

Instructional Technology Awareness Among Prospective Teachers In The Era Of Digital Education

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Abstract

The present study investigated the level of awareness of instructional technology among prospective teachers and examined whether awareness differed with respect to selected demographic and academic variables. A normative survey method was adopted for the study. The sample consisted of 250 prospective teachers selected from teacher education institutions in Chennai and Tiruvallur districts using an appropriate sampling technique. Data were collected through a standardized Awareness of Instructional Technology Scale and the responses were analyzed using descriptive and inferential statistical techniques, including percentage analysis, mean, standard deviation, t-test and ANOVA. The findings revealed that the majority of prospective teachers possessed a moderate level of awareness of instructional technology. The study further indicated that locality, medium of study, academic stream and type of management showed significant differences in awareness, whereas gender did not have a significant influence. Urban students, English-medium students, Science stream students and students from private institutions demonstrated relatively higher levels of awareness than their counterparts. The study emphasizes the need to strengthen teacher education programmes through enhanced ICT training, practical exposure to instructional technologies and continuous professional development initiatives to prepare future teachers for technology-enabled teaching and learning environments.

Keywords: *Instructional Technology, Prospective Teachers, Teacher Education, ICT Awareness, Digital Competence, Educational Technology, Technology Integration, Digital Education*

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I. Introduction

The rapid digital transformation of education has fundamentally changed the way teaching and learning are designed, delivered and assessed. Contemporary educational environments require teachers to possess not only subject expertise and pedagogical competence but also the ability to integrate instructional technologies effectively into classroom practices. Instructional technology encompasses a broad range of digital tools, multimedia resources, learning management systems, artificial intelligence applications and interactive platforms that facilitate learner-centered instruction and improve educational outcomes. Following the experiences of online and blended learning during the COVID-19 pandemic, educational institutions across the world have increasingly emphasized technology-enabled teaching as an essential professional competency for future educators. Consequently, prospective teachers are expected to develop adequate awareness of instructional technology to enhance student engagement, promote collaborative learning and support personalized instruction in diverse educational settings. The present study is theoretically anchored in the Technological Pedagogical Content Knowledge (TPACK) framework proposed by Mishra and Koehler (2006), which argues that effective teaching with technology depends on the dynamic integration of technological knowledge, pedagogical knowledge, and content knowledge. The framework suggests that teachers' awareness of instructional technology forms the foundation for meaningful technology integration in classroom practice rather than merely possessing technical skills.

In addition to TPACK, the study is supported by the Technology Acceptance Model (TAM) developed by Davis (1989), which explains that individuals' acceptance and use of technology are primarily determined by their perceptions of its usefulness and ease of use. Applied to teacher education, TAM indicates that prospective teachers who recognize the educational value of instructional technologies and perceive them as accessible are more likely to adopt them in future teaching practices. Recent developments in educational technology-including artificial intelligence, augmented reality, virtual reality, adaptive learning systems, and cloud-based learning environments-have further highlighted the necessity of strengthening technological awareness among teacher trainees. However, previous research consistently reports that although prospective teachers generally exhibit positive attitude towards educational technology, their awareness and practical competence remain moderate due to limited training opportunities, inadequate technological infrastructure, and insufficient hands-

on experience. Therefore, examining the level of awareness of instructional technology among prospective teachers is essential for identifying existing gaps and informing teacher education institutions in designing effective technology-integrated training programmes that prepare competent educators for the digital era.

II. Review Of Literature

Recent studies have emphasized that awareness of instructional technology among prospective teachers is a crucial determinant of successful technology integration in classrooms. Instefjord, E. J. and Munthe, E. (2020) reported that although pre-service teachers possess basic digital competencies, they often lack the pedagogical knowledge required to integrate technology effectively into classroom instruction, highlighting the need for technology-rich teacher education programmes. Similarly, Schmid, M. et al. (2021), through a comprehensive meta-analysis, found that educational technology significantly enhances students' learning outcomes when teachers are adequately trained in its pedagogical application. Furthermore, Bond, M. et al. (2021) observed that the COVID-19 pandemic accelerated digital transformation in higher education, but disparities in digital competence and instructional technology awareness among pre-service teachers remained a major challenge. These findings collectively suggest that teacher education institutions must strengthen technology-oriented pedagogical training to improve future teachers' confidence and readiness for digital instruction.

