Pakistan Journal of Distance & Online Learning
Volume: XII, Issue I, 2026, 1-18

Institutional Support and Teachers' Preparedness for Technology-Based Instruction: Evidence from Secondary School Level

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Abstract

The primary objective of the study was to explore institutional support and teachers' preparedness for technology-based instruction at school level in Punjab Pakistan. A sample of 627 teachers of secondary school was selected through a convenience sampling technique. Institutional Support Scale for Teachers (ISST) consisted of four dimensions: administrative and leadership support, technological infrastructure and physical support, digital resources access and professional development. Teachers' Preparedness for Technology-Based Instructions Scale (TPTIS) consisted of four dimensions: technological knowledge, pedagogical knowledge, digital instructional planning skills, and self-efficacy. Experts confirmed the content validity of ISST and TPTIS, and reliability was calculated employing Cronbach's alpha of .960 and .945, respectively. Pearson correlation and regression analysis were applied to analyze the collected data. The results of the study reported moderate levels of institutional support and teachers' preparedness. Pearson correlation analysis indicated a significant positive relationship between institutional support and teachers' preparedness ($r = .745$, $p < .01$). The study concluded that institutional support contributes in teachers' preparedness for technology-based instruction. It is recommended that the education department provide financial support and head teachers provide institutional support for availability and implementation of educational technology tools to promote technology-based instruction.

Keywords: Institutional support; teachers' preparedness; technology-based instruction

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Introductıon

The advancement of educational technology has increased the contribution of institutional support in preparing teachers for technology-based instruction, making it essential to examine how school heads facilitate teachers' readiness to integrate digital tools into the teaching learning process. International organizations have highlighted how digital tools in schools can improve educational quality and student outcomes in the twenty-first century (Antoninis et al., 2023; Li et al., 2023; OECD, 2021).

Institutional support refers to leadership facilitation in providing digital infrastructure and professional help to enable teachers to integrate educational technology in educational institutions. Dimensions of institutional support reported in literature were administrative and leadership support, technological infrastructure and physical support, digital resources access and professional development (Roshdy, 2026; Zhang et al., 2017). Institutional support includes efforts made by policymakers, educational authorities, and school heads to bridge technology integration in education. It includes administrative, technical, financial, and professional support systems that help teachers to use educational technology effectively. Administrative vision, organizational support, and training influence teachers' willingness to adopt technology-based competency and digital teaching methods. Schools that provide institutional support are more likely to have teachers who effectively utilize educational technology, implement innovative teaching strategies, and enhance students learning outcomes. S ustainable digital transformation requires coordinated policies and continuous institutional support rather than isolated technological investments (Ertmer & Ottenbreit-Leftwich, 2019; Hawkins et al., 2020; Scherer et al., 2019). Effective teacher preparation for technology-based instruction requires not only teachers' knowledge and skills, but also institutional support, resources, guidance, infrastructure, and professional development. Administrative support provides direction and encouragement to use available technology. Access to digital resources and professional development further enhance teachers' competencies. Institutional support is therefore essential for preparing teachers to integrate technology into their instruction (Davis, 2025; Li et al., 2023; Inan, & Lowther, 2010).

Teacher preparedness dimensions include technological knowledge, pedagogical knowledge, instructional planning skills, and self-efficacy. The technological knowledge refers procedural, conceptual and practical nature knowledge. Pedagogical knowledge is the understanding of teaching learning process. Instructional planning skills are the capabilities

necessary to plan, design, and implement for learning. Self-efficacy refers to beliefs about performing a specific task to achieve specific results. Teacher self-efficacy reflects their confidence in performing technology-related instructional tasks. It is a key predictor of their willingness to integrate technology during instruction (König et al., 2020; Scherer et al., 2019). Teachers with better technological self-efficacy are better technology tools implementer, overcome technological challenges, and apply technology-based instructional strategies effectively. Bandura (1997) claimed that individuals with strong self-efficacy beliefs suggest exhibiting greater persistence, motivation, and adaptability when facing challenges in new tasks. Technological, pedagogical knowledge, instructional planning, and self-efficacy highlight and support technology integration during instruction. Teachers develop comprehensive understanding of how technology meaningfully be integrated with pedagogy and subject content knowledge to enhance instructional effectiveness (Mishra & Koehler, 2006; Tondeur et al., 2017). Professionally trained teachers use suitable technological tools to foster online collaborative learning that supports critical thinking and problem solving. Such skills are essential in technology-based classrooms (DeCuir, 2024). Consequently, enhancing teacher preparedness through professional development, training opportunities, and institutional support remains a critical priority for educational institutions seeking to promote successful technology integration.

