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AI ESSAY FEEDBACK AND WRITING SELF-EFFICACY AMONG PAKISTANI HIGH-SCHOOL GIRLS: A MIXED-METHODS STUDY

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Abstract:
This paper investigates how high-school girls in Pakistan are impacted by essay feedback enabled through AI such as automated essay graders on writing self-efficacy, which has not been studied much concerning educational technologies. With artificial intelligence (AI) being one of the greatest areas that have transformed education in most parts of the world, there is an inclination that it should be explored on how to improve writing skills more so in a developing country where girl child education is common. This research aims to answer two questions: do the AI-generated feedback have an effect on the writing skills of Pakistani high-school girls and how do they affect their self-perception and feelings towards writing tasks. A mixed-methods research design was taken in conjunction with using surveys (n=200) and interviews (n=40) to allow quantitative and qualitative aspects to be addressed using questions and open-ended questions to gain information on the experiences and perception of the students. The results indicate that AI feedback is positively affecting the self-efficacy in writing among the students, contributing to writing confidence and another boost in the quality of writing. Nonetheless, the study also identifies such difficulties as narrow access to technology and non-human feedback rejection. These findings have significant implications towards the use of AI tools in the education arena and more so in South Asian nations. The research will be a contributing factor to the burgeoning nature of research on AI in education especially gender and technology in Pakistan.

Keywords: Artificial Intelligence-Assisted Feedback, Writing Self-Efficacy, Pakistani Girls in High School, Educational Technology, Mixed- Methodology, Artificial Intelligence in Education

Introduction

The merger of Artificial intelligence (AI) and education is an emerging area of expertise where there is also a possibility of the transformation of the traditional teaching and learning techniques. Due to the development of AI technologies, the introduction of artificial intelligence into educational systems holds significant potential to make the learning process more personalized, and students more engaged and better at performing. There has been a lot of research related to AI in education in the West but little to do with developing countries and even lesser with applying it in gender-specific educational organizations. This research gap is especially observed in Pakistan, where the educational system of girls is conditioned by the socio-cultural reality and economic problems hindering their educational activities (UNICEF, 2021). In this like, inclusion of AI in education and specifically on writing skills will present a special chance to improve learning achievements in the Pakistani high-school girls which is a group that has been traditionally under-researched regarding educational technology.

The issue of AI-driven essay feedback is of high interest to the sphere of education as the sphere where AI

is becoming increasingly active in shaping the way of teaching. Current tendencies show that such technologies of AI as automated writing assessment tools can help students get immediate and individualized feedback shifting their writing to better levels and contributing to the elevated concerns of self-efficacy (Baker & Siemens, 2014). Writing is a core discipline that is necessary to succeed in the academic world as well as become a productive communicator in a digital world. As digital communication seems to gain importance, writing abilities are becoming the most desirable ones, and there is a rising necessity in the sphere of developing effective tools that could help students to create these abilities.

Specifically, there is an opportunity to create individualized education in a form of AI feedback. Research has revealed that feedback is a decisive element of success in students however the traditional feedback techniques tend to be restrictive regarding criticism and timeliness (Shute, 2008). Grammarly and Turnitin are AI-based tools that give a real-life response on grammar, structure, and designing and allow students to increase their experience and grow better at writing (Thompson & McMullen, 2020). This is more so crucial to students in Pakistan were obtaining good standard education facilities as well as getting mechanisms of feedback is not an easy task especially at the rural and poorer regions.

Such AI-driven feedback not only holds the promise to improve writing performance, but also the writing self-efficacy of students, which is the belief that they can successfully complete writing assignments. Self-efficacy is a very important aspect of motivation and achievement according to Bandura (1997). Confidence to write and other writing capabilities is a major impediment to success among many students especially girls in Pakistan. Studies have found that girls in South Asia tend to have lower self-efficacy in academic work related to the gendered expectation in relation to this population, along with educational resource access (Mahmood & Malik, 2017).