Emerging evidence also indicates that awareness of instructional technology extends beyond digital literacy to include the ability to apply innovative technologies such as artificial intelligence, augmented reality, and virtual learning environments. Zhang, Y. et al. (2025) reported that while prospective teachers generally demonstrate satisfactory digital competence, they require systematic training in instructional design and technology-supported pedagogy to achieve sustainable educational practices. Likewise, Arini, F. et al. (2026) found that pre-service teachers exhibited positive attitudes toward AI-assisted instructional technologies but lacked practical classroom experience, recommending AI literacy programmes within teacher education curricula. Similarly, Küsel, J. et al. (2025) revealed significant differences in digital technology beliefs among German and American pre-service teachers, emphasizing that institutional support, digital infrastructure, and practical exposure substantially influence instructional technology awareness. Gurramkonda and Vanitha (2023) conducted a study titled 'Awareness on Assistive Technology among Pre-Service Teachers to Promote Inclusive Education' among Indian pre-service teachers using a descriptive survey method. The study found that prospective teachers possessed a moderate level of awareness of assistive technology, with no significant differences based on gender, pedagogy subject, or locality. However, participants reported limited classroom implementation due to inadequate practical training and exposure. The researchers recommended integrating assistive technology training into teacher education programmes to enhance inclusive teaching practices. These studies indicate that awareness, pedagogical competence and institutional readiness together determine the successful integration of instructional technology in teacher education.

III. Need And Significance Of The Study

In the present educational scenario, instructional technology has become an essential part of effective teaching and learning. Prospective teachers are the future educators who will be responsible for implementing modern teaching methods in classrooms. Therefore, it is necessary to study their level of awareness regarding instructional technology. Such a study helps in understanding how far student teachers are familiar with various digital tools, ICT resources, and modern pedagogical techniques. It also identifies gaps in their knowledge and skills, which may affect their ability to integrate technology effectively in teaching practices. The significance of this study lies in improving the quality of teacher education and preparing competent teachers for the digital age. By assessing the awareness of instructional technology among prospective teachers, teacher education institutions can identify areas that need improvement and design appropriate training programs, workshops, and ICT-based activities. This study also helps in promoting effective integration of technology in classrooms, leading to better student engagement and learning outcomes. Ultimately, it contributes to developing technologically skilled teaching practices.

IV. Objectives

1. To analyze the level of Awareness of Instructional Technology Teaching and Learning among Prospective Teachers.
2. There is no significant difference in Awareness of Instructional Technology among Prospective Teachers with respect to
 - (a) Gender
 - (b) Locality
 - (c) Medium of study
 - (d) Academic Streams

(e) Type of Management

V. Hypotheses

1. There is no significant difference in Awareness of Instructional Technology among prospective teachers based on gender.
2. There is no significant difference in Awareness of Instructional Technology among prospective teachers based on locality.
3. There is no significant difference in Awareness of Instructional Technology among prospective teachers based on medium of study.
4. There is no significant difference in Awareness of Instructional Technology among prospective teachers based on academic stream.
5. There is no significant difference in Awareness of Instructional Technology among prospective teachers based on type of management.

VI. Methodology Of The Study

Research Design

The study adopted a normative survey method, appropriate for describing existing conditions and examining relationships among variables in a large population.

Population and Sample

The population consisted of prospective teachers (B.Ed. student teachers) studying in Colleges of Education located in Chennai and Tiruvallur districts of Tamil Nadu. A sample of 250 prospective teachers was selected through stratified random sampling.

