Techno-Pedagogical Competency of Senior Secondary School Teachers in Bodoland Territorial Region (BTR), Assam

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Abstract: *This study explores the techno-pedagogical competency of senior secondary school teachers in Assam, the Bodoland Territorial Region (BTR). The study sample consisted of 100 senior secondary school teachers who were chosen using purposive sampling. To test the null hypotheses, data were collected using the Teachers' Techno-Pedagogical Competence Scale (S. Rajasekar and K. Sathiyaraj, 2013). The collected data scores were tabulated and analysed using the mean, percentage, SD, Z-score, t-test, and p-value to draw conclusions. The results of the present study are as follows: i) Regarding the level of teachers' techno-pedagogical competency, 1% was extremely high, 9% was high, 19% was above average, 45% was average, 10% was below average, 9% was low, and 7% was very low. ii) No statistically significant differences were found in techno-pedagogical competency between senior arts and science secondary school teachers. iv) Significant variation was found between urban and rural senior secondary school teachers in terms of techno-pedagogical competency. These results highlight the importance of ICT training in reducing regional differences and the need for continuous improvement.*

Keywords: Techno-Pedagogical Competency, ICT in Education, Senior Secondary School Teachers, Bodoland Territorial Region.

INTRODUCTION

The rapid development of Information and Communication Technology (ICT) in the twenty-first century has tremendously transformed communication in ways that were previously impossible. As the world is changing, so are students' needs. It is no longer enough to just study information but also to learn practical skills and a positive mindset to adjust to the modern world that is full of connections. Therefore, schools are transitioning from traditional to modern digital teaching techniques.

Techno-pedagogy is the meaningful integration of technology into educational theory and practice. It involves incorporating technology into the design of teaching and learning experiences to enhance learning outcomes, such as utilising the Internet for exploration and accessing information relevant to the teaching-learning process (Kumar, 2021). It also provides educational connectivity and relevant low-cost material to all teaching and learning groups. It focuses on how technology can successfully improve teaching strategies and learning outcomes, going beyond just employing digital tools. This approach requires educators' technological knowledge and pedagogical expertise, based on sound teaching principles and learning objectives.

It helps teachers teach with proper methodology, principles, and strategy (Sobha, 2021). Today, education is more creative, engaging, collaborative, and personalised because of these developments and expansions. Therefore, teachers must use technology in their classroom to assist students in achieving their future endeavours and to prepare them for the problems of the twenty-first century.

OBJECTIVES OF THE STUDY

I. To study the techno-pedagogical competency of senior secondary school teachers in the Bodoland Territorial Region (BTR), Assam.

II. To compare the techno-pedagogical competency of senior secondary school teachers in the Bodoland Territorial Region (BTR), Assam, in relation to stream (Art/Science).

III. To compare the techno-pedagogical competency of senior secondary school teachers in the Bodoland Territorial Region (BTR), Assam, in relation to location (Rural/Urban).

HYPOTHESES OF THE STUDY

$H0_1$: There is no significant difference in techno-pedagogical competency in relation to stream Arts and Science senior

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secondary school teachers in Bodoland Territorial Region (BTR), Assam.

$H0_2$: There is no significant difference in techno-pedagogical competency between rural and urban senior secondary school teachers in Bodoland Territorial Region (BTR), Assam.

REVIEW OF RELATED LITERATURE

Bhutia, T. D., & Tamang, A. (2025) conducted a study of PGT teachers' effectiveness at government secondary schools in Sikkim with techno-pedagogical skills. The analysis of the data revealed that gender and geographical differences did not significantly affect teacher effectiveness and techno-pedagogical skills. All cases showed a significant correlation between techno-pedagogical skills and teacher effectiveness.

Ering, O. & Ering, M. (2025) conducted a study on secondary school teachers' techno-pedagogical competency in the East Siang district of Arunachal Pradesh. The findings of the study revealed that the majority of secondary school teachers' techno-pedagogical competency was below average (46% and 31%, respectively), and no statistically significant difference was found between male and female secondary school teachers in techno-pedagogical competency. However, a significant gap was found between urban and rural secondary school teachers in terms of techno-pedagogical competency in this area.

Hajam, K.H. (2024) carried out a study on a doctoral thesis on techno-stress and techno-pedagogical competence among PGT teachers of Kashmir Valley. The findings of the doctoral study revealed that the majority of PGT teachers showed moderate to low levels of techno-pedagogical competence, and male/urban teachers had more techno-pedagogical competence than female/rural teachers.

