

Use of Instructional Technologies for Building Classroom Environments by Prospective Teachers

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ABSTRACT: This study investigates the use of instructional technologies for building a conducive classroom environment among prospective teachers enrolled in the Bachelor of Education (B.Ed.) to foster an interactive and supportive learning environment. This study aimed to assess the classroom application of instructional technology and its impact on student engagement, interaction, and the learning environment. A quantitative design was used, with data collection through a structured classroom observation checklist during practicum teaching sessions. Aspects of observations that were identified are the extent to which digital devices (projectors, smart boards, etc.) were employed, students' participation with technology, teacher-student interactions, and multimedia resources. The findings indicated that most of the prospective teachers incorporate instructional technology, primarily the projector and multimedia presentations, which improve interactive learning, enhance concept explanation, and increase student interest. There were limitations in opportunities that allowed students to use technology directly, and student-centered use of technology was rarely observed. Variables such as classroom management skills, teacher self-confidence, and availability of resources, among others, significantly influenced technology use in the classrooms. The study concluded that instructional technology is essential in current pedagogical practices, but its effective use depends on skillful pedagogy and student engagement, highlighting the fact that prospective teachers need more practical training in it.

KEYWORDS: Instructional Technology, Classroom Environment, Prospective Teachers, Classroom Observation, Pedagogy

Introduction

The prevalence of instructional technology is now setting modern educational institutions apart from traditional learning settings. Teacher education, with a greater reliance on digital technology, including multimedia applications, learning management systems, various learning websites, and other online resources and learning support systems, becomes an important element. If properly used, these can increase the level of student participation and also aid

Pages: 381 – 391

Volume: 5

Issue: 1 (2026)

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Cite this Article: Sheraz, S., Yousuf, M. I., Yousaf, S., & Janjua, I. M. (2026). Use of Instructional Technologies for Building Classroom Environments by Prospective Teachers. *The Regional Tribune*, 5(1), 381-391. <https://doi.org/10.55737/trt/v-i.232>

teachers in providing diversified learning methods. Hence, the prospective teachers need to not only be able to use technology proficiently but also possess foundational knowledge for its effective application.

Another key point raised here is the classroom environment and engagement. While technology-based teaching methods are closely related to interactive and learner-centred approaches, they may be difficult to achieve in traditional classroom environments. It has been argued that technology-based education requires a conducive classroom environment, as well as changes in teaching methods and student engagement. Otherwise, the use of technology may not have a significant impact on the learning process (Bond et al., 2020).

One of the challenges in teacher training is that many prospective teachers struggle to apply theoretical knowledge to actual classroom teaching. Lack of practical experience, insufficient guidance, and classroom management issues all negatively impact their confidence in using instructional technology in the classroom environment (Tondeur et al., 2021). Existing literature emphasizes the importance of providing guidance and practical training to prospective teachers to ensure they can skillfully use instructional technologies in the classroom. Addressing these issues is crucial because they are essential for developing excellent teachers capable of creating positive and effective classroom environments.

Instructional technologies and their role in improving the classroom setting in education are an area of research that has been well established. Learning environments that involve the use of technology have been established to help in improved student achievement through participation and higher-order thinking. Information and communication technologies (ICT) integration can transform learning environments into dynamic spaces in which students can be more active regarding content and acquire the skills of critical thinking (Ghavifekr & Rosdy, 2015).

Objectives of the Study

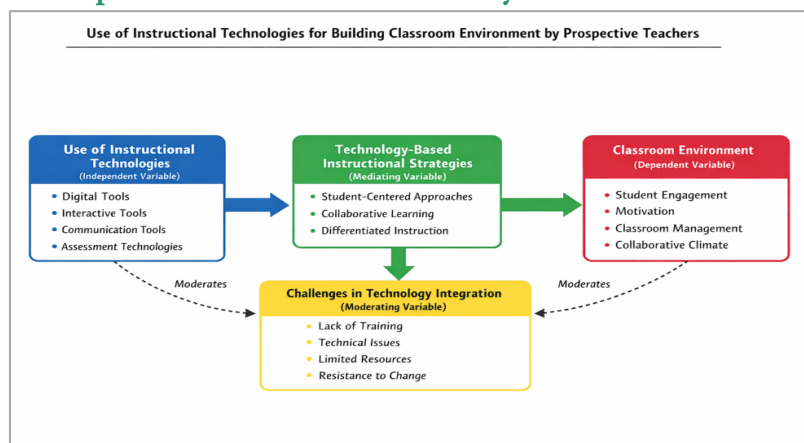
The key focus of the study was the following objective:

- a) To examine strategies, through the instructional technologies, to construct a favorable classroom setting.
- b) To investigate how would-be teachers experience difficulties with integrating instructional technologies to create a favorable environment.

Research Questions

1. What are some of the strategies for aspiring teachers for selecting appropriate instructional technology to develop a favorable learning environment in the classroom?
2. What are some of the challenges being faced by prospective teachers in integrating instructional technologies to create a conducive classroom environment?

Conceptual Framework of the Study



Significance of the Study

This research project is significant as it has the potential to target the learning experiences of prospective teachers for boosting student interest and achievement through effective integration of technology. It may help in policy-making processes such as allocation of resources and teacher training programmes for innovative teaching practices by future educators.

Literature Review

It takes into account the role of technological competence, pedagogical practices, and institutional support for teachers in preparing to incorporate technology in teaching. Teaching practices have been rapidly changing over the past several years through the introduction of digital resources and technological devices. Instructional technology is still a significant tool in enhancing the way education is conducted in a meaningful way. Computers and interactive whiteboards provide new avenues to involve students, and virtual learning environments have made it easier to plan lessons and share instructional content. Moreover, multimedia, including videos and computerized textbooks, can be used to enable teachers to create lessons that can be tailored to different learning requirements. With the emergence of new technologies, new opportunities to enhance student-centered education based on innovative teaching methods emerge (Roblyer & Hughes, 2019).

Classroom Environment

In classrooms, students spend a long period of time, and it is during this time that they learn some of the most important skills that they need to operate in a global society. In such a setting, they start gaining knowledge of their position in the broader world as well as understanding their own talents. The classroom also helps to form their aspirations, as it offers the knowledge and experiences that they need to meet their future goals. As the classroom is the focal point of the overall development of the students, it is essential to discuss the methods of classroom environment improvement in order to increase the effectiveness of the teaching and learning processes (Hannah, 2013). The classroom is the main learning environment, and its quality directly influences not only academic achievements but also how students feel about their social and educational environment. A Healthy classroom climate can promote cognitive and social growth, impacting results that are appreciated by the educators and stakeholders. To gain deeper insights into these relationships, a number of students have used quantitative methods to investigate the perceptions teachers and students have of their learning environments (Afari et al., 2013).

Prospective Teachers

The perceptions of the teaching profession in prospective teachers have also been studied at various levels of teacher training. Research has been conducted on the beliefs that people have upon joining teacher education courses and how those beliefs are changed due to classroom experiences during their training. Moreover, the focus has been on how these perceptions change as time goes by, especially between the start and end of their programmes. The literature on teacher education has long been addressing these aspects (Ezer et al., 2011).

Instructional technologies have emerged as an essential part of teacher education curricula to equip future teachers with the skills to operate in the present-day classroom setting. Though pre-service teachers tend to understand the importance of technology in instruction, most of them believe that they are not well-equipped to effectively use the technology. A study emphasizes that teachers are characterized by a lack of the necessary technological skills, and they struggle with the lack of training and the unclear institutional policies regarding the integration of ICT (Alrishan et al., 2023).

Pre-service teachers need greater practical experiences and constant guidance in order to successfully utilize digital tools in teaching. Respondents involved in pertinent studies have highlighted the importance of organized opportunities that enable them to be actively involved in working with technology in actual learning contexts. Moreover, special courses aimed at technological understanding development have been proven to enhance the technological pedagogical content knowledge of teachers greatly. This development can be achieved even by a single well-designed course, and this means that structured and comprehensive training in teacher education programs is important. Nonetheless, despite these results, numerous programs continue to offer few chances of long-term and meaningful interaction with teaching technologies (Tondeur et al., 2021).