In the public sector, efforts are being made to promote technology integration in education in Pakistan. Such initiatives are being reflected in national education policies and digital learning programs implementation (Government of Pakistan, 2021). Despite multiple initiatives, public sector schools are facing challenges of inadequate infrastructure, limited internet connectivity and insufficient professional development opportunities for technology integration (Ali & Rafique, 2023; Davis, 2025).

Existing studies have assessed institutional support and teacher preparedness, focusing on technology integration in isolation from different perspectives (Akram et al., 2022; Wohlfart & Wagner, 2023). However, limited empirical evidence has explored dimensional measures of institutional support and teachers' preparedness. The present study addresses the gap by revealing four dimensions of institutional support: administrative and leadership support, technological infrastructure and physical support, digital resources access, and professional development; and four dimensions of teachers' preparedness: technological knowledge,

pedagogical knowledge, digital instructional planning skills, and self-efficacy in the secondary-school context of Punjab, Pakistan.

The study may provide evidence-based insights for educational policymakers regarding digital infrastructure, teacher training, technology support, and integration in secondary schools. The findings of the study are useful for school heads in preparing teachers for technology-based instruction regarding institutional support and resource allocation. The results of the study are supportive of teachers recognizing the importance of technology-based instruction and enabling support mechanisms. The findings further support the effectiveness of distance and online learning, as teachers increasingly employ digital resources, virtual platforms, and technology-supported instructional activities.

Literature Review

The literature review of the present study is grounded on institutional support with its dimensions, teachers' preparedness with its dimensions, and previous studies regarding institutional support and teachers' preparedness at the school level.

Institutional Support

Institutional support refers to administrative assistance in providing technological infrastructure, technical support, financial resources, professional development opportunities, and collaborative environments that enable teachers to effectively implement technology-based instruction in school (Hew & Brush, 2007). Institutional support influences teachers to adopt and implement technology-based instructional strategies in the classroom. Institutional support faces challenges related to infrastructure, resources, and implementation in developing countries like Pakistan (Amjad et al., 2025; Ertmer & Ottenbreit-Leftwich, 2019). The institutional support dimensions include administrative and leadership support, technological infrastructure and physical support, digital resources access, and professional development (Roshdy, 2026; Zhang et al. 2017).

Administrative and leadership support refers to school leaders' capacity to provide vision, guidance, encouragement, and resources for effective technology integration in schools (Fullan, 2007). School leaders ensure that students and teachers have the learning facilities, digital tools, and training needed to support effective teaching and learning. Supportive leadership positively influences teachers' technology use and preparedness (Ali & Rafique, 2023).

Technological infrastructure and physical support involve the availability, reliability, and usability of technological facilities such as computers, internet connectivity, projectors, and electricity, which are essential for technology-based instruction (Tondeur et al., 2017; Howard et al., 2021). Digital resources access includes the availability of e-books, learning management systems, multimedia materials, and online learning that support teaching learning activities. Access to quality digital resources is associated with innovation and effectiveness in instructional practices (Howard et al., 2021; Voogt et al., 2015).

Professional development is a process to acquire, refine, and enrich knowledge, skills, attitudes, and practices to improve teaching and student learning. It involves formal and informal learning opportunities that help teachers to enhance pedagogical approaches, curriculum changes, educational technology usage, and subject-matter knowledge. Teachers' professional development plays a critical role in enhancing teacher preparedness and facilitating effective technology integration in educational settings (Darling-Hammond et al., 2017; Scherer et al., 2019). The integration of these dimensions provides supportive learning environments that facilitate the incorporation of technology into instructional practices. However, the unavailability of certain resources may limit teachers' ability to use digital tools effectively, even when other forms of support are present (Hew & Brush, 2007; Fullan, 2007; Tondeur et al., 2017; Howard et al., 2021; Voogt et al., 2015; Darling-Hammond et al., 2017; Scherer et al., 2019).

