

Research Paper

Techno-Pedagogical Competency and Self-Efficacy among Senior Secondary School Teachers of Kashmir Division: A Correlational Study

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ABSTRACT

Due to the fast integration of digital technologies in education, teachers now need to have strong techno-pedagogical competencies and confidence in their abilities to successfully integrate technology into teaching-learning process. This study examined the relationship between techno-pedagogical competency and self-efficacy among senior secondary schools of Kashmir division. Standardized measures of teacher self-efficacy and techno-pedagogical ability were used to gather data from a sample of senior secondary school teachers using a descriptive correlational research methodology. The data was analyzed using descriptive statistics, and Pearson's product-moment correlation. The result of the study showed a statistically significant positive association between techno-pedagogical competency and self-efficacy indicating, teachers with higher levels of techno-pedagogical competency tended to show better confidence in their teaching abilities. The study emphasizes the value of institutional support, technology-focused training, and ongoing professional development in enhancing teachers' techno-pedagogical competencies which in turn can boost instructors' self-efficacy, encourage successful technology integration, and eventually lead to better instruction and better learning outcomes for students. The results have significant ramifications for school administrators, educational policymakers, and teacher education institutions when creating professional development initiatives that support the digital transformation of education.

Keywords: *Techno-pedagogical competency, teacher self-efficacy, technology integration, digital competence, professional development*

Techno-pedagogy is the successful fusion of pedagogy and technology to provide meaningful instruction. Teachers' techno-pedagogical skills, which allow them to employ digital technology beyond simple communication and presentation, are critical to its success. Proficient educators utilize technology to establish stimulating, cooperative, and student-focused settings that promote creativity, innovation, critical

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thinking, and problem-solving. (Pablo-Palacio, 2025; Fullan, 2019). The integration of technology into educational practices necessitates a robust understanding of techno-pedagogical competency among educators. (Yürek & Sözen, 2025) This competency, encompassing technological, pedagogical, and content knowledge, is increasingly recognized as a critical factor influencing various aspects of teaching, including self-efficacy (Kaşıcı & Selçuk, 2021). Specifically, the confluence of these domains' forms Technological Pedagogical Content Knowledge, which has been shown to significantly influence teachers' readiness and efficacy in digital learning environments (Oroh et al., 2025), drawing upon findings that highlight high levels of positive correlation between these constructs (Abbitt, 2011; Birişçi & Kul, 2019). A key factor in the successful adoption of ICT in education is teachers' technology integration self-efficacy, or their confidence in their capacity to use technology in the classroom. Research has indicated that although a large number of educators possess a fundamental understanding of computer usage, their capacity to incorporate technology into their lesson plans frequently requires ongoing involvement and focused professional development. (Gallagher, 2018; Christensen et al., 2018; Pablo-Palacio 2025). Building self-efficacy in technology integration is critical for teachers, as it directly impacts their effectiveness in creating an engaging and productive learning environment. For instance, studies indicate a strong positive correlation between various TPACK components and self-efficacy, underscoring the importance of confidence in managing technology-integrated instruction (Rani & Kaur, 2024). Such correlations are often rooted in self-report measures, which intrinsically reflect self-efficacy beliefs rather than direct performance, thereby inherently linking perceived capabilities in technological and pedagogical domains to overall teaching self-efficacy (Scherer et al., 2017). This integration is further bolstered by the belief that learning and utilizing technology is engaging, important, and beneficial, thereby strengthening their motivation to enhance their information technology integration abilities and achieve a higher level of TPACK (Zeng et al., 2022). Moreover, an increased understanding of TPACK domains has been consistently linked to elevated levels of pre-service teachers' self-efficacy concerning classroom teaching (Caeneko et al., 2020). This relationship is dynamic, with technological pedagogical knowledge and pedagogical content knowledge being strong predictors of overall TPACK self-efficacy beliefs, especially in pre-service teachers (Joshi, 2023). Specifically, confidence in one's ability to integrate technology effectively significantly predicts the overall TPACK of prospective teachers, accounting for over half of the variance (Zahwa et al., 2020). This underscores the notion that a teacher's belief in their capacity to effectively merge technology with pedagogical strategies is a critical precursor to their holistic techno-pedagogical competence (Kadioğlu & Oskay, 2023) Furthermore, research indicates that enhanced technological proficiency directly contributes to heightened self-efficacy among educators, subsequently increasing the likelihood of technology adoption in instructional settings (Batane & Ngwako, 2016). A significant positive association has been found between overall Technological Pedagogical Content Knowledge and teacher self-efficacy, with specific dimensions of TPACK such as technological pedagogical knowledge demonstrating a favorable relationship with core efficacy (Ke et al., 2026). This suggests that teachers who possess a strong understanding of how to integrate technology effectively into their pedagogical strategies tend to exhibit higher levels of general teaching confidence (Aksoy & Çetinkaya, 2024). This heightened confidence, in turn, influences their decisions regarding the adoption of technology in teaching practices and their future instructional approaches (Kuo & Kuo, 2023). This dynamic interaction posits that teachers' perceptions of their capacity to integrate technology effectively into their instruction are pivotal for both the development and practice of TPACK (Kazu & Erten, 2014). This theoretical framing

