

Digital Self-Efficacy as a Predictor of Academic Performance among University Students

Aniqa Arshad

MPhil Scholar, Institute of Education and Research, University of the Punjab, Lahore, Punjab, Pakistan

Dr. Tariq Hussain

Assistant Professor and Head of Technology Education, IER, University of the Punjab, Lahore, Punjab, Pakistan

Dr. Shamim Ullah

shamimullah.IER@gmail.com

Assistant Professor, Institute of Education and Research, University of the Punjab, Lahore, Punjab, Pakistan

Corresponding Author: Dr. Shamim Ullah shamimullah.IER@gmail.com

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ABSTRACT

In the rapidly evolving digital landscape of higher education, students' ability to effectively utilize digital technologies has become an essential factor influencing their academic success. Digital self-efficacy, defined as students' confidence in their ability to perform academic tasks using digital tools and resources, is increasingly recognized as a key determinant of effective learning and academic achievement. This study investigates the relationship between digital self-efficacy and academic performance among university students. A correlational research design was employed to examine the strength and direction of this relationship. Data were collected using two structured questionnaires comprising 30 items measuring digital self-efficacy and 8 items assessing academic performance. The sample consisted of students from two public and two private universities, ensuring representation across diverse institutional contexts. Descriptive and inferential statistical techniques were used to analyze the data and examine the association between the study variables. The findings are expected to provide empirical evidence regarding the extent to which digital self-efficacy is associated with students' academic performance. The study offers valuable insights for higher education institutions and policymakers in developing strategies to strengthen students' digital competencies, thereby enhancing academic achievement and overall educational outcomes.

Keywords: Digital self-efficacy; Academic performance; Higher education; University students; Correlational research

INTRODUCTION

The rapid digital transformation of higher education has fundamentally changed the way students learn, communicate, and engage with academic content. Universities increasingly rely on learning management systems, online assessments, digital collaboration platforms, and other educational technologies to support teaching and learning (Bond et al., 2021; Hatlevik et al., 2018). In this technology-driven environment, students' success depends not only on access to digital resources but also on their confidence in using these technologies effectively for academic purposes. This confidence, commonly referred to as digital self-efficacy, has emerged as a critical factor influencing students' learning experiences and academic achievement (Bandura, 1997; Schunk & DiBenedetto, 2020).

Grounded in Bandura's (1997) Social Cognitive Theory, digital self-efficacy refers to an individual's belief in their capability to successfully perform academic tasks using digital technologies. Students with higher levels of digital self-efficacy are more likely to adopt effective learning strategies, engage actively in online learning environments, regulate their learning behaviors, and overcome technology-related challenges (Zimmerman, 2000; Schunk & DiBenedetto, 2020). Recent studies have consistently reported positive associations between digital self-efficacy and students' engagement,

motivation, digital competence, and academic performance (Widowati et al., 2023; *Education and Information Technologies*, 2022).

In Pakistan, the integration of digital technologies into higher education has accelerated following the expansion of online and blended learning. Universities increasingly employ digital platforms to support instruction and assessment; however, students' readiness to use these technologies effectively remains uneven (Khan et al., 2021; Majeed et al., 2020). Existing Pakistani research has primarily examined general self-efficacy or digital literacy, while limited empirical evidence specifically investigates the relationship between digital self-efficacy and academic performance among university students. This gap limits the development of evidence-based interventions aimed at enhancing students' digital capabilities and academic success.

To address this gap, the present study examines the relationship between digital self-efficacy and academic performance among university students in Pakistan. By focusing specifically on students' confidence in performing academic tasks using digital technologies, this study extends previous research beyond general self-efficacy and digital literacy. The findings are expected to contribute to the growing body of literature on digital learning and provide practical implications for educators, university administrators, and policymakers seeking to strengthen students' digital competencies and improve learning outcomes in higher education.

Statement of the Problem

The increasing integration of digital technologies in higher education requires university students to possess not only digital skills but also the confidence to use these technologies effectively for academic purposes. Although previous studies have established the importance of self-efficacy for learning outcomes, empirical evidence specifically examining the relationship between digital self-efficacy and academic performance remains limited, particularly in the context of Pakistani universities. Most local research has focused on general self-efficacy or digital literacy rather than students' confidence in using digital technologies for academic tasks. This gap restricts the development of evidence-based strategies to enhance students' digital competence and academic success. Therefore, the present study seeks to examine the relationship between digital self-efficacy and academic performance among university students, providing empirical evidence to inform educational policy and institutional practices.