Teachers' Preparedness

Teachers' preparedness for technology-based instruction refers to the knowledge, skills, competencies, attitudes, and confidence essential for teachers to integrate educational technology tools into teaching learning processes (Li et al., 2023; Tondeur et al., 2017). It involves teachers' readiness to use digital learning materials, online platforms, and educational software to enhance student learning outcomes. Teacher preparedness is influenced by both individual competencies and institutional support systems for effective teaching. Insufficient institutional support often results in resistance to technology adoption, lower confidence levels among teachers, and ineffective initiatives in implementing digital learning materials (Howard et al., 2021; König et al., 2020; Tondeur et al., 2017).

Dimensions of teachers' preparedness consisted of technological knowledge, pedagogical knowledge, digital instructional planning skills, and self-efficacy. Technological knowledge refers to teachers' ability to use digital technology equipment, software, and technological devices in

educational settings. This knowledge enables teachers to operate digital tools and access technological resources for instructional purposes. Pedagogical knowledge helps teachers select appropriate teaching approaches and integrate technology with instructional objectives. Teachers need to connect digital tools with suitable teaching methods to support meaningful learning experiences. The TPACK framework emphasizes the integration of technological and pedagogical knowledge in teaching (Mishra & Koehler, 2006).

Digital instructional planning skills refer to the abilities required to design, organize, and implement technology-based learning. These skills help teachers align digital tools with the curriculum, construct engaging instructional activities, and enhance student learning outcomes. In contemporary education, digital instructional planning is a critical competency for successful technology-based instruction (Mishra & Koehler, 2006; Voogt et al., 2015).

Self-efficacy refers to people's beliefs in their abilities to organize and execute required tasks to produce required results. It influences how people think, feel, and behave when facing challenges. Teachers' self-efficacy reflects their confidence in performing teaching tasks effectively. Teachers with higher self-efficacy are more willing to adopt innovative technology and persist in overcoming technological challenges (Bandura, 1997; Scherer et al., 2019; Tondeur et al., 2017). Bandura (1997) identified four basic sources of self-efficacy: mastery experiences, vicarious experiences, social persuasion, and physiological and emotional states.

These four dimensions work together to support teachers' preparedness for technology-based instruction. Technological knowledge enables teachers to operate digital tools, pedagogical knowledge helps them use these tools appropriately for teaching, digital instructional planning skills support the organization of technology-based learning activities, and self-efficacy strengthens their confidence in applying technology. Together, these dimensions provide a foundation for integrating educational technology into teaching and learning processes (Mishra & Koehler, 2006; Voogt et al., 2015; Bandura, 1997; Scherer et al., 2019; Tondeur et al., 2017).

Technology-based instruction refers to the use of digital technology and online learning platforms to facilitate the learning process. Modern education systems are increasingly leveraging digital technology and online platforms to enhance student engagement, promote collaboration, and support critical thinking among diverse learners (Antoninis et al., 2023; OECD, 2022). This transition highlights the importance of institutional support and teachers' preparedness for the effective

implementation of instructional technology (Trust & Whalen, 2020). Leadership support, adequate technological infrastructure, accessible digital resources, and continuous professional development opportunities for teachers are essential for successful implementation of technology-based instruction (Howard et al., 2021; Hawkins et al., 2020; Voogt et al., 2015).

Research studies on institutional support and teachers' preparedness for technology-based instruction

A study was planned by Mbona et al. (2026) to measure teachers' preparedness and technology usage influence in zimbabwe schools. The study was quantitative, correlational employed survey design. The sample of the study consisted of 59 teachers selected through stratified random sampling technique from public secondary schools. Structured questionnaire of Technology Acceptance Model (TAM) and Technological Pedagogical Content Knowledge (TPCK) were used to collect the data from respondents. Collected data were analyzed applying Spearman's correlation analysis. The results showed that teachers preparedness have moderate correlation with technology integration. The study concluded that teacher preparedness, positive attitudes, institutional support and availability of technological resources improve student engagement, conceptual understanding, learning experiences and academic performance.