Malla, H. A. & Mattoo, M. I. (2022) conducted a study to find out the influence of gender and stream on techno-pedagogical competence among PGT teachers: a post-Covid-19 perspective. The results of the study showed that there was a substantial statistical difference in techno-pedagogical competence between male and female PGT teachers, but there was a significant relationship between teachers teaching art, science, and commerce.

SIGNIFICANCE OF THE STUDY

Techno-pedagogy, an ongoing topic in education, envisions personalised and collaborative learning. Research suggests that teachers' techno-pedagogical competency significantly impacts students' academic achievement (Terzi, 2020). The Bodoland Territorial Region (BTR) is an important region of Assam, India. In this region, 31% of the population is Scheduled Tribes, 69% is non-Scheduled Tribes (Census, 2011), and many areas are considered backward. In this diverse educational landscape in the BTR, Assam, where access to quality education may vary, it is imperative to investigate this relationship. ICT has substantial potential to contribute to quality education (Saha, 2020). Understanding the level of a teacher's techno-pedagogical competency is essential because of the region's specific sociocultural setting. This study sought to analyse the effectiveness of pedagogical approaches that meet regional requirements and the role of technology in addressing educational disparities. Deb et al. (2023) identified significant differences in TPACK awareness among teachers in Barak Valley, Assam.

The findings of this study will guide policymakers and educational stakeholders in disseminating educational policies suited to the specific needs of the BTR region, Assam, and in encouraging equity in education.

STATEMENT OF THE PROBLEM

"Techno-pedagogical Competency of Senior Secondary School Teachers' in Bodoland Territorial Region (BTR), Assam"

OPERATIONAL DEFINITION OF THE TERMS

I. Techno-pedagogical competency: Operationalized as scores on a standardized Teacher's Techno-Pedagogical Competence Scale **(**TTPCS) developed by S. Rajasekar and K. Sathiyaraj, 2013. Higher scores indicate higher levels of competence.

II. Senior secondary school: Senior secondary school means Class 11th and 12th standard schools in the Bodoland Territorial Region (BTR), Assam.

RESEARCH DESIGN AND METHOD

Main aim of the present investigation is to analyse the techno-pedagogical competency of senior secondary school teachers in Assam, the Bodoland Territorial Region (BTR). Therefore, the investigator decided to use a descriptive research design and survey method. This is the most popular and economical research method. Hassan (2024) descriptive survey method aims to observe and describe phenomena as they naturally occur, without manipulating variables.

POPULATION OF THE STUDY

The target population included all senior secondaryschool teachers from 16 selected government and provincial schools in the Bodoland Territorial Region (BTR) in Assam.

SAMPLE AND SAMPLING TECHNIQUE

The present study selected 100 teachers from 16 senior secondary schools using the purposive sampling technique. It is a method of non-probability sampling in which respondents are selected purposefully, who may provide an opinion on the research question (Creswell, 2014). Teachers were selected from arts and science streams, working in selected schools, who were present in the school at the time of data collection.

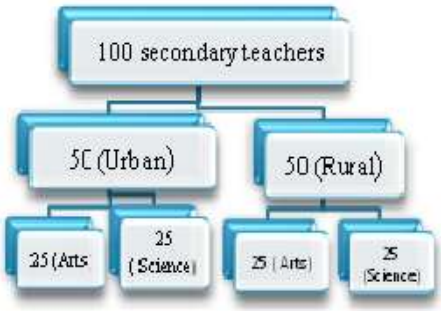

Figure1 Sampling flowchart of Teachers

TOOL TO BE USED

The Teachers' Techno-Pedagogical Competency Scale **(**TTPCS) was used for data collection. The scale was developed and standardized by S. Rajasekar and K. Sathiyaraj and published in 2013. This scale consists of 40 items with four headings: i) Technology used to prepare the lesson. ii) Technology used to motivate students. iii) Technology used in the presentation. iv) Technology in evaluation. Each statement was set against a five-point rating scale with weights of 5, 4, 3, 2, and 1.On this scale, the validity was 0.91, and the reliability was 0.82.

PROCEDURE OF DATA COLLECTION

The tool has only been administered on school days. Before administering the questionnaires, the investigator visited the institution to discuss the main purpose of the study with the authorities and sought permission for data collection. The investigator developed excellent rapport with the incumbent schoolteachers and was taken into confidence by saying that their information given by them would be strictly kept private and confidential, as well as exclusively used for research purposes only.

DATA ANALYSIS AND DISCUSSION

Table 1 Normality test of teachers' techno-pedagogical competency (TTPC) scores.