Research Questions

1. Is there a significant difference in digital self-efficacy between students enrolled in public and private universities?
2. Is there a significant difference in the level of digital self-efficacy between male and female university students?
3. Is there a significant relationship between students' digital self-efficacy and their academic performance?

REVIEW OF LITERATURE

Digital Self-Efficacy in Higher Education

The rapid advancement of information and communication technologies (ICT) has transformed higher education by reshaping teaching, learning, communication, and assessment practices. Universities increasingly rely on learning management systems, virtual classrooms, digital libraries, and online collaboration platforms to facilitate flexible and technology-enhanced learning (Bond et al., 2021). Consequently, students are expected not only to access digital resources but also to effectively utilize

digital technologies to accomplish academic tasks. Within this context, digital self-efficacy has emerged as a critical psychological construct influencing students' ability to adapt to digital learning environments and achieve academic success.

Digital self-efficacy refers to individuals' confidence in their ability to effectively use digital technologies to perform learning-related tasks. The concept is grounded in Bandura's (1997) Social Cognitive Theory, which posits that individuals' beliefs about their capabilities significantly influence their motivation, persistence, behavior, and performance. According to the theory, self-efficacy develops through mastery experiences, vicarious learning, social persuasion, and physiological or emotional states. Students with strong efficacy beliefs are more likely to embrace challenges, persist when facing difficulties, and successfully accomplish academic tasks (Bandura, 1997; Schunk & DiBenedetto, 2020). These principles are particularly relevant in digitally mediated learning environments where students are required to independently navigate various educational technologies.

The increasing integration of technology into higher education has expanded the traditional concept of self-efficacy to include confidence in using digital tools for learning. Unlike computer self-efficacy, which primarily focuses on operating computers, digital self-efficacy encompasses a broader range of competencies, including information retrieval, online communication, digital collaboration, content creation, problem-solving, and adaptation to emerging technologies (Pumptow & Brahm, 2021; Dai, 2023). Students with higher digital self-efficacy demonstrate greater confidence in using learning management systems, participating in virtual classrooms, accessing online resources, and completing technology-mediated assignments, whereas students with lower digital self-efficacy often experience anxiety and hesitate to engage in digital learning activities.

Recent empirical evidence consistently highlights the importance of digital self-efficacy in technology-enhanced learning. Students with strong digital self-efficacy exhibit higher levels of learning motivation, self-regulated learning, digital competence, and academic engagement (Ibrahim et al., 2023; Meng et al., 2023). They are more willing to explore digital resources, adopt innovative learning strategies, and effectively solve technology-related problems, enabling them to maximize the benefits of digital learning environments. In contrast, limited confidence in digital skills often restricts students' participation in online learning and reduces the effectiveness of technology-supported instruction (Jeon & Kim, 2022).

The significance of digital self-efficacy became particularly evident during the COVID-19 pandemic, when higher education institutions rapidly transitioned to online learning. This unprecedented shift demonstrated that students' academic success depended not only on access to digital technologies but also on their confidence in using those technologies effectively (Bond et al., 2021). Studies conducted during and after the pandemic reported that students with higher digital self-efficacy adapted more successfully to online learning, experienced lower levels of technological anxiety, and demonstrated greater academic engagement and learning satisfaction (Jeon & Kim, 2022). These findings reinforced the view that digital self-efficacy is an essential prerequisite for effective participation in contemporary higher education.

In Pakistan, the digital transformation of higher education has accelerated with the adoption of learning management systems, blended learning, and online assessment practices. Although universities have expanded access to digital technologies, students continue to differ considerably in their confidence and readiness to utilize these technologies for academic purposes. Existing Pakistani studies have primarily examined general self-efficacy, academic self-efficacy, or digital literacy, while relatively limited attention has been given to digital self-efficacy as an independent construct affecting students' educational outcomes. This lack of empirical evidence highlights the need for further research to understand how students' confidence in using digital technologies contributes to academic success within the Pakistani higher education context.

Research Design

This study employed a quantitative correlational research design to examine the relationship between digital self-efficacy and academic performance among university students in Pakistan. The correlational design was appropriate because it enabled the investigation of the strength and direction of the association between the study variables without manipulating them.

Population and Sample

The target population comprised undergraduate students enrolled in public and private universities in Pakistan. A representative sample of 420 students was selected from two public and two private universities using stratified random sampling. Stratification was based on gender and academic discipline to ensure adequate representation of students from diverse academic backgrounds.