A study was designed by Mpuangnan (2024) to analyze teachers' readiness and professional development for integrating technology in teachers' education in Ghana. A mixed-method approach was used to understand technology integration in education. The research followed a descriptive survey study design. Cluster and purposive sampling techniques were used to select a sample of 485 teachers' and16 principals for the study. The quantitative collected data were analyzed applying frequencies, percentages, and standard deviations. Inferential statistics of independent sample t-test, and Analysis of Variance (ANOVA) were used to measure differences in technology integration based on demographic variables such as gender, age, and work experiences. Thematic analysis was used to analyze qualitative data. The findings reported a moderate level of technology tools integration. The study concluded that effective technology integration involves institutional support, teacher training, and technological resources. The study recommended that educational authorities should provide regular technology-focused professional development programs, improve ICT infrastructure and provide resources for sustainable technology integration in school.

A study was framed by Ali et al. (2023) to reveal teacher perceptions about integrating technology in teacher education in Karachi, Pakistan. The sample of the study was selected through a convenience sampling technique. The data were analyzed using smart PLS. The results of the study revealed that technological knowledge and pedagogical knowledge of teachers' had a positive significant effect on teacher preparedness. The study recommended integrating the TPACK framework into teacher education, providing practical technology-based training and teacher supports to use technology tools in their teaching.

A study was designed by Fatima et al. (2025) to reveal the influence of technology tools integration on students' learning outcomes through traditional and technology instructional methods in three cities Lahore, Karachi, and Islamabad of Pakistan. A mixed-methods approach was used to explore phenomenon. The sample of the study consisted of 240 secondary school students, twenty-four teachers, and six school administrators from public and private schools selected through purposive sampling. The data were analyzed using quantitative and qualitative data analysis techniques. The quantitative data were analyzed through pre-test and post-test comparisons, descriptive statistics, significance testing ($p < .001$), the qualitative data of interviews and focus group discussions were analyzed through thematic analysis. The results revealed that students in technology-enhanced classrooms achieved significantly higher academic performance and demonstrated greater engagement than those receiving traditional instruction. The study recommended improving ICT infrastructure, providing teachers training, administrative support, and aligns technology teaching to enhance learning outcomes.

Previous studies reported that teacher's preparedness for technology integration is essential for improving teaching, student engagement, and learning outcomes. The studies stated that teachers recognize the importance of technology for instruction to enhance students' academic outcomes. However, effective technology integration face challenges of inadequate technology infrastructure, limited technical support, and insufficient professional development. Institutional support is essential for the successful technology implementation in educational settings. Moreover, institutional leadership support, technology availability, and facilities were identified as essential elements for promoting effective technology-based instruction. Overall, the literature suggests that successful technology integration depends not only on teachers' skills but also on the level of institutional support that facilitates technology-based instruction. This review provided a strong foundation for exploring the

relationship between institutional support and teachers' preparedness for technology-based instruction in schools.

Theoretical Framework

The current study is based on the Technological Pedagogical Content Knowledge (TPACK) framework of Mishra and Koehler (2006) and institutional support theory of Powell and DiMaggio (2012). TPACK offers strong foundation for probing institutional support, teachers' readiness, and technology-based instruction in teaching. TPACK highlights the aspects of teacher preparedness such as technological knowledge, pedagogical knowledge, and digital instructional planning skills. It is evident that teachers with a high level of TPACK can create more meaningful learning experiences through incorporating educational technology (König et al., 2020). This framework emphasized that teachers must be technologically competent and equipped with the ability to apply technology during educational practices in a way that supports students' learning. Institutional support theory (IST) of Powell and DiMaggio (2012) described the influence of organizational structure, norms, and policies on individual behavior. This theory stated that institutional support is an essential aspect in the development of teachers' instructional practices in terms of infrastructure, digital resources, and professional development. Teachers' technology use is not just their own technological proficiency but also institutional context (Ertmer & Ottenbreit-Leftwich, 2019). This study is supported by the TPACK-IST theoretical framework, which emphasized teacher preparedness and institutional support. Teacher preparedness is related to teachers' ability to develop and use pedagogical and technological knowledge. Institutional support refers to how organizational conditions, resources, leadership, and professional support shape teaching practices.

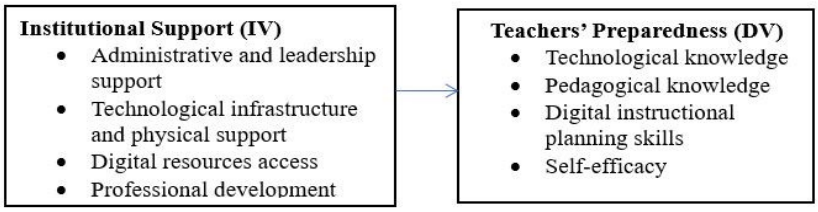


Figure 01. Conceptual framework of the study

Purpose of the Study

Objectives of this study were to:

1) Find out the existing level of institutional support and teachers' preparedness for technology-based instruction.

