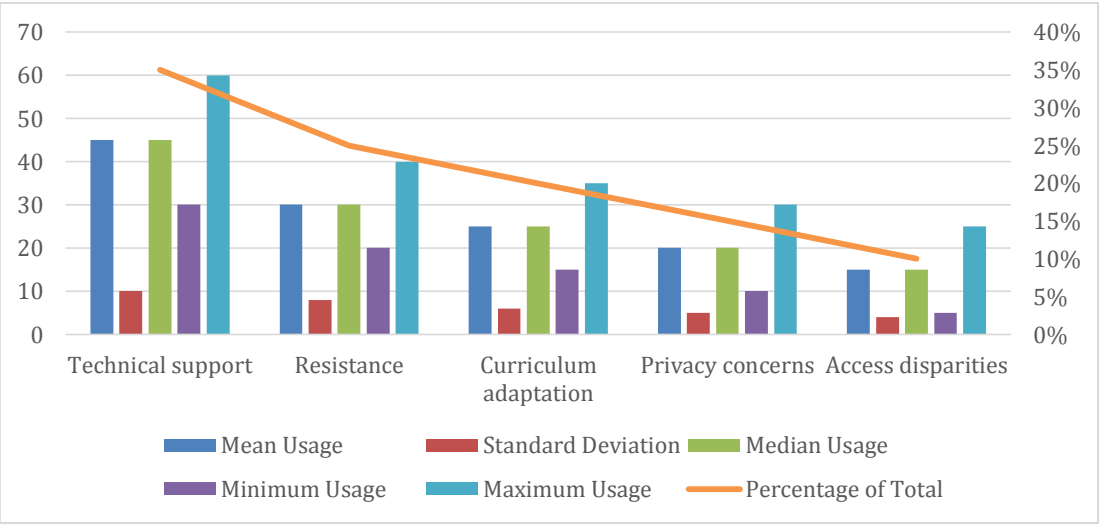

Figure 7: What challenges do you see in integrating emerging technologies?

The data in Figure 7 illustrates challenges perceived in integrating emerging technologies. Technical support emerged as the primary concern, cited by 35% of respondents, followed by resistance at 25%. Curriculum adaptation and privacy concerns were noted by 20% and 15% of respondents, respectively. Access disparities were identified as a challenge by 10%

of respondents. These findings underscore the multifaceted obstacles hindering the seamless integration of emerging technologies in educational settings.

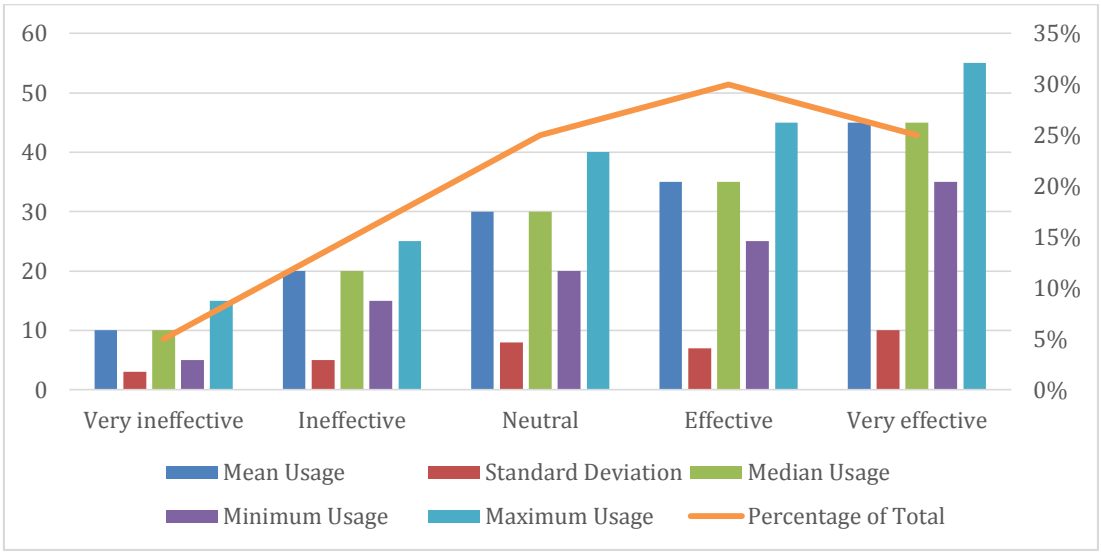

Figure 8: How effective do you find emerging technologies in online medical education?