Instrumentation

Awareness of Instructional Technology Questionnaire (2024) was constructed and validated by Dr.P.Pachaiyappan. The question consists of 40 items, each to be rated on the five-point likert scale. Each statement has five options viz. Strongly Agree (SA), Agree (A), Undecided (UN), Disagree (DA) and Strongly Disagree (SDA) out of which one has to be selected. It has both positive and negative statements.

Reliability and Validity

- Test-retest reliability coefficient: 0.962
- Intrinsic validity coefficient: 0.980

These values indicate that the instrument possesses excellent reliability and validity.

Statistical Techniques Used

The collected data were analyzed using:

Mean and Standard Deviation, Independent sample t-test and One-way ANOVA.

VII. Data Analysis And Interpretation

Table 1: The level of Awareness of Instructional Technology among Prospective Teachers

Level of Awareness of Instructional Technology	Frequency	Percentage
Low	32	13.03
Moderate	162	64.90
High	56	22.07

From the above table results reveals that 13.03% and 22.07% student-teachers have low and high level of Awareness of Instructional Technology respectively and most of the Prospective Teachers have moderate level (64.90%) of Awareness of Instructional Technology.

Figure 1: The level of Awareness of Instructional Technology among Prospective Teachers

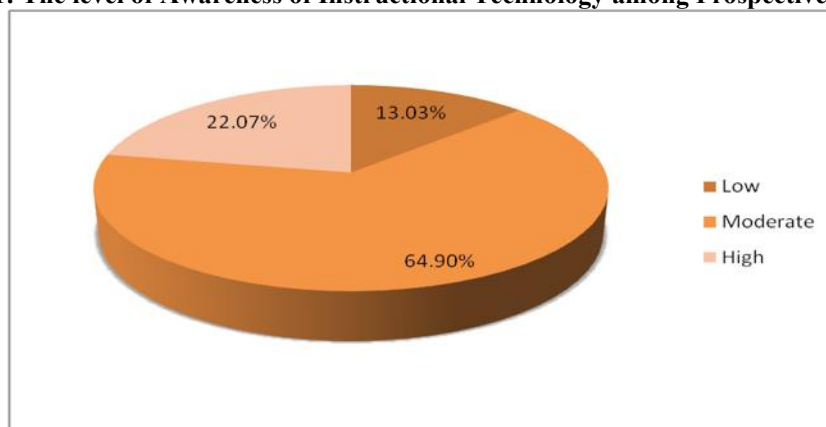


Table 2: Awareness of Instructional Technology among Prospective Teachers based on Gender

Gender	N	Mean	Std. Deviation	t-value	Level of Significance
Male	109	178.40	22.137	1.573	NS
Female	141	182.24	16.447		

From the above table, the calculated 't' value is 1.573 lesser than the table value (1.96). It is found that there is no significant difference between the male and female prospective teachers Awareness of Instructional Technology. Hence the null hypothesis is accepted.

Table 3: Awareness of Instructional Technology among Prospective Teachers based on Locality

Locality	N	Mean	Std. Deviation	t-value	Level of Significance
Rural	99	174.03	21.792	4.529	0.01
Urban	151	184.85	15.948		

From the above table, the calculated 't' value is 4.529 greater than the table value (2.58). It is found that there is a significant difference between the Rural and Urban prospective teachers with respect to Awareness of Instructional Technology. Hence the null hypothesis is rejected.

Table 4: Awareness of Instructional Technology among Prospective Teachers based on Medium of Study

Medium of Study	N	Mean	Std. Deviation	t-value	Level of Significance
Tamil	164	176.93	21.541	4.285	0.01
English	86	187.51	10.708		

From the above table, the calculated 't' value is 4.285 greater than the table value (2.58). It is found that there is a significant difference between the Tamil and English Medium prospective teachers with respect to their Awareness of Instructional Technology. Hence the null hypothesis is rejected.