Also, more advanced strategies like virtual reality (VR) can provide immersive learning to pre-service teachers, but due to inadequate infrastructure and resource shortages, they might not be implemented. Inter-university inter-school projects have also been fruitful in upgrading the technical competence of the aspiring teachers. Collaborative construction of teaching resources offers hands-on exposure and assists in creating confidence and competence in using technology to teach (Mumtaz, 2000).

National Education Policy 2009 of Pakistan focuses on the incorporation of instructional technology in teaching and teacher education programs as one of the ways of enhancing the quality of classroom settings (Khizar et al., 2019). Studies also show that future educators who actively use technology in their studies have a greater record of confidence and creativity in classroom practices. The competencies that are crucial to good teaching, and their growth, are directly associated with meaningful exposure to instructional technologies during teacher preparation.

Technological acceptance in teacher education is an issue, especially because of the poor digital skills of teachers and the absence of a connection between technology and the standard pedagogical framework. There are still a number of obstacles inhibiting the successful introduction of technology in classrooms. These obstacles are a lack of technical expertise, poor infrastructure, and institutional support (Hassan, 2021). The scarcity of digital resources and the unstructured training opportunities in most contexts further limit the meaningful use of instructional technologies in classrooms (Haleem et al., 2022). Information and communication technology (ICT) has helped to create more interactive and engaging learning experiences in the teaching process. These environments promote the active engagement of students, which is associated with better academic outcomes (Jogezai et al., 2018; Asif et al., 2020). Moreover, technology offers students greater access to numerous learning materials that facilitate independent and flexible learning.

Technology- Enhanced Learning Environment

Digital tools in education help students to learn through involvement in project-based learning, collaborative learning activities, and other interactive activities. These strategies support students to be more autonomous learners in and out of the classroom (Schaen et al., 2016). Furthermore, online platforms and multimedia resources allow educators to offer differentiated instruction to meet a range of different learning styles and individual needs, which is crucial when building inclusive classroom settings (Johler et al., 2022).

Theoretical Understandings of Teacher- Student Interaction

The Sociocultural Theory by Vygotsky emphasizes that learning is a development based on socialization, and language is a key component in cognitive development. Dialogue, scaffolding, and teacher support are directly related to the process of developing student communication skills in the classroom environment. The teachers support the learners through the provision of the right help in the zone of proximal development (ZPD) so that they can attain greater levels of understanding and language proficiency (Vygotsky, 1978). Positive immediacy behaviors like eye

contact, encouragement, and attentiveness by teachers are helpful to students both emotionally and cognitively. Studies have indicated that such practices enhance learner engagement and enable them to produce more oral output (Mehrabian, 1981).

Development of Teacher Questioning and Communication

One of the instructional strategies that has been employed in the development of communication skills in students entails teacher questioning. Open-ended questions stimulate learners to elaborate and think analytically. Higher-order questions, specifically, encourage more elaborate thinking and enable students to articulate their thoughts better, thus leading to the acquisition of communicative competence (Chin, 2007).

Interactional Supports, Feedback, and Scaffolding

Feedback is a significant factor in facilitating language acquisition among students, particularly when it is given in a formative and constructive way. Recasts, prompts, and elaboration are some of the techniques used to assist learners in advancing their oral language without breaking the communication process. These interactive approaches enable students to identify and rectify mistakes and to be actively involved in the learning process. Studies have indicated that this kind of feedback has a great effect on improving linguistic accuracy and general communicative development (Lyster & Ranta, 1997).

