

An Analysis of Technology Intervention and Its Impact on Students' Performance Among Public Girls' Secondary Schools of City Faisalabad

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Abstract

Technology intervention in education has emerged as a transformative tool for enhancing teaching and learning processes, particularly in developing countries. This study investigates the impact of technology intervention on student performance in public girls' secondary schools in Faisalabad. Specifically, the research investigated the demographic characteristics of respondents, assessed the extent of technology usage, identified hurdles to practical implementation, and examined the impact of technology on student engagement, motivation, and learning outcomes. The research adopted a descriptive survey design, utilizing a structured questionnaire as the primary data collection instrument. Out of a total population of 502 teachers working across 122 public secondary schools, a sample of 116 secondary school teachers was randomly selected for the study. The questionnaire, pre-tested for validity and reliability, included 63 closed-ended questions rated on a five-point Likert scale. Data analysis revealed that technology positively influences students' engagement (mean

score 4.44), motivation (mean score 4.37), and learning outcomes (mean score 4.32). The study concludes that while technology has substantial potential to improve educational outcomes, its effectiveness is constrained by resource limitations, lack of training, and insufficient policies. This research contributes to the growing body of literature on technology intervention in education and provides actionable insights for policymakers and educational administrators to enhance technology-based learning.

Keywords: Technology Intervention, Students' Performance, Motivation

Introduction

In the modern, fast-paced world, technology has become a crucial element of almost every facet of life, revolutionizing how we communicate, work, and gain access to information. A society's ability to adjust to the swift progress of technology is crucial, as it has revolutionized industries, optimized procedures, and stimulated creativity.

The book *Teaching in the Digital Age* discusses how "technology is leading to massive changes in the economy, in the way we communicate and relate to each other, and increasingly in the way we learn." Education no longer consists of a teacher standing before a classroom and delivering a lecture; the structure and access points have been adjusted (Bates, 2015; Sheeza et al., 2024).

Technological advancements and digitalization have transformed people's thinking, behaviour, communication, and work processes. The introduction of technology in education in the twenty-first century has altered both the learning settings and the learners themselves. The global digital revolution has resulted in substantial changes to education, particularly in the creation of curricula and methods of instruction. Technology in the classroom gives instructors and students the chance to adapt to the worldwide digital era (Hussain et al., 2024).

The term "technology" has several ramifications in numerical education and culture; thus, we question its definition. Technology includes 'hardware' gadgets such as computers, calculators, handhelds, mobile devices, smartphones, and 'software' programs that connect these devices to users (Freiman, 2020).

All technical tools, applications, and frameworks linking individuals and organizations are collectively called information and communication technology (ICT). Examples include smartphones, smart televisions, personal computers, 4G networking, social networking platforms, software, hardware, robots, and email (Irvin & Macklin, 2007; Asad et al., 2023; Zafar et al., 2024).

"Technology intervention" brings technological resources and tools into educational environments to improve teaching and learning. It involves integrating technology with pedagogy and subject knowledge, as the TPACK framework highlights. These treatments seek to establish stimulating learning environments, prompting educators to change their instructional approaches and innovatively employ accessible technology. These interventions must be flexible due to the dynamic nature of technology, which enables teachers to adapt to changing student demands and problems. Ultimately, technological intervention aims to enhance student comprehension and engagement through the strategic and inventive application of digital resources (Koehler & Mishra, 2009; Khan et al., 2024).

In the 21st century, students and teachers expect information to be accessible, instant, and

multi-dimensional. The researchers argue that technology integration in instruction (digital skills) is among the competencies of a 21st-century teacher, especially the implementation of technology-enhanced classrooms. However, the formation of how teachers keep up with technological changes is not fully documented, especially in developing countries (Ronzhina et al., 2021; Hussain et al., 2024).

Need for Study

Technology has brought many revolutions in every field of life. This must be effectively used in education by teachers in the classroom to bring positive outcomes, since technology is being used effectively in the education sector around the globe. This study analyzes technology intervention and its impact on students' performance among public girls' secondary schools in the city of Faisalabad. This research analyzed the level and extent to which the technology is being used in this region, and it also highlighted the problems and challenges in the effective implementation of the technology integration in schools.