	Shapiro-Wilk		
	Statistic	Df	Sig
Urban TTPC Scores	0.982	50	0.618
Urban TTPC Scores	0.959	50	0.081

Þ>0.05 accepted (Normally distributed

Table 2 Norms for Interpretation of the level of TTPC

SL. No.	Z-score	Grade	Level of Competency
1	+ 2.01 and above	A	Extremely High
2	+1.26 to + 2.00	B	High
3	+0.51 to +1.25	C	Above Average
4	-0.50 to +0.50	D	Average
5	-0.51 to – 1.25	E	Below Average
6	-1.25 to -2.00	F	Low
7	-2.01 and below	G	Extremely Low

Table 3 Percentage Wise Distribution of (N=100) Samples on Different Levels of TPC.

SL. No.	Level of TPC	N	Percentage
1	Extremely High	1	1%
2	High	9	9%
3	Above Average	19	19%
4	Average	45	45%
5	Below Average	10	10%
6	Low	9	9%
7	Extremely Low	7	7%
Total		100	100%

Note: Table 4.1.2 shows the percentage-wise distribution of (N=100) samples on different levels of TPC of SSS teachers. Of the 100 samples, 1% were extremely high, 9% were high, 19% were above average, 45% were average, 10% were below average, 9% were low, and 7% were extremely low.

$H0_1$: There is no significant difference in techno-pedagogical competency in relation to stream Arts and Science senior secondary school teachers in Bodoland Territorial Region (BTR), Assam.

Table 4, "Significant Difference in Mean Between Arts and Science Senior Secondary School Teachers", presents data on techno-pedagogical competency.

Stream	N	Mean	SD	df	t	p	Remark
Arts	56	105.46	28.02				
Science	46	112.54	23.51	98	-1.35	0.18	NS*
Total	100	218	51.53				

**Not Significant at both level (2-tailed)*

Note. The findings are shown in Table 4.1.3, where the t-value = -1.35, $p > 0.05$. There was no significant mean difference between arts senior secondary school teachers (M=105.46, SD=28.02) and science senior secondary school teachers (M=112.54, SD=23.51). Therefore, (H01) is accepted and is insignificant at both levels of significance. Malla, H. A., & Mattoo, M. I. (2022), concluded that there was a significant relationship between senior secondary teachers teaching art, science, and commerce.

$H0_2$: There is no significant difference in techno-pedagogical competency between rural and urban senior secondary school teachers in Bodoland Territorial Region (BTR), Assam.

Table 5 "Significant difference in mean TPC between urban and rural senior secondary school teachers

Location	N	Mean	SD	df	t	p	Remark
Urban	50	108.92	23.81				
Rural	50	96.32	28.94	98	2.38	0.019	S*
Total	100						

**Significant at 0.05 level (2-tailed)*

Note. The results are shown in Table 4.4. The p-value (0.019) is less than 0.05, so the null hypothesis (H03) is rejected, indicating significance at the 0.05 level. Ering, O., & Ering, M. (2025) concluded that there is a significant gap between urban and rural secondary school teachers in techno-pedagogical competency in the East Siang district of Arunachal Pradesh, India.

MAJOR FINDINGS OF THE CURRENT STUDY

I. The level of TTPC found that 1% is extremely high, 9% is high, 19% is above average, 5% is average, 10% is below average, 9% is low, and 7% is extremely low (Table 1).

II. No statistically significant differences were found in TPC between arts and science senior secondary school teachers (Table 4).

III. A significant variation was found between urban and rural SSS teachers in TPC in the study sample (Table 5).

DISCUSSION AND CONCLUSION

Today is a digital world; in the digital world, Information and Communication Technology (ICT) plays a crucial role for quality education. This can make education more personalised, collaborative, and easier to learn and teach. According to the results of the study, average and above-average (19%, 45%) levels of techno-pedagogical

competence (shown in Table 3) were exhibited, signifying further improvement. No identical differences were found across streams and sexes, similar to prior findings by Bhutia and Tamang (2025). However, urban teachers exhibited better competency than rural teachers, according to the patterns found by Hajam (2024). These results highlight the importance of customised ICT training to address regional differences and the need for continuous improvement.

RECOMMENDATIONS

The results recommend organising regular need-based ICT and techno-pedagogical training programs for SSS teachers in the BTR and Assam. Policymakers and educational stakeholders should upgrade their digital infrastructure and offer opportunities for ongoing professional development to enhance teachers' TPC.

This study has a number of limitations.First, the small sample size (100) of 16 senior secondary schools in BTR, Assam, limits the generalisability of our results. Second, there was only one variable, Techno-Pedagogical Competency (TPC). Finally, this study is confined to government and provincialized senior secondary schools only.

Future studies should include a larger sample across different regions and educational levels. Longitudinal and experimental studies should be conducted to examine the impact of ICT training on teachers' techno-pedagogical competence and student achievement.

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