Immediacy, Classroom Climate, and Teacher

A positive classroom setting is required to motivate students to participate and alleviate anxiety related to communication. Teacher immediacy, which is manifested by verbal and nonverbal responses, i.e., manifesting openness and being approached, has been shown to have a positive effect on the willingness of students to communicate. It also improves teacher-student relations and sets up a classroom environment that promotes active interaction and communication (Shahribonu, 2025).

Interaction Interactive Learning

Teamwork learning offers great opportunities to students to learn how to communicate with others. Group work, pair discussions, problem-solving tasks, etc., are the activities that encourage proper use of language and facilitate the sharing of ideas. Research has shown that cooperative learning arrangements extend the talk time of students and make them more confident and competent communicators (Johnson & Johnson, 1999).

Cultural and Contextual Factors Influencing Teacher–Student Interaction (TSI)

Classroom interaction is greatly influenced by cultural and contextual factors. In most Asian and South Asian societies, such as Pakistan, student involvement is usually restricted by the traditional teacher-centered methods. Nevertheless, studies indicate that interactive teaching methods can result in significant changes in the communication techniques of students, even in the hierarchical classroom environment. Communicative teaching methods can be easily accommodated in various cultural settings with the aid of proper teacher training (Nunan, 2003).

Technology and the 21st-Century Classroom Environment

The contemporary classroom is becoming more and more integrated with physical and digital learning environments. As a future teacher, I would not be interested in the application of technology in delivering content, but would be interested in applying it strategically in the classroom to establish a good and productive learning environment. These environments are marked by respect among themselves, active interaction, inclusiveness, and good interpersonal

interactions, which are critical to student success. Positive classroom climate has been directly associated with better achievements in academics and overall student growth (Wang & Eccles, 2013). Through this review, thus, the existing literature is brought together to analyze how the prospective teachers are being prepared to utilize instructional technologies and foundational teaching approaches not only as a means of instruction but also as a way of developing learning environments that are conducive and interesting (Qaseem et al., 2024).

Research Methodology

Research Design

The study used a quantitative research design to investigate prospective teachers' usage of instructional technologies in establishing a supportive classroom environment during their teaching practice. Quantitative study was preferred due to an in-depth understanding of actual classroom practices, teachers' behavior, and context-bound utilization of instructional technologies, and it required an understanding and description of naturally occurring behaviors and teaching practices rather than using numerical measures of observation.

Population and Sample

The target population was prospective teachers pursuing their Bachelor of Education program at the universities, namely Pir Mehr Ali Shah Arid Agriculture University (PMAS-AAUR), Rawalpindi, and University of Poonch, Rawalakot (AJK). These universities were selected on account of their teacher education programs being effectively run and providing teachers for the educational institutions.

A convenience sampling technique was used to collect data from the accessible prospective teachers while they were performing a teaching practicum. The sample of the study consisted of those prospective teachers who were actually involved in classroom teaching, as this gave the opportunity to observe teaching practices in an authentic way.

Research Instrument

The researcher used the classroom observation as the only data collection tool of the study. A structured classroom observation checklist was designed to collect information on various indicators such as use of instructional technology in the classroom, use of multimedia presentations/devices and projector/smart board, student-teacher interaction in the classroom with technology, eye contact with students, and encouraging student participation through instructional technologies. Using classroom observation, direct data about how teachers apply instructional technology in classroom settings was also collected in this process.

Data Collection Procedures

The data were collected by means of direct observation at prospective teachers' teaching practicum in selected schools. Before the collection of data, the researcher sought formal approval from the concerned university authorities and the respective schools/institutions where students were on their teaching practice. Observations were made during the natural classroom setting, and there was no intervention in teaching processes. An observation checklist was used to collect information on teaching practices, which focused on technology utilization and classroom environment.

Data Analysis

The data were analyzed by means of descriptive statistical analysis obtained from the observation checklist. Data was analyzed by reviewing it systematically, identifying codes to chunk data, and clustering codes into meaningful patterns and themes. Observation notes were systematically searched to find consistent themes and interesting findings with regard to the application of instructional technology in the classroom environment.