Objectives

This study has the following precise objectives:

- 1) To identify the demographic characteristics of respondents.
- 2) To assess the current level of technology intervention in public girls' secondary schools.
- 3) To assess how much technology is used in public girls' secondary schools.

Review of Literature

Cloete (2017) discussed its importance in education and how mixed learning and online education show their growing role. He said technology does not just exist as a tool, but changes how we learn and connect. Because of this, it is critical to continue considering how technology influences education and to acknowledge that technology is neither neutral nor independent of society. It is easy to see how technology affects other areas of society, like business. We must recognize that technology influences teaching and learning, and use it more wisely and effectively in the classroom. It is also important to consider educational technology's pros and cons. For example, some experts examine how it can help areas like theological studies.

De Sousa Silva (2024) addressed the significance of technology in today's classrooms and how it has changed how students learn. Learning begins at home, and schools are just a part of the bigger picture. Technology, such as the internet, facilitates communication between educators and their pupils, leading to more efficient education. Particularly in regions such as Piauí, the Education Mediated by Technology (EMT) is emphasized to enhance education. Projects using this strategy have positive outcomes in improving educational quality, even if criticized. If we want to improve our teaching results, we must reconsider how we use these tools.

Lin et al. (2017) examined how mobile phones and the Internet are increasingly valuable learning tools around standard time and space limits. They highlighted the significance of developing educational activities designed for digital learning and effectively integrating technology into teaching. The study utilized a quasi-experimental approach involving 116 students from four courses who completed surveys and took exams to express their opinions on digital learning. The findings indicated that digital learning had a more favorable effect on

learning motivation and outcomes than traditional methods. Furthermore, it was determined that learning motivation substantially enhanced both learning effectiveness and overall benefits. The study underscored implementing digital learning strategies to enhance student performance and instruction.

Hu et al. (2018) analyzed the influence of ICT at the national, institutional, and individual levels on student achievement in mathematics, reading, and scientific literacy, utilizing data from the PISA 2015 examination. An examination of 305,414 pupils from 11,075 schools in 44 nations uncovered some significant discoveries. Initially, national ICT skills significantly influenced academic achievement more than national ICT access and use. The availability of ICT in schools favorably impacted student progress; however, its availability at home had a detrimental effect. Furthermore, the academic utilization of ICT showed a negative link with performance, whereas the use for enjoyment demonstrated a favorable correlation. Ultimately, student attitudes towards ICT had mixed impacts; competence and autonomy were positively correlated with performance; however, social interaction with ICT adversely affected academic achievement.

Material And Methods

The research aims to present an overview of the current status of technology integration and its effect on students' performance. For this purpose, a descriptive study was appropriate for the investigation. The research regarding the analysis of technology intervention and its impact on student performance has been carried out at all the public girls' secondary schools in the city of Faisalabad, Punjab, Pakistan. The population for this study consists of all Secondary School Teachers (SST) from public girls' secondary schools in the city of Faisalabad. A sample of 116 secondary school teachers was randomly selected for the study. The research instrument used in this study was a questionnaire designed to analyze the impact of technology intervention on student performance.

Table 1: Allocation of respondents according to their age

Age of Respondents	Frequency	Percentage
20-30	12	10.3
31-40	60	51.7
41-50	26	22.4
51 and above	18	15.5
Total	116	100.0

According to Table 4.1, 10.3 % of respondents were between 20 and 30, while 51.7% were between 31 and 40. 22.4% of participants were aged 41-50, and 15.5% were aged 50 and above. Table 4.1 shows that most respondents were between 31 and 40 years old (51.7%), indicating a significant percentage amongst the other three categories. The second largest group is 41-50 years (22.4%). The current results are consistent with the findings of the study conducted by Cheng & Xie (2018), where the participants' ages ranged from 24 to 62.

Table 2: Allocation of respondents according to their level of education

Education	Frequency	Percentage
Bachelor's degree	3	2.6
Master's degree	73	62.9
M.Phil.	35	30.2

PhD	5	4.3
Total	116	100.0

Table 2 shows the level of education of respondents. The data showed that 2.6% of respondents held a Bachelor's degree while 62.9% qualified for a Master's degree. M.Phil. degree holders were 30.2% of the whole, whereas 4.3% of the respondents had PhD degrees. Most teachers held advanced degrees, with 62.9% having a Master's and 30.2% holding an M.Phil. This high level of education may positively influence receptiveness to professional development and technology integration, as research suggests that higher educational qualifications are associated with increased adaptability and openness to change (Mumtaz, 2000). Qualified educators are more inclined to participate in continuous professional development, which is crucial for the efficient use of technology in their instructional practices (Jiang, 2023). The current study results are correlated with the findings of (Cheng & Xie, 2018), which shows 22 participants (20.2%) reported having a bachelor's degree, and a greater number of 87 participants (79.8%) reported having a master's degree or higher.