Table 5: Awareness of Instructional Technology among Prospective Teachers based on the Academic Stream

Academic Stream	N	Mean	Std. Deviation	t-value	Level of Significance
Arts	141	176.12	22.279	4.312	0.01
Science	109	186.32	12.101		

From the above table, the calculated 't' value is 4.312 greater than the table value (2.58). It is found that there is a significant difference between the Arts and Science Stream prospective teachers with respect to their Awareness of Instructional Technology. Hence the null hypothesis is rejected.

Table 6: ANOVA for Awareness of Instructional Technology among Prospective Teachers based on Type of Management

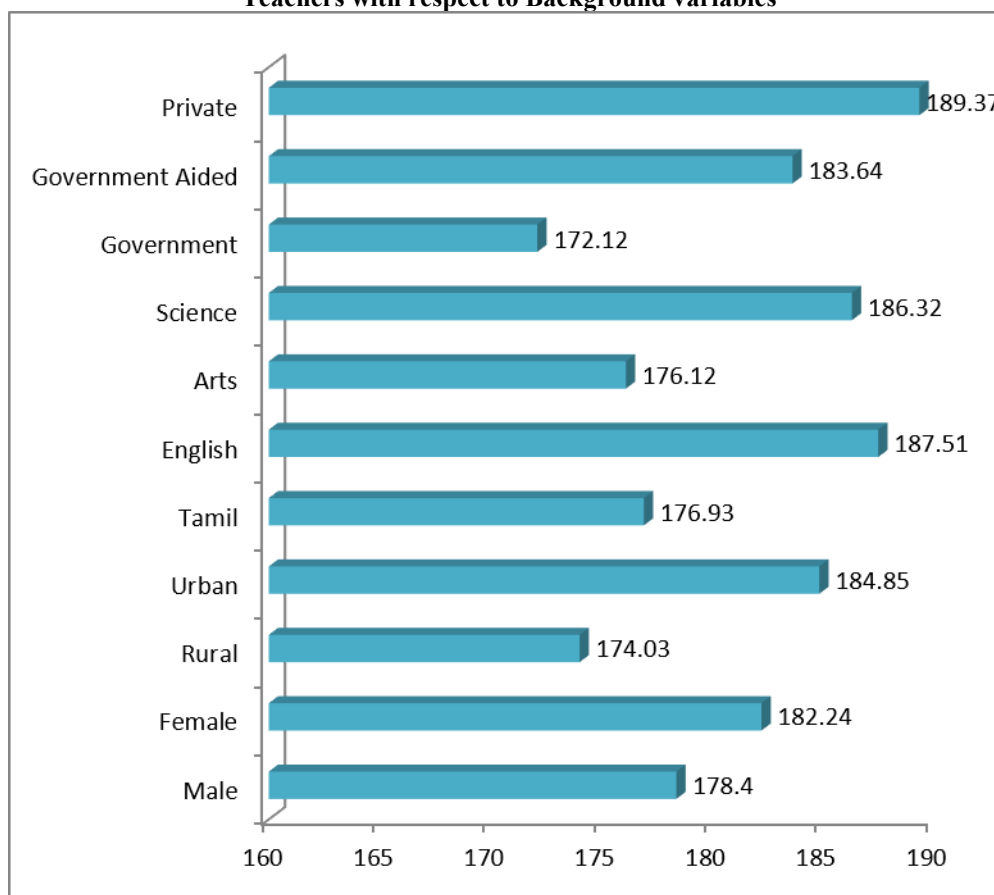
Attitude towards Integration of AR/VR	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12127.855	2	6063.927	18.823	0.01
Within Groups	79571.489	247	322.152		
Total	91699.344	249			

Table 6.1: Difference in the Awareness of Instructional Technology among Prospective Teachers based on Type of Management

Type of Management	N	Mean	F-value	Level of Significance
Government	95	172.12	18.823	0.01
Government Aided	98	183.64		
Private	57	189.37		

From the above table, the calculated 'F'-value is 18.823 greater than the table value (4.60). It is found that there is a significant difference among the Government, Government Aided and Private College B.Ed. prospective teachers with respect to their Awareness of Instructional Technology. Hence the null hypothesis is rejected.