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aligns with Bandura's social cognitive theory, wherein an individual's confidence in their capabilities (self-efficacy) profoundly influences their motivation and behavior in navigating challenging situations, such as technology integration in the classroom (Karaduman & Akman, 2024). Teachers with higher self-efficacy are generally more inclined to develop their abilities, master teaching, and effectively manage technology-enhanced classrooms (Alrwaished, 2024; Suryawati et al., 2024).

LITERATURE REVIEW

The scholarly discourse extensively investigates the multifaceted relationship between techno-pedagogical competency, often conceptualized through the Technological Pedagogical Content Knowledge framework, and various dimensions of self-efficacy among educators (Hahn et al., 2022; Liu et al., 2024). A salient finding in this area is that teachers' self-efficacy regarding technology integration significantly influences the extent to which they incorporate technology into their lessons (Bwalya & Rutegwa, 2023). However, some studies indicate that despite high self-efficacy in TPACK, educators may still face challenges in distinguishing between various knowledge domains within the framework, suggesting a need for more integrated instructional approaches (Corry & Stella, 2018). This indicates a potential gap between perceived competence and nuanced application, necessitating educational strategies that not only foster self-efficacy but also refine the conceptual clarity of TPACK's constituent elements (Şimşek & Sarsar, 2019). Furthermore, addressing these distinctions through targeted professional development can enhance the practical application of TPACK, translating self-efficacy into observable instructional improvements (Mansour et al., 2024). Conversely, the absence of robust self-efficacy can impede the adoption of innovative teaching methods, even when teachers possess adequate content and pedagogical knowledge (Aina & Azeez, 2023). The efficacy of teachers in using information and communication technologies is a significant determinant of their actual ICT integration in the classroom, with higher self-efficacy correlating with increased intent to utilize technology (Diamah et al., 2022). This interconnectedness suggests a recursive relationship where improved technological skills lead to enhanced self-efficacy, which in turn motivates further engagement with technology for instructional purposes (Stapf & Martin, 2019). For example, authentic learning experiences that require preservice teachers to design and implement technology-enhanced lessons have been shown to significantly increase their confidence and perceived self-efficacy (Banas & York, 2014). This phenomenon is further elucidated by findings that ICT self-efficacy mediates the effects of university ICT support on preservice teachers' Technological Pedagogical Content Knowledge, highlighting its crucial role in translating institutional backing into practical competency (Qiong & Zhao, 2021). This implies that institutional support, while important, is filtered through the individual's belief in their ability to leverage technology effectively for educational purposes (Chandra & Lloyd, 2020).

