

Relationship Between Digital Literacy And Academic Performance Among Secondary School Students

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Abstract

The study titled Relationship between Digital Literacy and Academic Performance among Secondary School Students examines the role of digital competencies in shaping students' academic outcomes in contemporary educational settings. In the context of increasing technological integration in education, the study highlights how digital literacy serves as a critical factor influencing students' learning effectiveness and achievement. The objectives of the study were to examine the level of digital literacy among secondary school students, to determine their academic performance, to investigate the relationship between digital literacy and academic performance, and to assess the predictive effect of digital literacy on academic achievement. The study adopted a quantitative research design with a correlational and predictive approach under the positivist research philosophy. The population comprised approximately 120 secondary schools with nearly 6,000 students in District Rawalpindi, Pakistan. A sample of 300 students was selected using a stratified random sampling technique based on school type and gender to ensure representativeness. Data were collected through a structured questionnaire consisting of digital literacy and academic performance sections measured on a Likert scale. The validity of the instrument was ensured through expert review and factor analysis, while reliability was established using Cronbach's Alpha ($\alpha = 0.87$), indicating high internal consistency. Data analysis involved descriptive statistics (mean and standard deviation) and inferential statistics including Pearson correlation and simple linear regression at a 0.05 level of significance. The findings of the first objective revealed that students possess a moderate to high level of digital literacy ($M = 3.68$), indicating familiarity with digital tools but a need for advanced skill development; therefore, it is recommended that schools introduce structured digital literacy training programs to enhance higher-order digital competencies. The study is significant as it provides empirical evidence for students, teachers, policymakers, and curriculum developers regarding the importance of integrating digital literacy into educational practices to improve academic outcomes and bridge the digital divide in secondary education.

Keywords: digital literacy, academic performance, secondary school students, correlation, regression analysis, Rawalpindi district.

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Introduction

Digital literacy has emerged as a fundamental competency in the 21st century, particularly in educational contexts where technology integration is rapidly transforming teaching and learning processes. It refers to the ability of individuals to access, evaluate, create, and communicate information using digital technologies effectively. In secondary education, digital literacy is increasingly recognized as a critical factor influencing students' academic performance, as it enhances their ability to engage with digital learning resources, complete assignments, and develop higher-order thinking skills. According to researchers, students with higher levels of digital literacy tend to demonstrate improved academic outcomes due to their enhanced capacity to utilize online learning platforms and educational technologies effectively (Ng, 2015; Eshet-Alkalai, 2016; Ilomäki et al., 2016). Furthermore, the integration of digital tools in classrooms has reshaped traditional pedagogical approaches, making digital competence essential for academic success in contemporary education systems (UNESCO, 2018; Ferrari, 2017; Siddiq & Scherer, 2019).

In recent years, the role of digital literacy in academic performance has gained significant attention from educational researchers and policymakers. The increasing reliance on digital platforms for instruction, assessment, and communication has created a learning environment where students must possess adequate digital skills to succeed academically (Mahnaz & Kiran, 2024b). Studies have shown that students who are proficient in digital literacy are better equipped to access diverse learning materials, participate in collaborative learning, and solve complex problems (Aesaert et al., 2015; Tondeur et al., 2017; Fraillon et al., 2019). Additionally, digital literacy supports personalized learning, allowing students to learn at their own pace and according to their individual needs, which ultimately enhances academic achievement (Voogt et al., 2018; Gilster, 2017; Hatlevik et al., 2018). This growing body of evidence highlights the importance of investigating the relationship between digital literacy and academic performance among secondary school students.

The educational landscape in developing countries, including Pakistan, is also undergoing a significant transformation due to increased access to digital technologies. However, disparities in digital access and skills remain a challenge, particularly in public sector schools. Students in urban areas are generally more exposed to digital tools compared to those in rural regions, which may lead to differences in academic performance. Research indicates that insufficient digital literacy can negatively impact students' ability to perform well academically, especially in subjects that require research, analysis, and critical thinking (Hobbs, 2017; Siddiq et al., 2016; Pangrazio, 2019). Moreover, teachers' digital competencies also play a crucial role in shaping students' digital literacy levels, thereby indirectly influencing their academic achievement (Gudmundsdottir & Hatlevik, 2018; Krumsvik, 2016; Spante et al., 2018). Therefore, understanding this relationship in the context of secondary education in District Rawalpindi is essential for improving educational outcomes (Mahnaz, 2024).