Ethical Considerations

The study strictly adhered to established ethical standards for educational research. Informed consent was obtained from participants before data collection. Anonymity and confidentiality of all participants were ensured, and all the collected data were used for research purposes only.

Data Analysis and Interpretation

In this case, to investigate the practice, techniques, perspectives, and barriers associated with instructional technologies by the prospective teachers, a quantitative method was utilized to generate a combination of both statistically significant numerical and in-depth qualitative data that have contributed to providing both numerical and in-depth information. Quantitatively, the data indicated statistical results of how they have utilized instructional technologies, what instructional strategies they used, and barriers they faced in the use of instructional technologies. It was analyzed using descriptive and inferential statistics.

Teaching Practice Experience of Respondents

Analysis of teaching practice experience reveals that 57.8% of the prospective teachers had already completed two months of practicum, 28.9% of the students had three months of practicum, and only 13.3% of the students had four months of teaching experience. These results suggest that most of the participants were in the preliminary stages of the practicum. Less teaching practice might influence the level of the teacher candidates' readiness and ability to use instructional technologies effectively in the classroom. The presence of teachers with a four-month practicum may allow for a balanced representation and helpful comparison of this sample.

Table 1

Use of Instructional Technologies in the Classroom

Statement	Response	Frequency	%
Knowledge about the use of instructional technology	▶ Well aware	44	98
	▶ Doubtful	1	2
Use of Multimedia Tools	▶ Smoothly used	25	56
	▶ Faced some challenges	20	44
Use of Projector and Smartboard	▶ Smoothly used	34	76
	▶ Faced challenges	11	24
Maintain Eye Contact	▶ Smoothly	37	82
	▶ Face some challenges	8	18
Encouragement of Students to Use Technology	▶ Smoothly	32	71
	▶ Face some challenges	13	29

Table 1 shows the responses about how capable the prospective teachers felt regarding the use of various facets of technology, like knowledge about instructional technology, multimedia, interaction, and student engagement. As the targeted group of prospective teachers underwent a basic module on classroom environment by the researcher, only one respondent was found doubtful regarding their knowledge of IT. Regarding the use of multimedia tools, there is a noticeable variation here, and 56% of the prospective teachers were able to use multimedia tools smoothly. The number of participants using multimedia resources comfortably is greater than half, but quite many had some problems in using them, either because of a lack of practice, insufficient training, or maybe some technical glitches. In case of the use of a projector and smartboard, twenty-four percent of the prospective teachers had to face difficulty in managing the projector/smart board and maintaining students' attention. Maintaining eye contact while using

instructional technology was maintained by 82% of respondents, which shows that a majority of teachers can easily handle screen use and maintain interactions at the same time. Regarding the encouragement of students to use technology, 29% of respondents faced some problems with it. A majority of the prospective teachers could also establish a user-friendly environment for the students' use of technology in classroom teaching, but some teachers had difficulties in integrating student participation through technology.

Table 2

Correlations among Instructional Technology Use and Classroom Practices

Aspects of Instructional Technology Use	Aspects of Classroom Environment	R	P
Encouragement to use technology	Promotion of critical thinking and active participation	0.345	0.02
Technology support for teamwork	Improved student collaboration	0.311	0.038
Classroom management during technology use	Better maintenance order & fairness	-0.341	0.022
Lesson planning with technology	Increased teacher confidence in technology use	0.413	0.005
Instruction linked with objectives	Digital feedback/reflection	0.322	0.031
Digital assessment tools	Availability and effective use of technological resources	0.494	0.001
Technology-based assessment practice	Greater confidence and willingness to use technology	0.349	0.019
Multimedia integration in teaching	Educational apps/software use	-.305	0.042
Multimedia-supported instruction	Digital feedback/reflection	0.307	0.040
Projector/Smartboard use	Technology disrupts classroom management	-.304	0.042

Table 2 shows the correlation between instructional technology use and classroom practices. The aspects of technology use having a significant positive relationship with effective classroom practice are the encouragement to use technology in relation to critical thinking and active participation ($r = 0.345$, $p = 0.02$), while technology support for teamwork improves student collaboration ($r = 0.311$, $p = 0.038$). Lesson planning with technology also increases teachers' confidence in using technology ($r = 0.413$, $p = 0.005$). In addition, digital assessment tools show a strong positive relationship with the availability and effective use of technological resources ($r = 0.494$, $p = 0.001$).