Figure 2: Bar diagram shows mean values of Awareness of Instructional Technology among Prospective Teachers with respect to Background variables



VIII. Major Findings Of The Study

The major findings of the study on Awareness of Instructional Technology among Prospective Teachers are presented variable-wise as follows:

1. Level of Awareness of Instructional Technology

The study revealed that the majority of the prospective teachers possessed a moderate level of Awareness of Instructional Technology (64.90%). About 22.07% of the prospective teachers had a high level of awareness. Only 13.03% of the prospective teachers had a low level of awareness. Hence, it can be concluded that most of the prospective teachers have an average understanding and awareness of instructional technology.

2. Awareness of Instructional Technology based on Gender

There was no significant difference between male and female prospective teachers in their Awareness of Instructional Technology. Female prospective teachers obtained a slightly higher mean score than male prospective teachers. Therefore, gender does not significantly influence Awareness of Instructional Technology among prospective teachers.

3. Awareness of Instructional Technology based on Locality

A significant difference was found between rural and urban prospective teachers regarding Awareness of Instructional Technology. Urban prospective teachers secured a higher mean score than rural prospective teachers. Hence, locality has a significant influence on Awareness of Instructional Technology.

4. Awareness of Instructional Technology based on Medium of Study

There was a significant difference between Tamil medium and English medium prospective teachers in their Awareness of Instructional Technology. English medium prospective teachers had a higher mean score compared to Tamil medium prospective teachers. Thus, medium of study significantly affects Awareness of Instructional Technology.

5. Awareness of Instructional Technology based on Academic Stream

A significant difference was observed between Arts and Science stream prospective teachers in their Awareness of Instructional Technology. Science stream prospective teachers obtained a higher mean score than Arts stream prospective teachers. Therefore, academic stream significantly influences Awareness of Instructional Technology.

6. Awareness of Instructional Technology based on Type of Management

There was a significant difference among Government, Government Aided and Private college prospective teachers with respect to Awareness of Instructional Technology. Private college prospective teachers obtained the highest mean score, followed by Government Aided college students and Government college students. Hence, type of management significantly influences Awareness of Instructional Technology among prospective teachers.

IX. Educational Implications

The findings of the study have important educational implications for teacher education institutions, administrators and policymakers. Since the majority of prospective teachers possess only a moderate level of awareness of instructional technology, there is a need to strengthen technology integration in teacher education programmes. Institutions should organize workshops, seminars, training programmes and practical sessions to improve the technological competencies of prospective teachers. Teacher educators should also encourage the use of digital tools, multimedia resources, smart classrooms, and online teaching platforms during classroom instruction and teaching practice. The curriculum of B.Ed. programmes should be revised periodically to include recent developments in instructional technology and ICT-based teaching methods.

The study further revealed significant differences in awareness levels based on locality, medium of study, academic stream and type of management. Therefore, special attention should be given to rural institutions, Tamil medium students, Arts stream students and Government college prospective teachers by providing adequate technological facilities, internet access, and language-supportive instructional materials. Equal opportunities should continue to be provided for both male and female prospective teachers, as no significant gender difference was found. Overall, the study highlights the importance of creating a technology-rich learning environment in teacher education institutions to prepare prospective teachers for effective and innovative classroom teaching in the modern educational system.

X. Conclusion

The present study was undertaken to examine the Awareness of Instructional Technology among Prospective Teachers. The findings of the study revealed that the majority of the prospective teachers possessed a moderate level of awareness regarding instructional technology. The study also indicated that variables such as locality, medium of study, academic stream and type of management significantly influenced the awareness of instructional technology, whereas gender did not show any significant influence. Urban students, English medium students, Science stream students, and students studying in private colleges demonstrated higher awareness levels compared to their counterparts.