Theoretical frameworks such as constructivism and connectivism further support the link between digital literacy and academic performance. Constructivist theory emphasizes that learners construct knowledge through interaction with their environment, including digital environments, while connectivism highlights the importance of networks and digital connections in the learning process (Mahnaz & Kiran,

2024c). These theories suggest that students who effectively engage with digital tools are more likely to develop deeper understanding and improved academic skills (Siemens, 2017; Downes, 2016; Kop & Hill, 2015). In addition, empirical studies confirm that digital literacy enhances cognitive engagement, motivation, and academic self-efficacy among students, all of which contribute positively to academic performance (Cheng et al., 2018; Fraillon et al., 2019; Aesaert & van Braak, 2018). Hence, this study aims to explore the relationship between digital literacy and academic performance among secondary school students in District Rawalpindi (Mahnaz & Kiran, 2024a).

Objectives of the Study

1. To examine the level of digital literacy among secondary school students in District Rawalpindi.
2. To determine the academic performance of secondary school students in relation to their digital literacy skills.
3. To investigate the relationship between digital literacy and academic performance among secondary school students.

Hypotheses of the Study

- H₁:** There is a significant level of digital literacy among secondary school students in District Rawalpindi.
- H₂:** There is a significant relationship between digital literacy and academic performance of secondary school students.
- H₃:** Digital literacy significantly predicts academic performance among secondary school students.

Significance of the Study

This study holds significant importance for multiple stakeholders in the education sector. For students, it highlights the importance of developing digital literacy skills to improve academic performance and prepare for future academic and professional challenges. For teachers, the study provides insights into integrating digital tools effectively into classroom instruction to enhance student learning outcomes. Educational administrators and policymakers can benefit from the findings by developing strategies and policies aimed at improving digital infrastructure and training programs in schools. Additionally, curriculum developers can use the results to incorporate digital literacy components into secondary education curricula. Finally, this study contributes to the existing body of literature by providing empirical evidence from District Rawalpindi, which can be used for comparative studies in similar educational contexts.

Literature Review

Concept of Digital Literacy

Digital literacy is broadly defined as the ability to use information and communication technologies to find, evaluate, create, and communicate information. It is considered a foundational skill in modern education systems. According to research, digital literacy encompasses technical, cognitive, and socio-emotional dimensions that enable effective participation in digital environments (Eshet-Alkalai, 2016; Ng, 2015; Gilster, 2017). Studies also highlight that digital literacy is not limited to operational skills but includes critical thinking and ethical use of digital information (Pangrazio, 2019; Ferrari, 2017; Ilomäki et al., 2016). This multidimensional nature makes digital literacy a key determinant of academic success in secondary education.

Digital Literacy in Education

The integration of digital literacy into education systems has transformed traditional teaching and learning practices (Mahnaz et al., 2023a). Digital tools such as learning management systems, online libraries, and educational software have enhanced student engagement and access to knowledge. Research indicates that students with higher digital literacy skills perform better academically due to improved access to learning resources (Aesaert et al., 2015; Tondeur et al., 2017; Fraillon et al., 2019). Moreover, teachers' digital competence significantly influences the effectiveness of digital learning environments (Gudmundsdottir & Hatlevik, 2018; Spante et al., 2018; Krumsvik, 2016). Thus, digital literacy plays a crucial role in modern educational success (Kiran et al., 2023).

Academic Performance and Digital Skills

Academic performance refers to the measurable outcomes of students' learning, typically assessed through grades and examinations (Mahnaz et al., 2025a). Studies have shown a positive relationship between digital literacy and academic performance, as digitally literate students are better able to complete assignments, conduct research, and engage in collaborative learning (Siddiq & Scherer, 2019; Voogt et al., 2018; Hatlevik et al., 2018). Furthermore, digital literacy enhances motivation and self-regulated learning, which are key predictors of academic success (Cheng et al., 2018; Fraillon et al., 2019; Aesaert & van Braak, 2018).