Classroom management during technology use was negatively associated with maintaining order and fairness ($r = -0.341$, $p = 0.022$), and projector/smartboard use was negatively related to classroom management disruptions ($r = -0.304$, $p = 0.042$). Overall, the results suggest that instructional technology generally supports better classroom practices, student engagement, collaboration, and teacher confidence, although challenges in classroom management may arise during technology integration.

Findings of the Study

- ▶ Prospective teachers, after gaining the basics of using instructional technology, multimedia tools, and maintaining classroom interaction, were found to be confident in handling screen use, maintaining eye contact, and creating a user-friendly technological environment in the classroom.
- ▶ The difficulties faced in effectively using multimedia tools, managing projectors/smart boards, and encouraging students' participation through technology indicate the need for more practical and technical support.
- ▶ It was found that the use of instructional technology for building a classroom environment has a positive effect on classroom practice, especially in promoting critical thinking, active participation, and student collaboration.

- ▶ Digital assessment tools and technology-based lesson planning significantly increased teachers' confidence and the effective use of technological resources in the classroom.
- ▶ Some aspects of technology integration showed a negative relationship with classroom management, further indicating that prospective teachers sometimes had to face challenges in maintaining discipline during classroom activities.

Discussion of the Study

This study investigates the usage of instructional technologies for constructing an amiable classroom environment for prospective teachers attending B.Ed. courses. It was discovered how technology was being utilized in a true classroom and the impact it has on teaching practice, student communication, and classroom interaction. The methodology of the research adopted a quantitative approach; classroom observation was chosen as the only instrument used to collect actual teacher behavior and technological practice. The study concludes that the majority of prospective teachers use instructional technologies, particularly projectors, smart boards, and multimedia presentations, to enhance the teaching of concepts. Also, most teachers were able to sustain eye contact with the students and maintain positive classroom interaction, along with the use of instructional technologies. Although technology usage was common, in terms of pedagogical usage, technology was being utilized in a teacher-centered way, and student interaction and communication had been minimal, with very few instances where students had the opportunity to engage with technology. Students' involvement and usage in technology were not consistent, meaning they varied among teachers; some teachers encouraged their students, while a few did not at all, suggesting a gap between perceived importance and practical usage.

Findings in this study reflect a change in traditional methods of teaching, as many prospective teachers are now accustomed to using instructional technologies for classroom teaching. High percentage usage indicates growing importance of using such tools in the pre-service teachers' training programs, as in a teaching-learning scenario, it leads to improved instruction; though an underlying limitation has been uncovered that while it is widely used, technology in the classroom has remained largely teacher-centered, which is seen as a barrier to its actual potential to promote student interaction, collaborative, and higher-order thinking skills. The present findings are similar to existing studies, suggesting that mere access to the technology does not guarantee its effective pedagogy. However, a key factor found in the present study is that the teachers maintain good interaction while using technology; it is implied here that this does not mean the use of technology has changed. Students' engagement level using technology is relatively lower in the class, which means learning in a student-centered way is at its lowest. Furthermore, it is clear that the gap among different levels of teachers' awareness on technology usage depends on factors like their comfort and confidence level.

Recommendations

Based on the above findings and discussion, the following recommendations are made:

- ▶ Prospective teachers should be encouraged to take training that focuses on pedagogical usage of technology.
- ▶ Teacher education programs should emphasize student-centered pedagogy with technology to facilitate deeper learning through the use of educational technology.
- ▶ Provide access to technology infrastructure, tools, and equipment in classrooms for teachers to effectively implement pedagogical usage of technology.
- ▶ Continue the teacher professional development program to enhance the skills and awareness of teachers on the use of educational technologies.

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