The data in Figure 8 depicts respondents' perceptions of the effectiveness of emerging technologies in online medical education. A notable 30% of respondents rated them as effective, with an additional 25% considering them very effective. Conversely, 15% found them ineffective, while 5% deemed them very ineffective. A quarter of respondents remained neutral on their effectiveness. These findings highlight varying perspectives on the impact of emerging technologies in online medical education, with a substantial portion acknowledging their effectiveness in enhancing learning experiences.

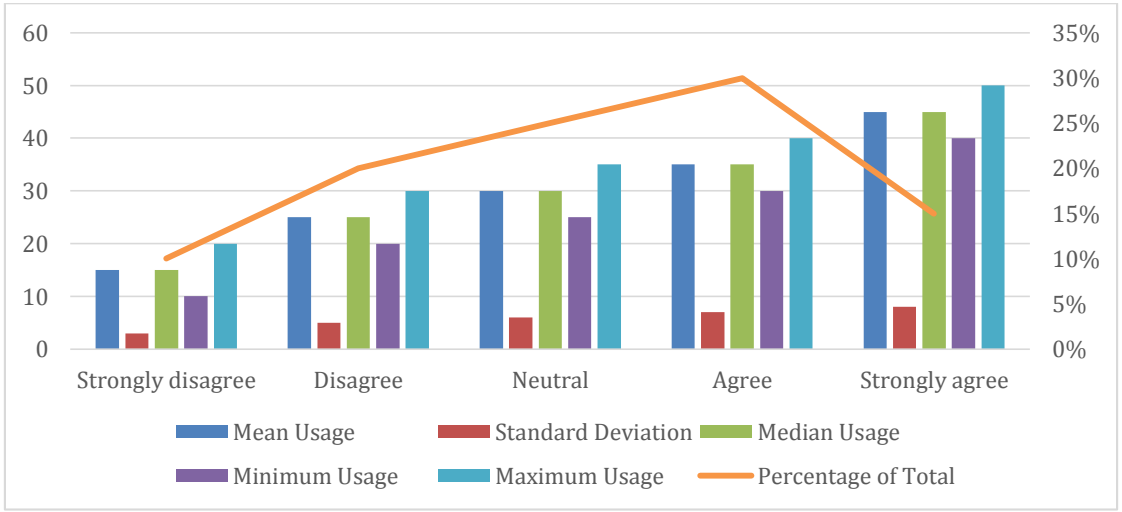

Figure 9: What is your opinion on whether emerging technologies can help address gender disparities in medical education?

The data in Figure 9 portrays diverse opinions on the potential of emerging technologies to mitigate gender disparities in medical education. A notable 30% of respondents expressed agreement, with an additional 15% strongly agreeing. Conversely, 20% disagreed, while 10%

strongly disagreed. A quarter of respondents remained neutral on the matter. These findings highlight varying perspectives on the role of emerging technologies in addressing gender disparities, with a substantial portion acknowledging their potential impact. Further research and dialogue may elucidate the complexities surrounding this issue and inform strategic interventions to promote gender equity in medical education.