Objective

- To find out correlation between techno-pedagogical competency and self-efficacy among senior secondary school teachers.

Hypothesis

- There are no significant correlation techno-pedagogical competency and self-efficacy of senior secondary school teachers.

METHODOLOGY

Research Design

This study used a descriptive-correlational design via quantitative approach using surveys to determine the techno-pedagogical competence and self- efficacy among senior secondary school teachers.

Population and Sampling

The research was conducted on government senior secondary school teachers of Kashmir division. The participants in this study were chosen from the target demographic using simple random sampling procedure. Every member of the population has an equal and independent chance of being chosen when using simple random sampling, a probability sampling technique. The relevant school authorities provided a list of government senior secondary school teachers from the chosen schools in the Kashmir Division, and a random selection process was used to choose the necessary sample of 200 teachers.

Tools Used in the Study

The tools used in this study were selected so that the researcher could be most confident in the course and actions they would take. Additionally, the researcher needs to be proficient with data collection instruments. After looking through several tools, the researcher used the following standardized instruments to collect the relevant and necessary data.

1. Teacher's Techno-Pedagogical Competence Scale developed and standardized by Rajasekar and Sathiyaraj (2013) was used to study the variable under investigation. The scale consists of 40 items categorized in four dimensions.
2. Self-Efficacy scale for teachers by Dr. Sushma Talesara and Dr. Farzana Irfan (2015) is a standardized scale to measure the self-efficacy of senior secondary school teachers. This scale consists 26 items divided into five dimensions.

Data Analysis

The collected data were coded and entered into the Statistical Package for the Social Sciences (SPSS) for analysis. Quantitative data was analysed using descriptive statistics including mean and standard deviation were computed to describe the level and inferential analysis, including Pearson's correlation, to investigate the relationship between techno-pedagogical competency and self-efficacy. Patterns were represented using frequencies and percentages.

RESULTS

Table 1 Demographic profile of Respondents

Total number	Variable	Category	Frequency	Percentage (%)
200	Gender	Male	106	53
		Female	94	47

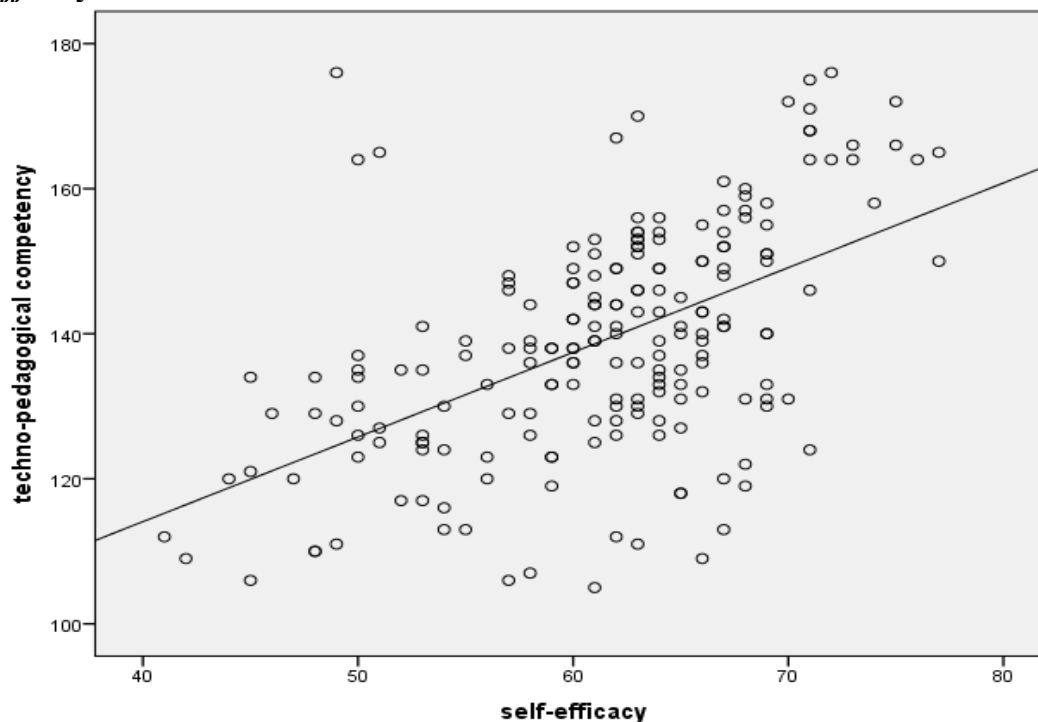
Table 2 correlation between techno-pedagogical competency and Self-Efficacy