A number of motive reasons justify the necessity of this study. There is firstly an emergence of realization of the gap in education on gender especially in the third world countries. The United Nations Educational, Scientific and Cultural Organization (UNESCO) further stated that the factors affecting the provision of quality education to girls in South Asia include norms of society, early marriage and poor infrastructure (UNESCO, 2020). This is in addition to the fact that there is very little access to technological devices that would help to bridge the education gap. The emergence of digital learning platforms and AI-assisted tools offers the prospective counter to the aforementioned challenges with the help of making learning opportunities affordable and accessible to the students who would otherwise unable to enter the education ecosystem.

Second, the AI technologies are increasingly available to schools across the globe, and this tendency starts to reach Pakistan as well. At the same time, the potential barriers to educational equity, such as infrastructure or training are relatively short, as more and more people gain access to smartphones and internet, and other AI tools become more accessible and affordable (Khan & Rehman, 2018). Instant feedback essay graders powered by AI may even be revolutionary in their ability to give customized and constant feedback to learners, as they progress in the development of their writing skills, no matter the distances between them geographically or their wealth and social accessibility.

Finally, in the age of the internet, the distinctions between writing skills are gaining prominence, which makes the study more relevant. In a world where digital media is making its way into our lives, we need to have good writing abilities that will help us succeed in this digital world both in school and in the job market (Lison, 2019). With the use of AI, Pakistani students, especially girls, who tend to have fewer opportunities in digital education, will be able to take advantage and continuously enhance their writing capabilities and

their self-efficacy.

Literature Review

Artificial intelligence (AI) is gaining currency as one of the strong educational tools, and especially in enhancing the learning results of the students through individual feedback. Automatic grading through AI-based feedback systems can identify the detailed assessment and give personalized suggestions that hold great importance in refining one with writing skills. The article by Lison (2019) also claims that since AI can provide instant feedback to the work of students, which is highly individualized and may be lacking in the old methods of providing feedback, it can ultimately improve the experience of learning. Such instantaneous feedback has been seen to enhance student motivation and response which are the essential aspects in academic implementation particularly in writing.

The author also highlights the value of AI in the educational system in the form of writing assistance, such as Grammarly and Turnitin, (Aiken, 2020). Such tools do not only identify grammar and spelling mistakes but also provide tips on how sentences could be improved, which words could be used, and how a particular text could be made more readable. This feedback helps the students to move on and improve their writing abilities constantly as they do not have to wait until the teachers evaluate them. Thompson and McMullen (2020) also state that such automated systems can reduce the workload of the instructors, enabling them to concentrate on the higher-order learning activities and more sophisticated feedback. It has been successfully implemented in western and international conditions meaning that AI might be used as an important part of writing development.

Yet, although these tools are extensively researched in developed world, there is a significant gap in research relating to the use of such tools in developing countries, including Pakistan; where education systems and access to technology pose slightly different problems. The gap is of special significance as far as gendered analysis is concerned because in most areas like South Asia, girls are experiencing compounded access barriers to education, especially in areas such as writing.

Also known as self-efficacy, the theory (Bandura 1977) is the belief an individual has that he/she will be successful in accomplishing a given task. Writing self-efficacy has a direct association with the feelings that a student has towards his or her writing skills, which also has a direct effect on their performance at school. There is a lot of research that underlines the role of self-efficacy in academic performance. Pajares (2003) posits that students with a stronger degree of writing self-efficacy will be much more inclined to engage in activities towards writing much well-recognized writing tasks and also revise their work as well and in the end be able to perform better. On the other hand, the students who have low writing self-efficacy would prefer writing tasks to be minimized, which will downgrade their performance in writing-driven subjects.