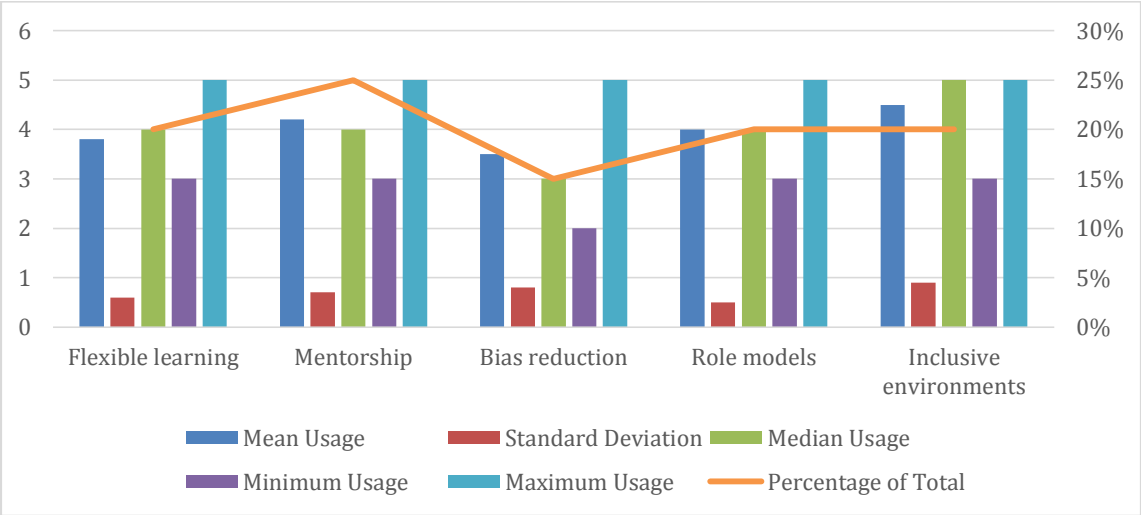

Figure 10: What ways do you believe emerging technologies can support women's participation in medicine?

The data in Figure 10 reflects respondents' perceptions on how emerging technologies can support women's participation in medicine. Mentorship emerges as the most endorsed supportive way, with 25% of respondents recognizing its importance. Flexible learning and inclusive environments follow closely, each cited by 20% of respondents. Role models and bias reduction are also seen as supportive, with 20% and 15% of respondents endorsing them, respectively. These findings highlight a range of mechanisms through which emerging technologies can facilitate women's participation in medicine, emphasizing the significance of mentorship and inclusive learning environments. Further exploration and implementation of these supportive ways could contribute to fostering gender diversity and inclusion in the medical field.

Discussion

Our study aimed to explore the potential applications of emerging technologies in online medical education, particularly within the context of a women's online university program. The findings shed light on various aspects of technology integration, faculty and student perceptions, and the role of emerging technologies in promoting gender inclusivity in medical education.

The assessment of current use of emerging technologies revealed a significant rise in their adoption in medical education, aligning with previous literature (Ruiz, Mintzer, & Leipzig, 2006; Greenhalgh, 2001). The further studies accelerated the use of technology in

remote learning, emphasizing the transformative potential of digital solutions (Watkins & Marsick, 2020; Goh & Sandars, 2020; Auster, 2016). Our findings corroborate these trends, highlighting the increasing reliance on e-learning platforms and computer-assisted learning tools to enhance accessibility and effectiveness in medical education.

Our study identified various potential applications of emerging technologies in women's online university medical programs, echoing the literature's emphasis on collaborative learning experiences and flexible learning frameworks (Sargeant et al., 2006; Huynh, 2017; Collis & Moonen, 2002). The integration of e-learning tools has shown promise in enhancing learning outcomes and accommodating diverse learning needs (Greenhalgh, 2001; Pottle, 2019). Additionally, our findings underscored the importance of user acceptance and perceived usefulness in driving the adoption of technology-enhanced learning environments, aligning with existing literature (Pottle, 2019).

Faculty and student perceptions play a crucial role in technology integration in medical education. Our study revealed diverse perspectives, with some emphasizing the potential benefits of technology-enhanced learning, while others raised concerns about implementation challenges (Gearhart, 2008; Andrade & Alden-Rivers, 2019). Understanding these perceptions is essential for addressing barriers to adoption and enhancing acceptance among faculty and students.

Emerging technologies have the potential to promote gender inclusivity in medical education by shaping learners' attitudes and behaviors (Hoffmann et al., 2021). Our findings suggest that scaffolding critical thinking skills in multimedia-supported learning environments can help address gender disparities in medical education (Saye & Brush, 2002; Edigin et al., 2020). Moreover, gender-sensitive approaches to online learning are essential for fostering inclusivity and increasing women's participation in medicine (Liang, Ooi, & Wang, 2020).

The findings of our study have practical implications for online medical education institutions and educators. Institutions should prioritize the integration of emerging technologies to enhance teaching effectiveness, learning outcomes, and gender inclusivity in medical education. Educators can leverage e-learning platforms and flexible learning frameworks to accommodate diverse learning needs and promote active engagement among students. Moreover, targeted interventions and support mechanisms are necessary to address faculty and student concerns regarding technology adoption and implementation.

Therefore, our study contributes to the existing literature by providing insights into the potential applications of emerging technologies in online medical education at a women's online university program. By interpreting the findings and highlighting practical implications, we aim to inform strategic interventions to promote effective technology integration and gender inclusivity in medical education.