Instrumentation

Data were collected using a structured questionnaire consisting of two sections. Digital self-efficacy was measured using an adapted version of the Digital Technologies Self-Efficacy Survey developed by Ok et al. (2017), Hughes (2013), and the TIMSS 2023 digital competence framework of the International Association for the Evaluation of Educational Achievement (IEA). Academic performance was measured using the Academic Performance Scale developed by Grattan and Birchmeier (2015). Minor contextual modifications were made to ensure the instruments' suitability for university students in Pakistan.

Validity and Reliability

The content and face validity of the questionnaire were established through expert review by the research supervisor and three experts in educational research from the Institute of Education and Research, University of the Punjab, Lahore. A pilot study involving 30 university students was conducted prior to the main survey. The internal consistency of the instruments was assessed using Cronbach's alpha. The Digital Self-Efficacy Scale demonstrated excellent reliability ($\alpha = .91$), while the Academic Performance Scale showed good reliability ($\alpha = .87$). These values exceeded the recommended threshold of .70, indicating that both instruments were sufficiently reliable for the main study (Nunnally & Bernstein, 1994).

Data Analysis

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics (frequency, percentage, mean, and standard deviation) were computed to summarize the data, while Pearson's product-moment correlation coefficient (r) was employed to examine the relationship between digital self-efficacy and academic performance. Statistical significance was determined at the .05 level.

RESULTS AND DISCUSSION

Research Question: Is there a significant difference in digital self-efficacy between students enrolled in public and private universities?

Table 1

Level of digital self-efficacy

University Type	N	Mean	SD	t	sig
Public	220	3.6317	.45241	.070	.250
Private	200	3.6347	.40869		

An independent-samples *t*-test was conducted to examine whether digital self-efficacy differed significantly between students enrolled in public and private universities. As shown in Table 1, students from public universities ($M = 3.63$, $SD = 0.45$) and private universities ($M = 3.63$, $SD = 0.41$) reported almost identical levels of digital self-efficacy. The results indicated that the difference between the two groups was not statistically significant, $t = -0.070$, $p = .250$ ($p > .05$). Therefore, the null hypothesis was retained. These findings suggest that university type does not significantly influence students' digital self-efficacy, indicating that students from both public and private universities possess comparable confidence in using digital technologies for academic purposes.

Research Question: Is there a significant difference in the level of digital self-efficacy between male and female university students?

Table 2

Digital Self-Efficacy-gender base difference

Gender	N	Mean	SD	t	sig
Male	224	3.6100	.42326	1.173	.888
Female	196	3.6595	.44061		

To determine whether digital self-efficacy differed significantly by gender, an independent-samples *t*-test was conducted. As presented in Table 3, male students ($M = 3.61$, $SD = 0.42$) and female students ($M = 3.66$, $SD = 0.44$) reported very similar levels of digital self-efficacy. Although female students obtained a slightly higher mean score than male students, the difference was not statistically significant, $t = -1.173$, $p = .888$. Since the obtained *p*-value exceeded the significance level of .05, the null hypothesis was retained.

These findings indicate that gender does not significantly influence the digital self-efficacy of university students in Pakistan. Both male and female students demonstrated comparable confidence in their ability to use digital technologies for academic purposes, suggesting that digital self-efficacy is relatively consistent across genders within the sampled universities.

Research Questions: Is there a significant relationship between students' digital self-efficacy and their academic performance?

Table: 3

Correlation between variables

Variable	N	Pearson correlation	Sig. (2-tailed)
Digital Self-Efficacy	420	1	
Academic Performance	420	.558	.000

To examine the relationship between students' digital self-efficacy and academic performance, Pearson's product-moment correlation coefficient was computed. As presented in Table 2, the analysis revealed a moderate positive and statistically significant relationship between digital self-efficacy and academic performance, $r(418) = .558, p < .001$. This finding indicates that students with higher levels of digital self-efficacy tend to demonstrate better academic performance. The correlation coefficient of .558 suggests a moderate association, implying that increased confidence in using digital technologies for academic tasks is associated with improved academic outcomes. Since the obtained p -value is less than the significance level of .05, the null hypothesis is rejected. Therefore, it is concluded that digital self-efficacy is a significant positive correlate of academic performance among university students. The findings suggest that students who are confident in their ability to use digital technologies effectively are more likely to perform well academically. Digital self-efficacy may enable students to access online learning resources efficiently, participate actively in technology-enhanced learning, manage digital assignments successfully, and adopt effective self-regulated learning strategies. Consequently, enhancing students' digital self-efficacy may contribute to improved academic achievement in higher education.