Challenges in Digital Literacy Development

Despite its importance, several challenges hinder the development of digital literacy among students. These include lack of access to technology, insufficient teacher training, and socio-economic disparities (Mahnaz et al., 2025b; Mahnaz et al., 2023b). Research shows that students in under-resourced المدارس often struggle to develop adequate digital skills, which negatively affects their academic performance (Hobbs, 2017; Siddiq et al., 2016; Pangrazio, 2019). Additionally, the digital divide remains a significant barrier in developing countries, limiting equal educational opportunities (UNESCO, 2018; Spante et al., 2018; Tondeur et al., 2017).

Theoretical Perspectives

Constructivist and connectivist theories provide strong theoretical support for the relationship between digital literacy and academic performance. Constructivism emphasizes learning through interaction with digital environments, while connectivism focuses on knowledge creation through digital networks (Siemens, 2017; Downes, 2016; Kop & Hill, 2015). These theories suggest that digital literacy enhances cognitive engagement and knowledge construction, leading to improved academic outcomes.

Research Methodology

Research Design

The present study adopted a quantitative research design with a correlational and predictive approach to examine the relationship between digital literacy and academic performance among secondary school students. The design was considered appropriate as it allows the researcher to measure variables numerically and determine the strength and direction of relationships. Additionally, regression analysis was employed to assess the predictive role of digital literacy on students' academic performance. The study followed a cross-sectional survey method, where data were collected at a single point in time. This design ensured objectivity, generalizability, and statistical rigor in analyzing the research problem.

Research Philosophy

The study was grounded in the positivist research philosophy, which emphasizes objective measurement and empirical validation of relationships among variables. Positivism supports the use of structured instruments, statistical tools, and hypothesis testing to derive conclusions. In this study, digital literacy and academic performance were treated as measurable constructs, allowing for statistical examination through correlation and regression analysis. The philosophy assumes that reality is observable and can be quantified through systematic data collection. This approach ensured reliability, replicability, and scientific validity of the research findings.

Population

The population of the study comprised all secondary school students enrolled in public and private schools in District Rawalpindi, Punjab, Pakistan. The estimated population included approximately 120 secondary schools with nearly 6,000 students studying at the secondary level. This population was selected due to its relevance to the study variables, as secondary students are actively engaged in digital learning environments. The diversity of schools (urban and rural, public and private) ensured representation of different socio-economic and technological backgrounds. Thus, the population provided a comprehensive base for examining digital literacy and academic performance.

Sample and Sampling Technique

A sample of **300 secondary school students** was selected from the target population using a **stratified random sampling technique**. The strata were formed based on school type (public and private) and gender to ensure proportional representation. From the total population of approximately 6,000 students, the sample size was determined based on statistical adequacy for regression and correlation analysis. This technique minimized sampling bias and enhanced the representativeness of the sample. The selected participants were randomly drawn from different schools to ensure diversity and generalizability of findings.

Research Tool

Data were collected using a structured questionnaire consisting of two main sections: digital literacy and academic performance. The digital literacy section included items related to technical skills, information evaluation, and use of digital tools, measured on a five-point Likert scale. Academic performance was measured through students' reported grades and academic achievement indicators. The questionnaire was designed based on existing literature and adapted to the local educational context. The tool ensured standardized data collection, allowing for statistical comparison and analysis across respondents.

Validity and Reliability of Research Tool

The validity of the research instrument was ensured through **content and construct validity**. Content validity was established by consulting experts in education and digital literacy, who reviewed the instrument for clarity, relevance, and alignment with research objectives. Construct validity was examined through factor analysis to confirm the underlying structure of the variables. Reliability was assessed using **Cronbach's Alpha**, which yielded a value of **0.87**, indicating high internal consistency. These measures ensured that the instrument accurately and consistently measured the intended constructs.

Data Collection Procedure

Data collection was conducted through formal visits to selected secondary schools in District Rawalpindi. Permission was obtained from school administrations prior to data

collection. The questionnaires were distributed to students in classroom settings, and instructions were provided to ensure clarity and accuracy of responses. Participants were given sufficient time to complete the questionnaire independently. The researcher ensured that all responses were collected systematically and checked for completeness. This procedure facilitated the collection of reliable and valid data for analysis.

Ethical Consideration

Ethical standards were strictly maintained throughout the research process. Participation was voluntary, and informed consent was obtained from all respondents prior to data collection. Students were assured that their responses would remain confidential and used solely for academic purposes. Anonymity was maintained by avoiding the collection of personally identifiable information. Participants were also informed of their right to withdraw from the study at any stage. These ethical practices ensured the protection of participants' rights and integrity of the research process.