2) Determine the relationship between institutional support and teachers' preparedness for technology-based instruction.
3) Examine whether institutional support significantly predicts teachers' preparedness for technology-based instruction

Methodology

The current study is based on the positivist paradigm, quantitative, correlational, and survey design. The prime objective of the study was to determine the relationship between institutional support and teachers' preparedness for technology-based instruction in secondary schools. The population of the study consisted of public sector secondary school teachers working in Punjab. A sample of 627 teachers was selected through a convenience sampling technique from this population. Institutional Support Scale for Teachers (ISST) consisted of four dimensions: administrative and leadership support, technological infrastructure and physical support, digital resources access, and professional development, with 25 items.

The Teachers' Preparedness for Technology-Based Instruction Scale (TPTIS) consisted of four dimensions: technological knowledge, pedagogical knowledge, digital instructional planning skills, and self-efficacy, comprising 20 items. Research instruments of ISST and TPTIS were based on 5-point Likert scale options ranging from Never (1) to Always (5) to collect responses from teachers. A panel of experts evaluated the instruments to confirm their content validity, clarity, and relevance to the research objectives. The validity of ISST and TPTIS was ensured by five educational experts. Necessary revisions were incorporated to improve the quality of the questionnaires. The reliability was calculated employing Cronbach's alpha of ISST and TPTIS .960 and .945 respectively.

Ethical considerations of study informed consent, voluntary participation, and confidentiality were shared and assured with participants. An online Google Form link was shared in secondary school WhatsApp groups to collect data from respondents through a convenience sampling technique. Descriptive statistics of mean, and SD, and inferential statistics of Pearson product-moment correlation and regression analysis were employed to analyze the collected data.

Findings

The collected data were analyzed according to the objectives of the study using data analysis software of SPSS. Initially, the data were screened and coded to ensure accuracy. Pearson correlation was applied to

find out the relationship between institutional support and teachers' preparedness. Regression analysis was used to reveal the effect of institutional support on teachers' preparedness.

Table 01
Relationship between the dimensions of institutional support and teacher preparedness

Variables	1	2	3	4
Administrative and Leadership Supportive	-			
Technological Infrastructure and Physical Support	.550**	-		
Digital Resources Access	.523**	.794**	-	
Professional Development	.402**	.680**	.704**	-
Teachers' preparedness	.468**	.649**	.722**	.650**

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

Table 01 showed the relationships among the dimensions of institutional support and teachers' preparedness. The results indicated that four dimensions of institutional support have a significant positive correlation with teachers' preparedness at the 0.01 level. Administrative and leadership support showed a moderate and positive relationship with teachers preparedness ($r = .468$, $p < .01$). Technological infrastructure and physical support had substantial and positively associated with teachers preparedness ($r = .649$, $p < .01$). Digital Resources Access exhibited the strongest correlation with teachers preparedness ($r = .722$, $p < .01$), followed by professional development ($r = .650$, $p < .01$). Furthermore, significant positive correlations were observed among four dimensions of institutional support, indicating that improvements in one dimension were associated with improvements in the others. These results suggest that higher levels of institutional support are linked with greater teachers' preparedness.

Table 02
Relationship between institutional support and teachers preparedness

Variables	1	2
Institutional Support	-	
Teacher Preparedness	.745**	-

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

Table 02 displayed a strong significant relationship between institutional support and teachers preparedness ($r = .745$, $p < .01$). The correlation coefficient indicates that teachers who perceived higher levels

of institutional support also reported higher levels of preparedness. The results suggested that institutional support plays an important role in enhancing teachers' readiness to effectively perform their professional responsibilities in educational settings.