DISCUSSION

This study examined the differences in digital self-efficacy based on university type and gender and explored the relationship between digital self-efficacy and academic performance among university students in Pakistan. The findings revealed that students enrolled in public and private universities did not differ significantly in their levels of digital self-efficacy. This result suggests that students across both sectors possess comparable confidence in using digital technologies for academic purposes. The increasing integration of digital technologies, learning management systems, and online learning platforms across higher education institutions in Pakistan may have reduced institutional differences in students' digital experiences. These findings are consistent with previous studies that emphasize that digital self-efficacy is influenced more by students' learning experiences, access to technology, and opportunities for digital engagement than by institutional sector alone (Bandura, 1997; Pumptow & Brahm, 2021). The findings also support the argument that digital transformation in higher education has created relatively similar technological learning environments across universities. No statistically significant gender difference was found in students' digital self-efficacy. Although female students reported slightly higher mean scores than male students, the difference was not significant. This finding indicates that both male and female university students possess comparable confidence in utilizing digital technologies for academic tasks. The result reflects the increasing accessibility of digital technologies and educational resources to both genders in higher education. It is also consistent with previous research suggesting that gender differences in technology-related confidence have diminished as digital technologies have become an integral part of students' educational experiences (Hatlevik et al., 2018; Schunk & DiBenedetto, 2020). The findings suggest that digital competence development initiatives implemented by universities are benefiting students irrespective of gender.

The most important finding of this study was the significant positive relationship between digital self-efficacy and academic performance. The moderate positive correlation indicates that students who

possess greater confidence in using digital technologies tend to achieve better academic outcomes. This finding supports Bandura's (1997) Social Cognitive Theory, which proposes that individuals' beliefs about their capabilities influence their motivation, persistence, and performance. Students with higher digital self-efficacy are more likely to engage actively with digital learning platforms, complete online assignments effectively, access learning resources independently, and employ self-regulated learning strategies. These behaviors contribute to improved academic achievement.

The present findings are consistent with previous international studies reporting that digital self-efficacy positively predicts students' academic engagement, digital competence, online learning readiness, and academic performance (Mehrvarz et al., 2021; Ibrahim et al., 2023; Pumptow & Brahm, 2021). Similarly, studies conducted in Pakistan have demonstrated that self-efficacy and digital competence positively influence students' academic motivation, engagement, and educational achievement (Majeed et al., 2022; Hussain et al., 2023). Therefore, the current study extends existing literature by providing empirical evidence that digital self-efficacy is an important correlate of academic performance within the Pakistani higher education context. The findings suggest that strengthening students' confidence in using digital technologies may enhance their learning experiences and contribute to improved academic success.

CONCLUSION

The present study concludes that university students in Pakistan generally demonstrate comparable levels of digital self-efficacy regardless of university type or gender. Neither institutional sector nor gender significantly influenced students' confidence in using digital technologies for academic purposes. However, digital self-efficacy was found to have a significant positive relationship with academic performance, indicating that students with greater confidence in using digital technologies tend to achieve better academic outcomes. These findings highlight digital self-efficacy as an important psychological factor supporting academic success in technology-enhanced learning environments. As higher education increasingly integrates digital technologies into teaching, learning, and assessment, strengthening students' digital self-efficacy should become an institutional priority. Developing students' confidence in using educational technologies can improve engagement, self-regulated learning, and ultimately academic achievement.

Recommendations

Following recommendations are anticipated:

1. Higher education institutions should organize regular digital skills and technology training programs to strengthen students' digital self-efficacy and confidence in using educational technologies.
2. Universities should integrate digital literacy and digital competency development into undergraduate curricula to prepare students for technology-enhanced learning environments.
3. Faculty members should incorporate interactive digital learning strategies, including learning management systems, online collaboration tools, and digital assessment methods, to encourage students' active engagement with technology.
4. Universities should ensure equitable access to digital resources, reliable internet connectivity, and technological support services for all students, regardless of institutional sector or demographic characteristics.
5. Academic support centers should provide workshops on self-regulated learning, digital problem-solving, and effective use of educational technologies to enhance students' academic performance.

6. Policymakers and higher education administrators should formulate institutional policies that promote digital competence development as an essential graduate attribute in higher education.
7. Future researchers should investigate the mediating and moderating roles of variables such as digital literacy, academic motivation, self-regulated learning, student engagement, and online learning readiness in the relationship between digital self-efficacy and academic performance. Longitudinal and mixed-methods studies across diverse educational settings are also recommended to provide a more comprehensive understanding of this relationship.

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