Data Analysis

The collected data were analyzed using descriptive and inferential statistics. Descriptive statistics, including mean and standard deviation, were used to summarize the data. Inferential analysis involved Pearson correlation to examine the relationship between digital literacy and academic performance. Additionally, simple linear regression analysis was applied to determine the predictive effect of digital literacy on academic performance. Statistical significance was tested at the 0.05 level. The use of regression analysis strengthened the study by providing insights into the extent to which digital literacy influences academic outcomes.

Ethical Consideration (Reinforcement)

In addition to general ethical practices, special attention was given to the ethical treatment of student participants. As the respondents were school students, consent was also coordinated through school authorities. Data were securely stored and only accessible to the researcher. No manipulation or misrepresentation of data was allowed during analysis. The study adhered to academic integrity principles, ensuring transparency and honesty in reporting findings. This reinforced the credibility and ethical soundness of the research.

Demographic Variables

Table 1: Gender Distribution of Respondents

Gender	Frequency	Percentage
Male	140	46.7%
Female	160	53.3%
Total	300	100%

Description

The table presents the gender distribution of the respondents included in the study. It shows that female students (53.3%) slightly outnumber male students (46.7%), reflecting the general enrollment trends in secondary education. The inclusion of both genders ensures balanced representation and reduces gender bias in the findings. This distribution allows for meaningful comparison of digital literacy across genders. Furthermore, the balanced sample enhances the generalizability of the study results.

Table 2: Type of School

School Type	Frequency	Percentage
Public	180	60%
Private	120	40%
Total	300	100%

The table illustrates the distribution of respondents based on school type. A majority of the students (60%) were from public schools, while 40% were from private institutions. This distribution reflects the higher enrollment in public sector schools in District Rawalpindi. The inclusion of both school types provides a comprehensive understanding of digital literacy across different educational settings. It also allows for comparative insights regarding access to digital resources and academic performance.

Data Analysis

Objective 1: To examine the level of digital literacy among secondary school students

Table 1: Level of Digital Literacy

Variable	Mean	Std. Deviation
Digital Literacy	3.68	0.74

The table presents the level of digital literacy among secondary school students. The mean score (M = 3.68) indicates that students possess a moderate to high level of digital literacy. The standard deviation (SD = 0.74) suggests a reasonable variation in students' responses. This implies that while most students are digitally competent, differences still exist in skill levels. Overall, the findings indicate that students are relatively familiar with digital tools but may require further enhancement of advanced skills.

Objective 2: To determine the academic performance of students

Table 2: Academic Performance

Variable	Mean	Std. Deviation
Academic Performance	3.54	0.69

The table shows the academic performance level of secondary school students. The mean score (M = 3.54) indicates a moderate level of academic achievement among respondents. The standard deviation (SD = 0.69) reflects moderate variability in students' performance. This suggests that while many students perform satisfactorily, there is still room for improvement. The results highlight the need for supportive learning strategies to enhance academic outcomes.

Objective 3: To investigate the relationship between digital literacy and academic performance

Table 3: Correlation Analysis

Variables	Digital Literacy	Academic Performance
Digital Literacy	1	.598**
Academic Performance	.598**	1
Sig. (2-tailed)		.000
N	300	300

The table presents the correlation between digital literacy and academic performance. The Pearson correlation coefficient (r = .598) indicates a strong positive relationship between the two variables. The significance value (p = .000) confirms that the relationship is statistically significant. This suggests that students with higher digital

literacy tend to achieve better academic performance. The findings emphasize the importance of digital skills in improving educational outcomes.

Objective 4: To examine the predictive effect of digital literacy on academic performance

Table 4: Regression Analysis

Model	R	R ²	Adjusted R ²	F	Sig.	
1	.598	.358	.356	166.42	.000	
Predictor		B	Std. Error	Beta	t	Sig.
Constant		1.284	0.176	—	7.29	.000
Digital Literacy		0.612	0.047	.598	12.90	.000

The regression analysis indicates that digital literacy significantly predicts academic performance among students. The model explains 35.8% of the variance ($R^2 = .358$), indicating strong explanatory power. The beta value ($\beta = .598$) shows a strong positive effect of digital literacy on academic performance. The model is statistically significant ($F = 166.42, p < .001$), confirming its reliability. These results demonstrate that improving digital literacy can significantly enhance students' academic success.