The study highlights the growing importance of instructional technology in the field of teacher education and emphasizes the need for providing adequate technological facilities, training, and exposure to prospective teachers. Effective integration of instructional technology in teacher education programmes can improve teaching competency, classroom interaction, and learning outcomes. Therefore, educational institutions, teacher educators and policymakers should take necessary steps to promote awareness and effective utilization of instructional technology among prospective teachers so that they can meet the demands of modern education and contribute to quality teaching and learning practices.

References

- [1]. Bond, M., Bedenlier, S., Marin, V. I., & Händel, M. (2021). *Emergency Remote Teaching In Higher Education: Mapping The First Global Online Semester*. **International Journal Of Educational Technology In Higher Education**, 18, 50. <https://doi.org/10.1186/S41239-021-00282-X>
- [2]. Gurramkonda, B., & Vanitha, C. (2023). *Awareness On Assistive Technology Among Pre-Service Teachers To Promote Inclusive Education*. *International Journal Of Current Educational Studies*, 2(2), 28–40. <https://doi.org/10.46328/Ijces.80>
- [3]. Instefjord, E. J., & Munthe, E. (2020). Educating Digitally Competent Teachers: A Study Of Integration Of Professional Digital Competence In Teacher Education. *Teaching And Teacher Education*, 67, 37–45. <https://doi.org/10.1016/J.Tate.2017.05.016>
- [4]. Küsel, J., Et Al. (2025). Investigating U.S. And German Pre-Service Teachers' Beliefs Regarding Digital Technology. *Education And Information Technologies*. <https://doi.org/10.1007/S10639-024-13147-5>
- [5]. Mishra, P., & Koehler, M. J. (2006). *Technological Pedagogical Content Knowledge: A Framework For Teacher Knowledge*. **Teachers College Record**, 108(6), 1017–1054. <https://doi.org/10.1111/J.1467-9620.2006.00684.X>
- [6]. Pachaiyappan, P (2022). Evaluation Of Techno-Pedagogical Skills Among Prospective Teachers. *International Journal Of Early Childhood Special Education*, 14(2), 2671- 2679. DOI: 10.9756/INT-JECSE/V14I2.252
- [7]. Scherer, R., Siddiq, F., & Tondeur, J. (2019). *The Technology Acceptance Model (TAM): A Meta-Analytic Structural Equation Modeling Approach To Explaining Teachers' Adoption Of Digital Technology In Education*. **Computers & Education**, 128, 13–35. <https://doi.org/10.1016/J.Compedu.2018.09.009>
- [8]. Schmid, M., Brianza, E., & Petko, D. (2021). Developing A Short Assessment Instrument For Technological Pedagogical Content Knowledge (TPACK.Xs) And Comparing The Factor Structure Of An Integrative And A Transformative Model. *Computers & Education*, 157, 103967. <https://doi.org/10.1016/J.Compedu.2020.103967>
- [9]. Tondeur, J., Scherer, R., Siddiq, F., & Baran, E. (2020). *Enhancing Pre-Service Teachers' Technological Pedagogical Content Knowledge (TPACK): A Mixed-Method Study*. **Educational Technology Research And Development**, 68, 3193–3212. <https://doi.org/10.1007/S11423-020-09803-4>
- [10]. Uerz, D., Volman, M., & Kral, M. (2018). *Teacher Educators' Competences In Fostering Student Teachers' Proficiency In Teaching And Learning With Technology: An Overview Of Relevant Research Literature*. **Teaching And Teacher Education**, 70, 12–23. <https://doi.org/10.1016/J.Tate.2017.11.005>
- [11]. Zhang, Y., Yang, X., & Zheng, L. (2025). Digital Competence For Sustainable Education Of Pre-Service Teachers: A Systematic Review. *Education And Information Technologies*. <https://doi.org/10.1007/S10639-024-13069-2>