Conclusion

In conclusion, our research explored the landscape of emerging technologies in online medical education, focusing on their potential applications in women's online university

medical programs. Through an assessment of current technology use, identification of potential applications, exploration of faculty and student perceptions, and investigation of the role in promoting gender inclusivity, we have gained valuable insights into the integration of technology in medical education.

Our findings underscore the increasing reliance on emerging technologies, such as e-learning platforms and computer-assisted learning tools, to enhance accessibility, effectiveness, and inclusivity in medical education. The COVID-19 pandemic has accelerated this trend, highlighting the transformative potential of digital solutions in facilitating remote learning and addressing educational challenges.

Furthermore, our study highlights the importance of understanding faculty and student perceptions in technology integration efforts. While some stakeholders recognize the benefits of technology-enhanced learning, others raise concerns about implementation challenges. Addressing these concerns and enhancing acceptance among faculty and students are essential for successful technology integration.

Moreover, emerging technologies have the potential to promote gender inclusivity and increase women's participation in medicine. By scaffolding critical thinking skills, fostering collaborative learning experiences, and adopting gender-sensitive approaches, technology can help address gender disparities in medical education and create inclusive learning environments.

In practical terms, our research has implications for online medical education institutions, educators, and policymakers. Institutions should prioritize the integration of emerging technologies to enhance teaching effectiveness, learning outcomes, and gender inclusivity in medical education. Educators can leverage technology to accommodate diverse learning needs and promote active student engagement.

To sum up, our study contributes to the existing literature by providing insights into the potential applications of emerging technologies in online medical education, particularly within the context of women's university programs. By interpreting the findings and highlighting practical implications, we aim to inform strategic interventions to promote effective technology integration and gender inclusivity in medical education.

Recommendation

Based on the findings of our study on emerging technologies in online medical education, we propose several recommendations to stakeholders in the field:

Investment in Technology Infrastructure: Institutions should prioritize investment in robust technology infrastructure to support the seamless integration of emerging technologies into medical education. This includes ensuring reliable internet connectivity, access to necessary hardware and software, and technical support for faculty and students.

Professional Development for Educators: Institutions should provide ongoing professional development opportunities for educators to enhance their digital literacy and pedagogical skills in utilizing emerging technologies effectively. Training programs should

focus on best practices for integrating technology into curriculum design, delivery, and assessment.

Promotion of Inclusive Learning Environments: Educators should adopt inclusive pedagogical approaches that leverage emerging technologies to accommodate diverse learning needs and promote equitable participation among students. This includes providing accessible learning materials, fostering collaborative learning experiences, and implementing strategies to address potential biases in technology use.

Engagement of Stakeholders in Decision-Making: Institutions should involve faculty, students, and other stakeholders in decision-making processes related to technology integration in medical education. By soliciting feedback and actively involving stakeholders in the design and implementation of technology initiatives, institutions can ensure that solutions are responsive to the needs and preferences of the end-users.

Research and Evaluation of Technology Initiatives: There is a need for ongoing research and evaluation of technology initiatives in medical education to assess their impact on teaching effectiveness, learning outcomes, and gender inclusivity. Institutions should support research efforts that examine the effectiveness of different technologies, identify best practices, and inform evidence-based decision-making.

Collaboration and Knowledge Sharing: Institutions should foster collaboration and knowledge sharing among educators, researchers, and policymakers to facilitate the exchange of ideas, experiences, and resources related to technology integration in medical education. This includes establishing communities of practice, organizing conferences and workshops, and leveraging online platforms for networking and collaboration

Implication and Future Research

The findings of this study on emerging technologies in online medical education have several implications for practice, policy, and future research:

Educators and instructional designers can use the insights from this study to inform the design and implementation of online medical education programs that leverage emerging technologies effectively.

Institutions can use the findings to develop professional development programs for faculty to enhance their digital literacy and pedagogical skills in utilizing emerging technologies.

Policy makers can use the findings to advocate for investments in technology infrastructure and support initiatives that promote gender inclusivity in medical education.

Further research is needed to explore the long-term impact of emerging technologies on teaching effectiveness, learning outcomes, and gender inclusivity in medical education.

Comparative studies can be conducted to examine the effectiveness of different emerging technologies and their implications for diverse student populations.

Qualitative research methods, such as interviews and focus groups, can be employed to gain deeper insights into faculty and student perceptions of technology integration in medical education.