In nations that are developing especially in Pakistan gender difference in education tends to create cases of girls having a poor writing self-efficacy. In their article, Mahmood and Malik (2017) address the problem of cultural norms, weak accessibility to high-quality education, and social pressures affecting the self-esteem and self-efficacy of girls towards academic activities. Such obstacles can pose a major setback to the education gender parity especially when it comes to knowledge areas such as writing where a girl might feel less approved as compared to their male counterparts. More so, girls are influenced by societal norms that discourage girls to further their education or seek academic careers, hence setting the loop of low educational performance and lack of confidence in what they can achieve.

AI technologies, and those that may provide a real-time assessment of writing, may help to change these barriers significantly. Research shows that customized feedback can be used to increase the levels of self-efficacy among the students by offering information that is specific as well as strengthening their views and areas where they are performing well and working on areas of weakness (Shute, 2008). When effectively applied, AI-driven writing tools may contribute to the enhancement of writing self-efficacy in Pakistani girls since the personalized assistance they may receive can assure them of the ability to successfully complete their schoolwork and be more confident about their academic potential.

The use of AI feedback in improving the performance of students in writing has been found to be very helpful. Grimes and Watkins (2021) also discovered that the application of Artificial Intelligence tools where students can get their personalized and real-time feedback results in significant increases in writing proficiency. Students who got the AI feedback proved to be more accurate with their grammar and their sentence structure was also found to be better than students who got the conventional teacher feedback in their study. Such results were similar in various educational contexts, and AI feedback could be a central tool in the improvements of writing skills.

Nonetheless, there is a lot of work in Western contexts, but there is little use of AI in education in South Asia, especially in Pakistan. Hassan and Nazir (2019) discussed the application of technology in Pakistani schools and determined that the AI feedback systems positively influenced the educational experience of students, namely in rural settlements where the lack of resources was especially strong. In spite of the poor access to technologies, the research findings showed that AI-based feedback assisted in closing the gaps in learning especially in students with lower literacy rates. This conclusion is following the realization that there is indeed way through which AI can be used to reduce educational discrepancies by equipping the less served groups the facilities and resources that they require to excel in their studies.

Although the role of AI in the educational field has been already discussed in literature extensively, obvious gap is observed when it comes to the specific contribution despite the available information, AI has made to writing self-efficacy in South Asia specifically. A majority of the studies that have been undertaken so far have focused on Western education contexts which have a higher availability of technological resource to students. Conversely, the even more specific needs of the girls in Pakistan have been left unfilled, such as the socio-cultural restrictions and the lack of educational technology.

In addition, although research has been conducted on the impact of AI feedback tools on writing performances, there is little evidence of research on the impact of AI feedback tools on students and their sense of self and confidence, especially in non-Western gendered population. This study will endeavor to fill the gap by ensuring a review of the quantitative impacts of AI feedback on the writing performance as well as the qualitative information on what students perceived about their writing potentials.

The weakness of the research conducted earlier is that it relates to Western education where access to technology is vaster. Consequently, it will not encompass the full extent of the problems experienced by students in third world countries such as Pakistan in the findings. Besides, a lot of studies were grounded on either qualitative or quantitative approach, failing to consider the advantages of the combination of both types. To resolve these gaps, this study attempts to employ mixed-methods design in which both quantitative and qualitative data are analyzed to bring more depth to explain the relationship between AI feedback and writing self-efficacy of Pakistani girls in high school, as yet, no study has been attempted to explain this relationship using mixed-methods design.

Research Objective
The main goal of the study is to investigate the implications of AI-based essay feedback on the writing self-efficacy among Pakistani girls that attend high-school.

Research Questions
1. How does the AI-produced feedback affect the writing of the female high-school students in Pakistan?
2. What is the effect of the AI feedback on the writing of high-school girls in Pakistan?

Theoretical Framework
The present research is carried out through the lenses of the theory of self-efficacy by Bandura (1977), who asserts that beliefs of people about their capabilities play a critical role in determining their performance in a given task. The application of this theory in the context of AI feedback will help the research determine how higher self-efficacy in writing can lead to more effective academic results of Pakistani girls.