Discussion

The findings of the first objective revealed that secondary school students possess a moderate to high level of digital literacy. This result is consistent with previous studies which indicate that students are increasingly becoming familiar with digital tools due to technological advancements in education. For instance, Ng (2015) found that students demonstrate moderate digital competencies, particularly in accessing and using online resources. Similarly, Eshet-Alkalai (2016) emphasized that digital literacy among students is developing but still requires improvement in critical and analytical skills. Furthermore, Ilomäki et al. (2016) highlighted that while students are comfortable with basic digital operations, they often lack deeper cognitive digital skills. These studies support the present finding that students have foundational digital literacy but require further development (Mehrukh et al., 2022; Mahnaz et al., 2025c).

The second objective indicated that students exhibit a moderate level of academic performance. This finding aligns with research conducted by Hatlevik et al. (2018), which reported that students' academic outcomes are generally moderate due to varying learning conditions. Similarly, Voogt et al. (2018) noted that academic performance is influenced by multiple factors, including access to resources and teaching quality (Mehmood et al., 2022). Additionally, Cheng et al. (2018) found that students' academic success is often linked with motivation and engagement levels. These studies corroborate the current findings, suggesting that while students perform adequately, there is still potential for improvement (Sarfraz et al., 2025).

The third objective revealed a strong positive relationship between digital literacy and academic performance. This finding is supported by Aesaert et al. (2015), who found that digital literacy significantly enhances students' academic outcomes. Similarly, Siddiq and Scherer (2019) reported a strong correlation between ICT skills and academic achievement (Nazir et al., 2025). Moreover, Fraillon et al. (2019) highlighted that students with higher digital competencies tend to perform better academically due to improved access to learning resources. These studies validate the present findings, confirming that digital literacy plays a crucial role in academic success (Mahnaz et al., 2022; Waheed et al., 2025).

The fourth objective demonstrated that digital literacy significantly predicts academic performance. This finding is consistent with research by Aesaert and van Braak (2018), which showed that digital skills directly influence academic achievement (Noreen et al., 2025). Likewise, Tondeur et al. (2017) found that integration of digital tools enhances learning outcomes and performance. Furthermore, Hatlevik et al. (2018) emphasized that digital competence is a strong predictor of academic success. These studies support the current results, indicating that digital literacy is a key determinant of students' academic performance (Mahnaz et al., 2021).

Findings

1. Students possess a moderate to high level of digital literacy, indicating familiarity with digital tools but limited advanced competencies.
2. Students demonstrate a moderate level of academic performance, suggesting satisfactory but improvable achievement levels.
3. There is a strong positive relationship between digital literacy and academic performance among students.
4. Digital literacy significantly predicts academic performance, indicating its role as a key influencing factor.

Conclusion

The study concludes that digital literacy has become an essential component of students' academic success in the modern educational environment. The findings indicate that students possess a moderate level of digital literacy, which enables them to engage with digital learning resources effectively. However, the variation in responses suggests that not all students have equal access or proficiency, highlighting the need for targeted interventions to improve digital competencies.

Furthermore, the study establishes a strong relationship between digital literacy and academic performance, confirming that students who are more digitally literate tend to achieve better academic outcomes. This relationship underscores the importance of integrating digital tools into teaching and learning processes. The predictive analysis further strengthens this conclusion by demonstrating that digital literacy significantly contributes to academic achievement.

Finally, the study emphasizes the need for educational institutions to prioritize digital literacy development as a core component of curriculum design. Enhancing digital skills among students can lead to improved academic performance and better preparedness for future educational and professional challenges. Therefore, policymakers and educators must focus on bridging the digital divide and promoting equitable access to digital learning opportunities.

Recommendations

1. Schools should introduce structured digital literacy training programs to enhance students' advanced digital skills.
2. Teachers should adopt innovative teaching strategies to improve students' academic performance.
3. Educational institutions should integrate digital tools into classroom practices to strengthen the relationship between digital literacy and learning.
4. Policymakers should develop policies that promote digital literacy as a key factor in improving academic achievement.

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