Longitudinal studies can be conducted to track the evolution of technology use in medical education over time and assess its implications for the future of the profession.

The findings of this study highlight the potential of emerging technologies to promote gender inclusivity in medical education by addressing barriers to access and participation.

Future research can explore strategies for leveraging emerging technologies to create more inclusive learning environments that support the needs of female students in traditionally male-dominated fields.

Policy makers and educational institutions can use the findings to inform the development of policies and initiatives that support the integration of emerging technologies in medical education and promote gender equity in the field.

Declaration of conflicting interest

The authors declare that there is no conflict of interest in this work.

Acknowledgment

I would like to express my sincere gratitude to Supervisor Musawer Hakimi for their invaluable guidance and support throughout this research project. Their expertise and insights have been instrumental in shaping the direction of this study. I am also thankful for their continuous encouragement and unwavering commitment to excellence. Additionally, I extend my appreciation to all the participants who contributed their time and insights to this research. Their cooperation and involvement were essential to the success of this study.

References

Andrade, M.S., & Alden-Rivers, B. (2019). Developing a framework for sustainable growth of flexible learning opportunities. Higher Education Pedagogies, 4(1), 1-16. https://doi.org 10.1080/23752696.2018.1564879

Angadi, N.B., Kavi, A., Shetty, K., & Hashilkar, N.K. (2019). Effectiveness of flipped classroom as a teaching-learning method among undergraduate medical students: an interventional study. Journal of Education and Health Promotion, 8, 211.

Auster, C.J. (2016). Blended learning as a potentially winning combination of face-to-face and online learning: an exploratory study. Teaching Sociology, 44(1), 39-48. https://doi.org 10.1177/0092055X15619217

Amiri, F., Quraishi, T., Hakimi, M., & Fazil, A. W. (2024). Assessing The Efficiency of Web-Hosted E-Learning Platforms in Afghanistan Academic Settings: An Exploration at Herat University. *EDUTREND: Journal of Emerging Issues and Trends in Education*, *1*(1), 39–56. Retrieved from http://www.rcsdevelopment.org/index.php/edutrend/article/view/309

Collis, B., & Moonen, J. (2002). Flexible learning in a digital world. Open Learning: The Journal of Open, Distance and e-Learning, 17(3), 217-230. https://doi.org 10.1080/0268051022000048228

Edigin, E., Eseaton, P.O., Shaka, H., Ojemolon, P.E., Asemota, I.R., & Akuna, E. (2020). Impact of COVID-19 pandemic on medical postgraduate training in the United States. Medical Education Online, 25(1), 1774318. https://doi.org/10.1080/10872981.2020.1774318

Gearhart, D. (2008). Understanding flexible learning theory and how it is used in online learning. Hershey, PA: IGI Global. Retrieved from https://www.igi-global.com/chapter/understanding-flexible-learning-theory-used/30555

Goh, P.S., & Sandars, J. (2020). A vision of the use of technology in medical education after the COVID-19 pandemic. MedEdPublish. https://doi.org/10.15694/mep.2020.000049.1

Greenhalgh, T. (2001). Computer-assisted learning in undergraduate medical education. British Medical Journal, 322(7277), 40-44. https://doi.org/10.1136/bmj.322.7277.40

Hakimi, N., Hakimi, M., Hejran, M., Quraishi, T., Qasemi, P., Ahmadi, L., Daudzai, M., & Ulusi, H. (2024). Challenges and Opportunities of E-Learning for Women's Education in Developing Countries: Insights from Women Online University. *EDUTREND: Journal of Emerging Issues and Trends in Education*, *1*(1), 57–69. Retrieved from http://www.rcsdevelopment.org/index.php/edutrend/article/view/310

Hakimi, M., Shahidzay, A. K., & Aslamzai, S. (2024). Exploring Factors Influencing MOOC Adoption in Afghanistan's Educational Landscape. *International Journal of Scientific Multidisciplinary Research*, *2*(1), 97-112. https://doi.org/10.55927/ijsmr.v2i1.8020

Han, S.G., Kim, Y.D., Kong, T.Y., & Cho, J. (2021). Virtual reality-based neurological examination teaching tool (VRNET) versus standardized patient in teaching neurological examinations for the medical students: a randomized, single-blind study. BMC Medical Education, 21(1), 493. https://doi.org/10.1186/s12909-021-02920-4