Methodology
This research study used a convergent mixed-methods design to attempt to determine the effect of AI-based learners feedback on the writing self-efficacy of high-school Pakistani girls. It is a method that mixes quantitative and qualitative data collection and provides an opportunity to have a holistic analysis of the issues, which involves measurable benefits along with deep personal impressions. Mixed-methods design will be suitable in educational research because it will present competing views in the study to provide both statistical trends and contextual insights (Creswell & Plano Clark, 2018). The same research pointed out that the combination of methods improves the predictability and the strength of interpretations used in educational interventions (Grimes & Watkins, 2021).

The survey component of the quantitative component constituted a structured survey among 200 girls among high-school population of urban and rural schools in the provinces of Punjab and Khyber Pakhtunkhwa. A pre-test, and post-test type of research helped to measure the pre- and post-intervention of writing self-efficacy after the implementation of the AI-based feedback tools. Self-efficacy on writing was determined by the usage of survey items covering some elements of past established writing self-efficacy scales revealed in literature used in academic research (Pajares and Valiante, 2001). This methodology is similar to the one applied by Shute (2008) who measured the outcome of learning process after the implementation of the feedback and showed that it changed both the confidence and performance of the students significantly.

In a bid to supplement the quantitative data, a study involving semi structured deep interviews was carried out on 40 students selected across the same schools. Following these interviews, there were questions of how the participants made sense of the AI feedback and whether they felt it helped them increase their self-confidence and determination as writers. The semi-structured design made it flexible, and thus the students were able to talk about subtle experiences but contained a certain level of consistency between interviews. This qualitative methodology is in line with approaches resorted to by Thompson and McMullen (2020), who studied the emotional reactions of students to the use of digital learning technologies in under-resourced learning environments.

The sample was chosen with the help of purposive sampling, with the emphasis on the students who had earlier experience of using AIs and provided them with feedback in their academic writing. The participants were of various socio-economic and geographic backgrounds which made them increase the external validity of the study. The sample was created in such a way (200 survey + 40 interviews) that it would

compromise the balance of breadth and depth, which lies in the best practice of mixed methods (Teddlie & Yu, 2007).

The analysis of quantitative data was performed by means of spss Mean scores, standard deviations, and paired sample t-tests of statistically significant difference were achieved to determine the mean change in writing self-efficacy after the intervention. level of the Sig. 0.05, Sig.20. In the meantime, thematic analysis developed by Braun and Clarke (2006) was implemented as the method of analyzing the qualitative data. The interviews were transcribed and coded inductively to facilitate the recognition of frequently occurring themes, like enhanced writing confidence, decreased anxiety, and stronger motivation, among the others. Morality was paid so much attention to. All participants were provided with informed consent, and parental consent was secured on behalf of the latter participants who were minors. These were; data anonymizing, anonymous participant storing techniques. This research passed the Institutional Review Board of the university which guides the research work. The data sources and data collection methods were triangulated to maximize reliability and member checking was utilized in the qualitative phase of the study since that can help to establish accuracy in interpretation and internal validity (Creswell, 2014).

This approach presents a powerful combination of quantitative measurement and personal testimonies in determining how the use of AI-related tools can shape educational equality and online empowerment among underage females in the Pakistani educational system in its transition period.

Results and Evaluation

The survey results gave the quantitative picture depicting that the writing self-efficacy of the student greatly increased when the students felt the impact of AI-driven feedback. The post-test and the pre-test results were compared and it emerged that on average the confidence of the students in terms of their writing skills significantly improved by 30 percent. Before students got some AI feedback, their writing-related self-efficacy was moderate: on the scale of self-efficacy, it is 55\%. The post-test scores rose to 85 percent after several writing tasks with the use of AI feedback thus showing great confidence with the writing ability gained by the students.

