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PRE-SERVICE TEACHERS' SELF-EFFICACY TOWARDS EDUCATIONAL TECHNOLOGY INTEGRATION

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Abstract
This research assessed the self-efficacy of pre-service teachers regarding the integration of educational technology. A quantitative research method with a descriptive survey design was used for the study. Data were gathered using a simple random sampling technique. The TPACK self-efficacy questionnaire instrument was employed to assess the perceived self-efficacy of pre-service teachers. Mean and standard deviation were computed to evaluate the degree of the practices. It was suggested that pre-service teachers should improve their knowledge and practices by promoting self-reflection, establishing achievable goals, offering constructive feedback, and fostering a supportive learning environment to enhance self-efficacy. Additionally, the TPACK framework should be utilized as a resource to facilitate effective technology integration and assess teachers' knowledge, thereby improving teacher education curriculums and increasing self-efficacy among pre-service teachers.

INTRODUCTION

Pakistan has emphasized the importance of improving technological integration in education as one of the most important concerns facing developing nations today. Many reasons prevent educational technologies from being fully incorporated into training programs for aspiring teachers, but efforts are made. It is impossible to integrate technology effectively and efficiently until educators start to adopt more positive attitudes regarding its use in their everyday teaching tasks (Aldhilan et al., 2025). The knowledge required for effective learning in connection with technology integration is student-centered and goes beyond the usage of technology tools offered by pedagogical theories and teacher education courses (Aldhilan & Rafiq, 2025). This type of understanding can only be attained by the individual instructor who is able to rethink technology to create new paradigms and act as a coach to pupils or a role model for colleagues. However, many pre-service teachers are frequently taught technical abilities using smartphones and other modern tools, as well as how to use them for academic purposes (Rafiq et al., 2024). Furthermore, a significant portion of today's pupils are growing incompetent and more untrained in using different instructional technology. It follows that teachers' proficiency with these technologies to improve instruction in classrooms should be commensurate with the needs of their students.

Self-Efficacy

An individual's assessment of their own capacity to plan and carry out the tasks necessary to attain optimal performance is known as self-efficacy. A high level of self-efficacy is linked to several good social,

physical, and psychological outcomes. According to Albert Bandura (1977), people's perceptions of their own abilities and the degree of risk they are willing to accept affect the kinds of performance they will engage in. He used the term "self-efficacy" to refer to a person's confidence in their ability to carry out a particular behavior.

According to Bandura (1977) self-efficacy is the belief in one's ability to plan and carry out the necessary actions to manage a possible circumstance. It is a subjective assessment of one's capacity to carry out a specific task. Efficacy has an impact on classroom engagement and learning (Afzal & Rafiq, 2022). Teachers who report feeling more effective both individually and as a group within the institution are more likely to enter the field, report feeling more satisfied with their jobs overall, show positive energy and motivation in their students, take on extra roles in their institutions, and be more resilient over the course of their careers (Labone 2004; Wheatley 2005).

TPACK framework

Pre-service teachers must be able to learn Technological Pedagogical Content Knowledge (TPACK) from their teacher education the educational program. The knowledge needed by educators to integrate technology with content and pedagogy is known as technological pedagogical content knowledge. According to Mishra and Koehler (2006), TPACK is a method of considering the information that educators must comprehend to successfully incorporate technology into their instruction. TPACK is a theoretical framework that describes instructors' proficiency in integrating information and communication. Thus, TPACK serves as a framework for characterizing and evaluating the degrees of expertise that educators possess in order to successfully integrate technology into teaching and learning.

Enhancing Self-Efficacy of Pre-service Teachers towards Technology Integration

Research indicates that pre-service teachers' self-efficacy towards integrating technology pedagogical practices can be enhanced through attending courses offering a combination of competence or simulated interactions with the application of technology. Giles and Kent (2016) used 28 pre-service teachers from a U.S. university's college of education to find out how confident preservice instructors were in their ability to incorporate technology into their lessons. Nearly all the participants (93%) integrated technology into their classes, according to the data, and most of them (68%) expressed great confidence in their capacity to choose and apply technology in the classroom. Additionally, 89% of participants said they could incorporate technology into the curriculum, and 80% said they could usually figure out why, when, and how. In the study (Yang, et., al 2024) investigated pre-service teachers' perceived difficulties integrating technology and how these relate to their self-efficacy. Pre-service teachers' perceived difficulties with applying theories and creating technology are negatively connected with their TI self-efficacy, whereas their perceived difficulties with differentiating students' needs and utilizing technology to support learning are positively connected. According to the findings, more educational materials ought to be created to assist aspiring instructors in identifying the needs of secondary pupils and coordinating TI with learning objectives. Additionally, lesson planning, technology evaluation training, and real-world TI examples should all be incorporated into future TI courses.



Figure 1. TPACK framework and its components (Koehler and Mishra 2009)

Theoretical framework

This research expands upon a theoretical framework that combines the values of social cognitive theory (SCT) and technology pedagogical content knowledge (TPACK). This framework's integration is essential for fully investigating the complex relationship between pre-service instructors' practice of integrated technologies and their level of self-efficacy.