Hasas, A., Enayat, W., Hakimi, M., & Ahmady, E. (2024). A Comprehensive Review Of ICT Integration In Enhancing Physics Education. *MAGNETON: Jurnal Inovasi Pembelajaran Fisika*, *2*(1), 36-44. https://doi.org/10.30822/magneton.v2i1.3106

Hakimi, M., Fazil, A. W., Ahmady, E., Qarizada, A., & Quraishi, T. (2024). Cyber Opportunities: Fostering Women's Empowerment through E-Commerce in Afghanistan. *Room of Civil Society Development*, *3*(1), 1–12. https://doi.org/10.59110/rcsd.275

Hasas, A., Hakimi, M., Shahidzay, A. K., & Fazil, A. W. (2024). AI for Social Good: Leveraging Artificial Intelligence for Community Development. Journal of Community Service and Society Empowerment, 2(02), 196-210. https://doi.org/10.59653/jcsse.v2i02.592

Hasas, A., Sadaat, S. N., Hakimi, M., & Quchi, M. M. (2024). Interactive Learning in Afghanistan: Feasibility of Implementing IoT Connected Devices in Classrooms. *American Journal of Smart Technology and Solutions*, *3*(1), 8–16. https://doi.org/10.54536/ajsts.v3i1.2342

Hoffmann, D.S., Kearns, K., Bovenmyer, K.M., Cumming, W.F., Drane, L.E., Gonin, M., et al. (2021). Benefits of a multi-institutional, hybrid approach to teaching course design for graduate students, postdoctoral scholars, and leaders. Teaching & Learning Inquiry, 9(1), 218-240. https://doi.org/10.20343/teachlearninqu.9.1.15

Huynh, R. (2017). The role of e-learning in medical education. Academic Medicine, 92(4), 430. https://doi.org/0.1097/ACM.0000000000001596

Liang, Z.C., Ooi, S.B.S., & Wang, W. (2020). Pandemics and their impact on medical training: lessons from Singapore. Academic Medicine, 95(9), 1359-1361. https://doi.org/10.1097/ACM.0000000000003441

Naidu, S. (2017). How flexible is flexible learning, who is to decide and what are its implications? Distance Education, 38(3), 269-272. https://doi.org/10.1080/01587919.2017.1371831

O'Doherty, D., Dromey, M., Lougheed, J., Hannigan, A., Last, J., & McGrath, D. (2018). Barriers and solutions to online learning in medical education: an integrative review. BMC Medical Education, 18(1), 130. https://doi.org/10.1186/s12909-018-1240-0

Pei, L., & Wu, H. (2019). Does online learning work better than offline learning in undergraduate medical education? a systematic review and meta-analysis. Medical Education Online, 24(1), 1666538. https://doi.org/10.1080/10872981.2019.1666538

Pottle, J. (2019). Virtual reality and the transformation of medical education. Future Healthcare Journal, 6(3), 181-185. https://doi.org/10.7861/fhj.2019-0036

Rose, S. (2020). Medical student education in the time of COVID-19. Journal of the American Medical Association, 323(21), 2131-2132. https://doi.org/10.1001/jama.2020.5227

Ruiz, J.G., Mintzer, M.J., & Leipzig, R.M. (2006). The impact of E-learning in medical education. Academic Medicine, 81(3), 207-212. https://doi.org/10.1097/00001888-200603000-00002

Sargeant, J., Curran, V., Allen, M., Jarvis-Selinger, S., & Ho, K. (2006). Facilitating interpersonal interaction and learning online: linking theory and practice. Journal of Continuing Education in the Health Professions, 26(2), 128-136. https://doi.org/10.1002/chp.61

Saye, J.W., & Brush, T. (2002). Scaffolding critical reasoning about history and social issues in multimedia-supported learning environments. Educational Technology Research and Development, 50(3), 77-96. https://doi.org/10.1007/BF02505026

Watkins, K.E., & Marsick, V.J. (2020). Informal and incidental learning in the time of COVID-19. Advances in Developing Human Resources, 23(1), 88-96. https://doi.org/10.1177/1523422320973656

Zhang, K., & Aslan, A.B. (2021). AI technologies for education: recent research & future directions. Computers & Education: Artificial Intelligence, 2, 100025. https://doi.org/10.1016/j.caeai.2021.100025