Table 3: Allocation of respondents according to their teaching experience

Experience	Frequency	Percentage
Less than 5 years	2	1.7
5-10 years	49	42.2
11-15 years	33	28.4
More than 15 years	32	27.6
Total	116	100.0

Table 4.3 shows that most respondents have 5-10 years of teaching experience, which is 42.2% of the whole, while 28.4% have 11-15 years of teaching experience. 27.6 % of the respondents have more than 15 years of teaching experience, and only 1.7% have less than 5 years of experience. (Laabidi, 2022) collected information on the duration of teachers' employment. A predominant 41.1 percent of participants had over 20 years of teaching experience. 20.9 percent possessed 11-15 years of experience, 14.1 percent had 1 to 5 years, 13.5 percent held 16-20 years of experience, and just 10.4 percent had 6 to 10 years of experience.

Table 4: Allocation of respondents according to subject specialization

Subject	Frequency	Percentage
Science	41	35.3
Mathematics	20	17.2
English	23	19.8
Social Studies	7	6.0
Other	25	21.6
Total	116	100.0

Table 4.4 shows the allocation of respondents according to their subject specialization. 41% of the sample (35.3%) specializes in science subjects. In comparison, 17.2% are specialized in mathematics, 19.8% are specialized in English, 21.6% in other subjects, and only 6% of the whole sample is specialized in social studies. According to data, the majority of individuals have a specialization in a science subject. Teaching subjects included mathematics (23.9%), English language arts (27.5%), science (30.3%), and others (18.3%). The results of this study

align with the findings of Cheng & Xie (2018), which showed that most respondents (30.3%) were teaching science subjects.

Table 5: According to respondents, Availability of IT resources

No.	Statement	5	4	3	2	1
1	Our school has adequate IT equipment (computers, tablets, internet, projectors) for teaching and learning purposes.	9.5	14.7	0	50	25.9
2	Students have access to computers/tablets during lessons.	1.7	14.7	18.1	50	15.5
3	We have access to online learning platforms and resources.	1.7	13.8	18.1	49.1	17.2

Strongly agree=5, Agree=4, Neutral=3, Disagree=2, Strongly disagree=1

The data reveals significant IT infrastructure and technology access deficiencies in the schools surveyed. Only 9.5% of respondents strongly agree and 14.7% agree that their school has adequate IT equipment for teaching and learning, while the majority, 50% and 25.9%, respectively, disagree and strongly disagree. Similarly, very few respondents (1.7% strongly agree and 14.7% agree) report that students have access to computers or tablets during lessons, with 50% disagree and 15.5% strongly disagree. Neutral responses (18.1%) suggest that some respondents are uncertain about student access. Regarding access to online learning platforms and resources, 1.7% strongly agree and 13.8% agree, whereas 49.1% disagree and 17.2% strongly disagree, with 18.1% remaining neutral. These findings indicate a lack of adequate IT resources, limited student access to technology, and minimal availability or use of online platforms, which may hinder the effectiveness of technology integration in schools.

Table 6.1: According to respondents, Availability of IT resources (Weighted Score, Mean, SD, Rank)

Statement	Weighted score	Mean	SD	R. O
Students have access to computers/tablets during lessons.	275	2.37	0.97	1
We have access to online learning platforms and resources.	271	2.34	0.97	2
Our school has adequate IT equipment (computers, tablets, internet, projectors) for teaching and learning purposes.	241	2.08	0.88	3

Table 4.10 shows participants' responses regarding the availability and accessibility of technological resources within their schools. According to respondents, the availability of IT resources is ranked as: Students have access to computers/tablets during lessons ranked 1st

with a weighted score of 275, a mean of 2.37, and a standard deviation of 0.97, rated as disagree. We have access to online learning platforms and resources, ranked 2nd, with a weighted score of 271, a mean of 2.34, and a standard deviation of 0.97. rated as disagree. Our school, which has adequate IT equipment for teaching and learning purposes, was ranked 3rd with a weighted score of 241, a mean of 2.08, and a standard deviation of 0.88, and was rated in the disagree category. Overall, the findings indicate a substantial deficiency in IT resources, which may hinder effective technology integration and limit students' ability to benefit from digital learning opportunities.