Albion (2001) assessed teachers' self-efficacy in using computers at the start of the course and again after a semester in which some students had taken computer courses. The most significant contribution to the variation in computer-use self-efficacy at both the pretest and posttest was the quantity of time spent on computers. The impact of additional variables, like individual computer ownership and completion of computer courses, seemed to be exerted through changes in usage levels. Techniques are offered for teacher educators to try to boost students' self-efficacy by promoting computer use. A more thorough perspective on the incorporation of technology into education is also provided by the TPACK framework (Shafie et al., 2019). It highlights the critical relationship between pedagogical, technological, and content-related knowledge and argues that effective technology integration into education requires a sophisticated grasp of how these domains intersect (Santos and Castro, 2021).

A significant theoretical foundation for this proposed study is focused on clarifying the interrelated connections between self-efficacy and the pedagogical application of instructional technology provided by the mutual relationship between TPACK and SCT. Both the individual essentials of the educational process and the overall impact that arises from the intentional coordination of these components are considered by this integrated framework.

Research design

For achieving the objectives, a quantitative research design using a descriptive method was used to investigating the relations between aspects of self-efficacy and technology integration among pre-service teachers.

Research Questions

Q1. What is the extent to which pre-service teachers perceive the integration of technology in teaching and learning?

Q2. How does pre-service teachers' active participation in creating technology-enhanced learning affect their TPACK self-efficacy?

Data Analysis

The survey items were utilized to determine the extent of novice teachers practices for self-efficacy and technology integration on five-point Likert scale. Descriptive statistics were used to determine the mean and standard deviation, and the results obtained from quantitative data helped to explain the pre-service instructors that participated in this study.

Data Interpretation

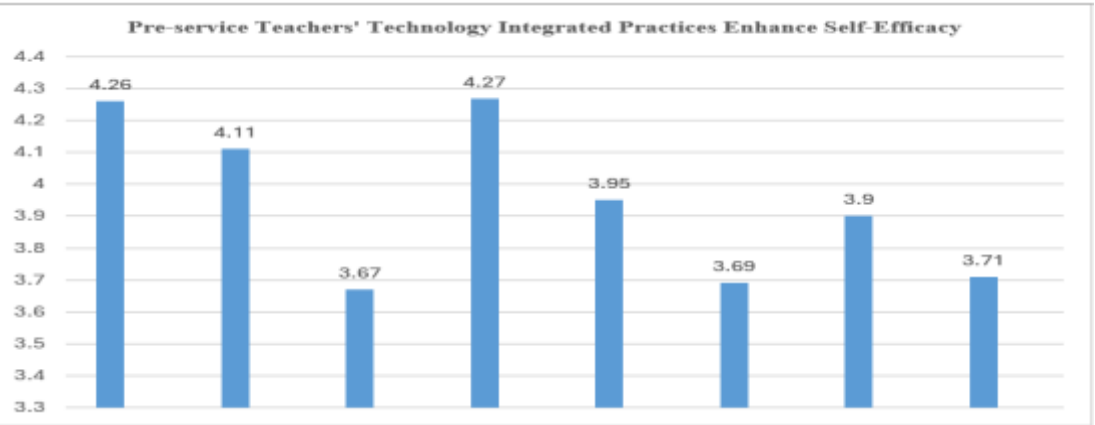


Table 1 Pre-service Teachers' Technology Integrated Practices Enhanced Self-efficacy

The highest mean values show that teachers have a high degree of self-efficacy in their ability to select instructional software that advances learning objectives. Such confidence, according to SCT, probably results from past successes or observed learning during training. Since the first step in successfully integrating technology is choosing the appropriate tool, this skill is fundamental to the TPACK paradigm. Additionally, this indicates a rising faith in the integration of technology and pedagogy, as well as Technological Pedagogical Knowledge (TPK). It indicates certainty that can arise from experience under guidance and modeling in teacher education programs, enhancing motivation and instructional style. The increased standard deviation and some mean to lower point differences allude to variations in administrative technology proficiency. Institution management systems might not be as familiar to pre-service educators, or they might be less user-friendly. Even if technical knowledge is there, SCT suggests that a lack of mastery experiences in this field may reduce self-efficacy.

Conclusion

It is concluded that to strengthen the technical and pedagogical integration of technology in institutions and to produce future teachers who are self-assured, capable, and creative, teacher education experiences must be practice-rich, reflective, and feedback-driven. Pre-service teachers could establish strong self-efficacy in fundamental instructional uses of technology (choosing tools, creating activities, and meaningfully integrating into ICT). Pre-service teachers must have high levels of self-efficacy in the areas that need improved facilitation skills (recordkeeping, student motivation, collaborative tech-based work) as well as instructional uses of technology (choosing tools, creating activities, and meaningfully integrating ICT). This pattern shows that although there is TPACK knowledge, there is still space for improvement in terms of its actual implementation, particularly in dynamic classroom environments (Rafiq et al., 2022).

Recommendation

- The need for integrating technology into education is growing because of the technologies that are increasing in the field of Education. The boards of education, policymakers, and stakeholders should be informed about this to provide curriculum reforms and technological infrastructure that keep up with the advancements in information and communication technologies to assist pre-service teachers develop a greater sense of self-efficacy.
- Teachers need to enhance their knowledge and practice by encouraging self-reflection, setting attainable objectives, providing constructive feedback, and creating a supportive learning environment to develop self-efficacy.
- Teachers can become more proficient in enhancing the teaching and learning environment by rewarding achievements, encouraging peer collaboration, and setting an example for students.

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