This change can be explained by the results of other researches indicating the effects of feedback on academic self-confidence. As an example, Shute (2008) discovered that formative feedback, especially in case it is timely and particular, can increase the level of self-efficacy and motivation of students significantly. The results of this study prove this idea too since AI feedback gave students feedback in real-time with constructive information which led to the segment of writing skills of students. Besides, the findings align with the findings of a study conducted by Grimes and Watkins (2021), who noted comparable changes in the self-esteem levels and writing skills of the students they considered after the introduction of the AI feedback systems in schools.

In order to establish the strength of the results, statistical analyses were done using paired t-tests to validate that the results had been found to be statistically significant. The ANOVA ensured that scores of self-efficacies had improved significantly ($p < 0.05$), thus supporting the assertion that the intervention of feedback by AI had improved the writing self-efficacy of the students.

Qualitative results were obtained based on a sample of 40 participants through in-depth interviewing, and they revealed detailed information on the impact of AI feedback on their writing self-efficacy. The majority of the students (78%) stated that they became more confident in the writing activity when they got feedback provided by AI. The non-judgmental format of AI feedback enabled numbers of students to see a chance to

revise without the fear of criticism. When students spoke about AI feedback, one of them stated, "I think that AI feedback is less personal, thus, I can correct my mistakes and not feel guilty of it." Such a view was also replicated by other students who stated the freedom to correct their work and alter it to be better and not being compelled to face the judgment of a human being.

Besides the overall increase in writing self-efficacy, the students stated that the AI feedback enabled them to get an insight into certain aspects where they had problems. The most typical results of the interviews revealed that there was more consciousness of grammatical and punctuation problems, better sentence construction, and organization in general. This corroborates the finding of Thompson and McMullen (2020), who stated that AI feedback assists students in highlighting and correcting linguistic mistakes which could go unrecognized.

All the students did not, however, have a universally good experience. Occasionally, the access to the AI tools had to be provided to some rural students (22%) as well; they had found themselves facing limited access to technology such as poor internet connectivity or access to the devices. One of the respondents commented that the internet can be inconsistent and undependable in their village and he or she is not always able to utilize the AI tool to the fullest extent. This problem of accessibility corresponds with the results developed by Hassan and Nazir (2019) who found the digital divide as a challenge to the successful adoption of technology in rural Pakistani classrooms.

The combination of the quantitative and qualitative results implies that the use of AI-provided feedback leads to positive effects on the self-efficacy of writing among the students, in general. The dramatic rise in the self-efficacy scores of students, along with a qualitative understanding of their experiences, puts forward the power of AI tools as the means of writing confidence building. The finding that students perceive the instant, non-judgmental feedback of AI as positive, and that it can direct the correction in the isolated skills such as grammar and structure, correlates with the studies suggesting the applicability of the use of personalized, real time feedback to enhance learning outcomes (Lison, 2019).

In general, this study emphasizes the disruptive narrative of AI in enhancing writing self-efficacy, especially amongst girls in Pakistan, who have critical socio-cultural and economic factors to access good education. Since the study results are positive and consistent with the international studies that espouse the role of AI in educational environments, this research does not require further recommendations to be considered effective (Grimes & Watkins, 2021). The issues surrounding technology access in rural settings are, however, to be dealt with so that AI-driven feedback could be decently distributed to all the target populations of students.

Discussion

Even though the outcomes of this study could have been imposing, it has a number of weaknesses. Firstly, the sample size consisted of 200 survey participants and 40 interviewed people which is not fully representative of the Pakistani student body. The study narrowed down on the high-school girls and thus the results may not be reflected across the board to other members of the society such as boys or those in other levels of education. Moreover, the study was carried out in particular parts of the Pakistan- i.e. Punjab and Khyber Pakhtunkhwa so the results cannot be generalized to the students of other provinces or even more remote areas.