Table 03
Effect of all the dimensions of institutional support and teachers' preparedness

Dependent Variable	Independent	SE	B	T	P
Teachers Preparedness	Administrative and Leadership Support	.026	.097	3.05	.002*
	Technological Infrastructure & Physical Support	.038	.241	5.82	.01**
	Digital Resources Access	.037	.426	9.06	.000**
	Professional Development	.027	.253	6.57	.000**

Dependent Variable: Teachers Preparedness, R^2= .575

Table 03 showed that Administrative and Leadership Support had a weak and significant positive effect on teachers' preparedness (β = .097, SE = .026, t = 3.05, p = .002). Technological Infrastructure and Physical Support also had a weak and significant positive effect on teachers' preparedness (β = .241, SE = .038, t = 5.82, p = .001). Digital Resources Access had a moderate and positive effect on teachers' preparedness (β = .426, SE = .037, t = 9.06, p < .001). Likewise, Professional Development had a weak and significantly and positively affected teachers' preparedness (β = .253, SE = .027, t = 6.57, p < .001). The results indicate that all four dimensions of institutional support had moderate and positively influenced teachers' preparedness, with Digital Resources Access being the strongest predictor.

Table 04
Effect of all the dimensions of institutional support and teachers preparedness

Dependent Variable	Independent Variable	SE	B	T	P
Teachers Preparedness	Institutional Support	.032	.318	6.72	.000

Dependent Variable: Teachers preparedness, R^2= .561

Table 04 showed that institutional support had a moderate and significant positive effect on teachers' preparedness ($\beta = .318$, SE = .032, $t = 6.72$, $p < .001$). This finding indicates that higher levels of institutional support are associated with higher levels of teachers' preparedness.

Discussion

The study results showed that four dimensions of institutional support were moderately and positively and significantly associated with teachers' preparedness. Among the dimensions, digital resources access showed the strongest relationship with teachers preparedness ($r = .722$, $p < .01$), followed by professional development ($r = .650$, $p < .01$), technological infrastructure and physical support ($r = .649$, $p < .01$), and administrative and leadership support ($r = .468$, $p < .01$). These results indicate that increased institutional support is coupled with higher levels of teachers' preparedness for technology-based instruction.

The correlation analysis further revealed a strong and significant relationship between overall institutional support and teachers preparedness ($r = .745$, $p < .01$). This finding suggested that teachers who receive better institutional support tend to be better prepared to integrate technology into their instructional practices.

The multiple regression analysis showed that administrative and leadership support ($\beta = .097$, $p = .002$), technological infrastructure and physical support ($\beta = .241$, $p = .001$), digital resources access ($\beta = .426$, $p < .001$), and professional development ($\beta = .253$, $p < .001$) significantly predicted teachers preparedness. Among these predictors, digital resources access emerged as the strongest contributor to teachers' preparedness.

The regression analysis indicated that overall institutional support had a moderate and significant positive effect on teachers preparedness ($\beta = .318$, $t = 6.72$, $p < .001$). The findings demonstrate that institutional support is a significant predictor of teachers' preparedness and plays an important role in increasing teachers' preparedness for technology-based instruction.

The discussion part of the present study stated that this study was framed to determine institutional support and teachers' preparedness for technology-based instruction. The current study's overall correlation analysis results reported a strong positive relationship between institutional support and teachers preparedness ($r = .745$, $p < .01$), and the regression analysis indicated that institutional support had a significant positive effect on teachers preparedness ($\beta = .318$, $t = 6.72$, $p < .001$). The results of Mbona et al. (2026) study reported that teachers' preparedness has a moderate correlation with technology integration for classroom

instruction. The results of Mpuangnan's (2024) study reported that teachers' preparedness has a moderate level of association with technology tools integration. The results of Ali et al. (2023) stated that teachers' technology and technological pedagogical knowledge had a significant effect on teachers' preparedness. The reported study results were consistent with the present study. These findings emphasize the need to provide technology-based training, infrastructure, and technical resources to strengthen teachers' instructional practices and preparedness.

Conclusion

The study concluded that institutional support is a significant element influencing teachers' preparedness for technology-based instruction. Schools that provide institutional leadership support, technological infrastructure, physical facilities, and professional development to teachers are well-prepared to integrate technology into their instructional practices. Strengthening institutional support ensures the successful implementation of technology-based classroom instruction. Institutions that provide educational technology tools are more likely to enrich teachers' preparedness through knowledge, instructional planning, and self-efficacy in integrating technology. Based on the study's results, it is recommended that the education department provide funds for educational technology tools. Head teachers should support teachers in using accessible educational technology tools in classrooms and offer professional development to encourage technology-based instruction.

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