Variable	Total Sample	r
techno-pedagogical competency	200	0.532**
Self-Efficacy		

***. Correlation is significant at the 0.01 level (2-tailed)*

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Figure 1 Scatter Plot of correlation between techno-pedagogical competency and Self-Efficacy



The result revealed that occupational stress and teacher effectiveness has significant negative relationship $r = 0.532$ which is significant at 0.01 level. scatter plot at figure also visualizes the gathering of maximum dots on and around the upward line of best fit. Which means increase in self-efficacy leads to increase in techno-pedagogical competency among senior secondary school teachers Therefore, Null Hypothesis there is no significant relationship between techno-pedagogical competency and Self-Efficacy got rejected.

DISCUSSION

The analysis of the collected data revealed a statistically significant positive correlation between educators' techno-pedagogical competency and their self-efficacy in technology integration, indicating that as one's mastery of TPACK domains increases, so does their confidence in employing these skills effectively. Specifically, higher scores on assessments of technological pedagogical knowledge, pedagogical content knowledge, and technological content knowledge were consistently associated with elevated self-efficacy beliefs regarding the implementation of digital tools and strategies in instructional settings. Furthermore, teachers exhibiting strong understandings of systematically designing courses and effectively utilizing technology for knowledge construction and concept learning also reported higher self-efficacy in guiding students through technology-enhanced learning (Sui et al., 2024). The observed strong positive correlation between techno-pedagogical competency and self-efficacy aligns with previous research highlighting the intertwined nature of skill development and belief in one's capabilities in technology-enhanced learning environments (Siddiq & Scherer, 2016). This congruence underscores the principle that heightened familiarity and proficiency with technological tools and pedagogical strategies foster a greater sense of confidence among educators, which in turn motivates them to integrate these advancements into their instructional practices more readily (Dikmen &

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Demirer, 2021). Conversely, teachers with robust digital skills exhibit increased confidence, leading them to proactively integrate digital tools and innovate teaching approaches (Mayantao & Tantiado, 2024). This interplay between competence and confidence is crucial for successful technology integration in education, as teachers who feel competent in using ICT for teaching purposes are more likely to emphasize fostering students' digital skills (Siddiq et al., 2015). Indeed, studies indicate that teachers who perceive themselves as digitally proficient tend to exhibit higher self-efficacy, leading to increased adoption and integration of technology in their classrooms (Anwar et al., 2025). This aligns with findings suggesting that digital literacy positively influences ICT self-efficacy, enabling more effective technology utilization across various educational settings (Zhao et al., 2025). The present study's findings are further supported by the Technology Acceptance Model, which posits that external factors, such as self-efficacy, significantly influence the perceived usefulness and ultimate adoption of technology, suggesting a direct link between a teacher's confidence and their intention to integrate digital tools in the classroom (Hebibi et al., 2025). Furthermore, self-efficacy significantly influences the attitudes, digital competence, digital tools utilization, and ICT integration of teachers currently in service, suggesting that low self-efficacy may lead to perceptions of ICT as difficult or less useful (Peng et al., 2023).