The findings of the present research are indicative of the capacity of AI-informed feedback to increase the writing self-efficacy of Pakistani high-school girls, a group of people who are also experiencing high levels

of gender gaps in the education sector. The most common obstacles that girls face in Pakistan, especially in rural areas, are societal expectations, lack of access to educational supplies, and the inability to seek individual support (Mahmood & Malik, 2017). These are some of the conditions that lead to poor academic self-efficacy especially in matters where students need constant directions and feedbacks like in writing. This can also be very transformational with the feedback systems but the message is that the systems should be capable of giving personal and real-time feedback. AI tools and their capability to critique in real-time and constructively serve as the catalyst that can entice the majority of girls to continue their improvement efforts by removing the judgment and pre-judgment problem. This point echoes the sentiments expressed by Shute (2008), who referred to the fact that formative feedback helped improve the confidence and results of students. In Pakistani environment, where there may be a disproportionate number of teachers in schools and a lack of material availability, the tool accompanying AI can help fill the gap with individual attention to each student.

Although the outcomes of the study are encouraging, they are also evidence of the fact that rural Pakistan is still afflicted by infrastructural constraints. Not every student will be able to enjoy the benefits provided by AI-driven feedback due to limited access to stable internet, insufficient devices, and low digital literacy (Hassan & Nazir, 2019). These issues demonstrate that special interventions are required to make sure that AI tools become accessible to every student, no matter where they study or live and what their socio-economic status is.

The results of this research are very important in respect to policies that should be made by the authorities responsible in the sphere of education in Pakistan. Policymakers need to invest more in digital infrastructure so that they can maximize feedback that are AI-driven. This is in encouraging better connectivity, making the devices cheap and affordable to students and training teachers on how to properly use the AI tools in fashioning the curriculum. In the future, AI technology is still developing, which means that its use in schools can be potentially used as a beneficial tool not only to hone the writing skills - a very much ignored domain among girls, but also to recognize the importance of girls picked on more in traditional schools. Furthermore, the school policies should aim at achieving gender equality bearing in mind that both boys and girls should have equal access to such technological resources. Since the application of AI feedback had a significant positive effect on the fostering of writing self-efficacy, it is optimal to continue attempting to integrate mind into the national educational systems. This would not only enhance writing ability, but also enable girls to have confidence that they might strive better in their academic and career life.

Conclusion

The current study shows that the use of AI that generates essay feedback can make a big difference in the development of writing self-efficacy of the Pakistani high-school girls, especially when they benefit because of an immediate and personalized type of feedback and thus become more confident in their writing skills. The results are also in line with other studies revealing formative and non-evaluative feedbacks as tremendously productive in enhancing students' academic performance, particularly in instances where official support mechanisms are unavailable (Shute, 2008; Grimes & Watkins, 2021).

Nevertheless, the paper does point out various limitations which include the fact that students in rural localities do not have access to technology as easily as those in urban areas. Although AI feedback can potentially enhance female students and develop their writing, it is essential to understand that the infrastructural limitations to access to technology should be dealt with in order to enable all people to equally enjoy the possibilities of this tool.

The findings of the study can be of great relevance to the education policy of Pakistan where efforts need to be made to invest in the digital infrastructure and education of both students and teachers to utilize the opportunity of AI in improving the educational scenario of Pakistan. The impact of AI feedback, any lasting effects or the effectiveness of the AI feedback needs to be further researched and the effectiveness in various learning environments in South Asia needs to be determined.

References

Aiken, M. (2020). AI in education: A new era for learning. Journal of Educational Technology, 18(2), 45-59. Alzahrani, B., & Chang, Y. (2020). Blockchain technology applications in energy systems: A review. Energy Reports, 6(2), 196-205. [https://doi.org/10.1016/j.egyr.2020.11.003] (https://doi.org/10.1016/j.egyr.2020.11.003)

Arif, A., & Shad, A. (2020). Blockchain technology in Pakistan: Exploring its potential in rural areas. International Journal of Energy Economics and Policy, 10(5), 463-469.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84(2), 191-215. Bandura, A. (1997). Self-efficacy: The exercise of control. W\.H. Freeman and Company.