Table 7. According to respondents, technology integration and usage in teaching

No.	Statement	5	4	3	2	1
1	Technology is regularly integrated into the curriculum at our school.	12.1	51.7	16.4	18.1	1.7
2	Teachers at our school use technology to enhance lesson delivery.	10.3	51.7	19	15.5	3.4
3	Teachers are encouraged to use technology in innovative ways	10.3	62.1	14.7	9.5	3.4
4	Students are encouraged to use technology for research and assignments.	16.4	58.6	14.7	8.6	1.7

The data indicates a generally positive perception of technology integration in schools, with most respondents agreeing with the statements. For integrating technology into the curriculum, 12.1% strongly agree and 51.7% agree, indicating that most schools incorporate technology into teaching plans, though 18.1% disagree and 1.7% strongly disagree, suggesting some inconsistencies. Regarding teachers using technology to enhance lesson delivery, 10.3% strongly agree and 51.7% agree. In comparison, 19% remain neutral and 15.5% disagree, reflecting that while most teachers utilize technology, a minority may face challenges or limitations. Teachers are widely encouraged to use technology innovatively, with 10.3% strongly agreeing and 62.1% agreeing, and only a small proportion disagreeing (9.5% disagree and 3.4% strongly disagree). Students are also encouraged to use technology for research and assignments, as evidenced by 16.4% strongly agree and 58.6% agree, with minimal disagreement (8.6% disagree and 1.7% strongly disagree). These findings suggest that while technology is widely integrated and supported in schools, there are areas where its implementation could be further enhanced or made more consistent.

Table 7: According to respondents, technology integration and usage in teaching (Weighted Score, Mean, SD, Rank)

Statement	Weighted score	Mean	SD	R.O
Students are encouraged to use technology for research and assignments.	470	4.05	0.75	1
Teachers are encouraged to use technology in innovative ways	460	4.00	0.78	2
Technology is regularly integrated into the curriculum at our school.	450	4.00	0.82	3
Teachers at our school use technology to enhance lesson delivery.	406	3.65	0.85	4

Strongly agree=5, Agree=4, Neutral=3, Disagree=2, Strongly disagree=1

Table 4.10 shows participants' responses regarding the integration and support for technology use within their schools. According to respondents, technology integration is ranked 1st with a weighted score of 470, a mean of 4.05, and a standard deviation of 0.75, rated as agree. Teachers are encouraged to use technology innovatively, ranked 2nd with a weighted score of 460, a mean of 4.00, and a standard deviation of 0.78, rated as agree. Technology is regularly integrated into the curriculum at our school, which was ranked 3rd with a weighted score of 450, a mean of 4.00, and a standard deviation of 0.82, rated as agree. Teachers at our school use technology to enhance lesson delivery, which was ranked 4th with a weighted score of 406, a mean of 3.65, and a standard deviation of 0.85. This lies between agree and neutral but leans towards agree. Overall, the findings strongly endorse technology integration and support, with respondents recognizing its positive impact on enhancing teaching practices and learning experiences.

Conclusion

Technology intervention is a critical driver in modernizing education by bridging the gap between traditional teaching methods and the demands of a digitally enabled learning environment. This study, "An Analysis of Technology Intervention and its Impact on Student Performance among Public Girls' Secondary Schools of City Faisalabad," has demonstrated both the transformative potential of technology in enhancing student engagement, motivation, and learning outcomes, as well as the significant challenges that must be overcome for its effective implementation. Teachers in these schools strongly commit to integrating technology into their instructional practices. They reported moderate to high levels of confidence in using technology, with many acknowledging that digital tools enhance lesson delivery, promote innovative teaching methods, and contribute positively to student performance. However, the study also uncovered critical deficiencies in the current technological infrastructure. Respondents expressed considerable dissatisfaction with the availability of essential IT resources such as computers/tablets, online learning platforms, and overall equipment, all of which received low ratings.

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