Educational Implications

The findings of the present study are expected to assist future policymakers and educational planners in strengthening techno-pedagogical competence, enhancing teacher self-efficacy, teaching-style, reduce anxiety towards use of instructional aids and promoting overall teacher effectiveness among senior secondary school teachers. Some of the educational implications of the present study are as follows:

- Improving teachers' digital and pedagogical skills can boost their confidence in using technology into classroom instruction, according to the strong positive correlation between techno-pedagogical competency and instructors' self-efficacy.
- To prepare future educators for teaching with technology, teacher education institutions should include thorough techno-pedagogical competency training in pre-service teacher education programs.
- Regular professional development programs, workshops, and practical training should be given to in-service teachers in order to improve their technology proficiency and teaching confidence.
- To enable successful technology integration, schools should guarantee the availability of sufficient digital infrastructure, such as computers, interactive smart boards, projectors, tablets, dependable internet connectivity, and instructional software.
- Educators should be encouraged to utilize digital platforms like DIKSHA, SWAYAM, PM eVIDYA, NISHTHA, Google for Education, Microsoft Learn, and Canva for Education in order to enhance their techno-pedagogical expertise and teaching methods,
- To boost teachers' self-efficacy, school administrators should foster a supportive learning environment by offering them opportunities for collaborative learning, technical help, and mentorship.

Suggestions for Future Research

Considering the results of the present study. The following suggestions must be taken into consideration while conducting any similar type of research in the present field of investigation. The following suggestions were recommended for the future researchers.

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- The study was confined to senior secondary school teachers of Kashmir division. similar study can also be done on the teachers working at primary level, secondary level, college level and university level.
- To improve the generalizability of the results, future researchers could repeat the study with larger samples, varying educational levels, and different geographic locations.
- Additional factors like digital literacy, teaching efficacy, work satisfaction, classroom motivation, organizational support, and instructors' attitudes toward technology may be investigated in future research.
- The long-term effects of techno-pedagogical competency training on teachers' self-efficacy and classroom performance may be examined through longitudinal and experimental research.

CONCLUSION

This investigation unequivocally demonstrates a robust and intricate relationship between techno-pedagogical competency and self-efficacy among educators, reinforcing the notion that these constructs are not merely correlated but mutually reinforcing components of effective technology integration in pedagogical practice. Specifically, enhancing teachers' technological competence can lead to higher technological self-efficacy, thereby increasing the effectiveness of educational technologies (Kocob et al., 2023). This symbiotic relationship is crucial for fostering an environment where innovative instructional strategies are not only embraced but also effectively implemented, thereby contributing to enhanced student learning outcomes. Therefore, educational policies and professional development initiatives should strategically target both the development of techno-pedagogical skills and the cultivation of self-efficacy beliefs to maximize the impact of technology on teaching and learning (Pečiuliauskienė et al., 2022). Such targeted interventions can empower educators to confidently navigate the evolving digital landscape, transforming challenges into opportunities for innovative pedagogical approaches (Robertson & Al-Zahrani, 2012). Moreover, while some studies indicate that a direct correlation between Technological Pedagogical Content Knowledge and self-efficacy may not always be straightforward, often mediated by perceived ease of use and usefulness of technology, the overarching consensus emphasizes the critical role of teacher confidence in adopting and integrating ICTs effectively in instruction (Andyani et al., 2020). This highlights the necessity for comprehensive training programs that address not only technical proficiency but also psychological factors influencing adoption, such as overcoming initial resistance and fostering a growth mindset (Putry et al., 2022). However, some studies suggest that while self-efficacy is a significant factor in technology integration, it may not always be a primary predictor of prospective ICT use, especially among pre-service teachers (Pozas & Letzel, 2021). However, the impact of professional development on teacher self-efficacy, particularly in the context of technology integration, warrants further exploration (Aljuzayri, 2021). For instance, continued research into various professional development models, such as those emphasizing exposure to best practices or regular in-servicing, could further elucidate their efficacy in enhancing teachers' self-efficacy perceptions for technology integration (Moore-Hayes, 2011).

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Conflict of Interest

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