Baker, R. S., & Siemens, G. (2014). Educational data mining and learning analytics. In Cambridge handbook of the learning sciences (pp. 253-267). Cambridge University Press.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77-101. [https://doi.org/10.1191/1478088706qp063oa] (https://doi.org/10.11-91/1478088706qp063oa)

Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approach (4th ed.). SAGE Publications.

Grimes, J., & Watkins, J. (2021). The role of AI in writing education: Feedback and self-efficacy. Educational Technology & Society, 24(1), 87-102.

Hassan, F., & Nazir, H. (2019). Technology in rural education: Barriers and opportunities for Pakistani girls. Journal of Educational Research, 33(4), 195-206.

Khan, S., & Rehman, A. (2018). The digital divide in Pakistan: A critical analysis of gender disparities in education. Asian Education and Development Studies, 7(2), 180-193.

Kumar, S., & Sharma, S. (2021). Bridging the gender gap in education through technology in South Asia. Journal of Educational Technology & Pedagogy, 26(3), 110-127.

Lison, P. (2019). Using AI for personalized learning in writing. Journal of Educational Research & Practice, 9(2), 60-70.

Lister, S., & Parnell, J. (2020). Artificial intelligence in education: A review of its applications in writing and language acquisition. International Journal of Educational Technology, 16(4), 212-224.

Mahmood, R., & Malik, S. (2017). Gender and education in Pakistan: Challenges and opportunities. Journal of South Asian Studies, 42(1), 123-134.

Mukhtar, A., & Waseem, A. (2019). AI and education: Exploring the potential for improving literacy rates in Pakistan. Journal of Learning Technology & Development, 14(1), 34-47.

Nasr, T., & Rahman, A. (2020). Impact of online feedback tools on writing efficacy in Pakistani classrooms. South Asian Journal of Education, 30(1), 79-94.

Pajares, F. (2003). Self-efficacy beliefs, motivation, and achievement in writing: A review of the literature. Educational Psychology Review, 15(2), 119-136.

Powell, L., & Williams, D. (2021). The evolution of AI in education: How artificial intelligence is reshaping student assessments. Journal of Educational Development, 23(5), 215-228.

Raza, S., & Jamil, I. (2019). Gender and self-efficacy in education: A case study of Pakistani students. Pakistan Journal of Educational Studies, 21(3), 89-102.

Rehman, F., & Mirza, M. (2020). AI as a tool for education in Pakistan: Challenges and opportunities for girls' education. Journal of Educational Technology & Innovation, 7(2), 45-60. Sherman, R., & Davidson, H. (2020). The role of artificial intelligence in personalized learning. Journal of Learning Sciences, 22(1), 18-31.

Shute, V. J. (2008). Focus on formative feedback. Review of Educational Research, 78(1), 153-189.

Sultana, N., & Ahmed, Z. (2021). Exploring digital literacy and writing self-efficacy among rural girls in Pakistan. International Journal of Gender & Education, 29(4), 305-320.

Tan, P., & Lee, K. (2020). Artificial intelligence in education: A global perspective. Technology in Education Journal, 17(3), 142-156.

Thompson, L., & McMullen, M. (2020). Grammatical improvement through AI feedback: A study of student outcomes. Computers & Education, 135, 45-55.

Turner, P., & Meyer, J. (2021). Empowering girls with AI: Writing self-efficacy and digital feedback. International Journal of Educational Research, 35(2), 112-125.

UNICEF. (2021). The state of education for girls in Pakistan. UNICEF Pakistan.

UNESCO. (2020). Global education monitoring report 2020: Gender and education. UNESCO.

Zia, M., & Ahmed, F. (2019). Digital divide and education in Pakistan: Bridging the gap through technology. Asian Journal of Educational Research, 7(4), 85-98.