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TECHNO PEDAGOGICAL COMPETENCY OF SECONDARY SCHOOL TEACHERS IN EAST SIANG DISTRICT OF ARUNACHAL PRADESH

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Abstract

The 21st-century education landscape is undergoing rapid transformation driven by technological advancements. In this evolving scenario, teachers are expected to possess not only content and pedagogical knowledge but also techno-pedagogical competencies the ability to integrate technology meaningfully into the teaching-learning process. This study explores the techno-pedagogical competency of secondary school teachers in the East Siang district of Arunachal Pradesh, examining how effectively they utilize digital tools to enhance instruction and student engagement. With the National Education Policy (NEP) 2020 emphasizing technology-enabled education, this research becomes crucial in understanding local implementation challenges and opportunities. The findings aim to inform teacher training, professional development programs, and policy frameworks to ensure equitable and effective technology integration in classrooms.

Keywords: *Techno-pedagogical competency, Secondary school teachers, NEP 2020, Teacher training, Arunachal Pradesh*

Introduction

Education is a powerful tool for personal growth, social development, and national progress. It shapes individuals and societies, fosters critical thinking, and nurtures emotional and intellectual maturity. The National Education Policy (2020) asserts that education is fundamental for realizing human potential, building a just society, and driving national development. As education evolves from traditional classroom models to more dynamic, technology-integrated platforms, the role of teachers becomes increasingly complex and vital.

In the current digital era, marked by rapid scientific and technological advancement, the educational landscape is witnessing unprecedented changes. According to Banathy and Jenks (1993), public education has undergone successive waves of reform in response to changing social and technological contexts. Today, the integration of technology in education is not just a trend but a necessity. It reshapes instructional methods, enhances student engagement, and bridges gaps in access and equity.

Teachers are now required to adapt to these changes by developing techno-pedagogical competencies a blend of technological proficiency, pedagogical understanding, and content expertise. As noted by Selwyn (2012) and Quashi & Jan (2022), the role of technology in education is no longer peripheral; it is central to how knowledge is constructed and disseminated. Especially in remote and diverse regions like East Siang district of Arunachal Pradesh, assessing the techno-pedagogical competencies of teachers provides insight into the readiness and effectiveness of educational transformation at the grassroots level.

Rationale of the Study

The rapid advancement of educational technology has significantly transformed the teaching-learning process, making techno-pedagogical competency a critical requirement for modern educators. According to Quashi and Jan (2022), the traditional "chalk and talk" method is being replaced by digital instruction, expanding the capabilities of teachers and enriching the information base of students. In today's technology-driven world, where students are deeply immersed in digital environments, the ability of teachers to integrate ICT tools effectively into pedagogy is essential for improving student engagement, fostering digital literacy, and developing critical thinking skills. Therefore, this study seeks to evaluate the techno-pedagogical skills of secondary school teachers, particularly as they play a foundational role in shaping students during a crucial developmental phase.

In regions like East Siang district of Arunachal Pradesh, where geographic and infrastructural challenges persist (Barman, 2023), it becomes even more important to assess teachers' preparedness to incorporate technology into education. The effective use of ICT not only enhances classroom instruction but also addresses broader educational equity issues. Furthermore, teachers must be equipped to guide students on the safe and responsible use of technology, countering risks such as cyber threats and digital distractions. As NEP 2020 advocates for technology-integrated learning, studying the actual competency levels of teachers in such remote regions will offer valuable insights for designing localized training programs, educational policies, and support systems.

Previous research on techno-pedagogical competencies across India and elsewhere has explored variables such as teaching experience, gender, subject area, and school location. Studies by Kumar (2018), Guru & Beura (2019), Sindhwani (2019), Baregama & Arora (2021), and others have shown varying levels of competency and influencing factors. While some reported significant differences based on demographic factors, others found no such variations. However, no specific study has yet focused on secondary school teachers in East Siang, making this research both timely and regionally significant. The findings will contribute to improving teacher effectiveness, informing policy decisions, and ultimately enhancing the quality of education in Arunachal Pradesh in the digital age.

Review of related literature

Ibrahim (2017) found a positive relationship between pre-service teachers' techno-pedagogical competency and their proficiency in technology-enhanced material development. Enhanced techno-pedagogical skills led to improved material development competency.

Incik & Akay (2017) Using mixed methods, the study revealed that pre-service teachers perceived educational technologies as useful tools for enhancing learning, presentation, and material development. Gender and subject-wise differences in perception were observed.

Baby and Sareef (2018) assessed the techno-pedagogical attitude and digital literacy of 360 secondary school teachers in Kerala. It found varied levels of both traits and a moderate positive correlation between them. While techno-pedagogical attitude did not vary by gender or school type, digital literacy differed based on gender and school locale.

Habib (2018) investigated the impact of techno-pedagogical competency on teacher effectiveness among 400 senior secondary teachers in Jammu and Kashmir. The results showed that teachers with higher techno-pedagogical competence were more effective in teaching, with a positive correlation between the two variables.

Guru and Beura (2019) explored the relationship between teacher's techno-pedagogical competency and student's academic achievement in science. Urban teachers had higher competency than rural ones due to better resources, and a positive relationship was found between teacher competency and student performance.

Sindhwani (2019) examined techno-pedagogical competency in relation to gender, academic stream, and teaching experience among 160 senior secondary teachers in CBSE schools of Haryana. Significant differences were observed based on gender, stream, and experience, with male, science, and less experienced teachers showing higher competency. However, some interaction effects among variables were not significant.

Baregama and Arora (2021) assessed techno-pedagogical content competency among 600 secondary school teachers in Tonk district. The study found no significant difference based on gender and type of school, but competency varied significantly by school location.

Sobha (2021) explored techno-pedagogical competency in relation to teaching style and effectiveness among private senior secondary teachers. It found no significant differences based on gender, stream, or experience but revealed a strong positive correlation between techno-pedagogical competency, teaching effectiveness, and teaching styles.

Kalaimani and Stephen (2022) studied the TPACK (Technological Pedagogical Content Knowledge) of 30 high school teachers in Chennai. Findings showed moderate competency levels with no significant differences based on gender or subject stream.

Qurashi and Jan (2022) studied the techno-pedagogical competency among 600 teachers in Kashmir, the study found that private school teachers demonstrated significantly higher techno-pedagogical competence

than government teachers. Most teachers showed average competency levels, with a notable urban-rural and school-type divide.

Thappa and Baliya (2022) Surveying 47 teachers post-Covid, this study found significant gender-based differences in techno-pedagogical competency. However, professional qualifications and experience did not significantly affect competence levels.

Karthiyayini and Rani (2023) investigated the relationship between techno-pedagogical competency and awareness on the use of technology among higher secondary school teachers in Chengalpattu district. Using Rajasekar and Sathiyaraj's (2013) scale along with a self-made awareness questionnaire, it found a significant correlation between competency and awareness, with no significant differences based on gender, subject, or institution type.

Sachan and Dwivedi (2023) Focused on secondary school teachers in Greater Noida and Ghaziabad, the study assessed digital competence and techno-pedagogical skills. Tools were investigator-developed. Findings showed no significant differences in these skills based on gender, residence, experience, or subject specialization, indicating a uniform skill level across demographics.

Biswas and Sankar (2024) explored teacher's intuition towards Transformative Techno Pedagogy (TTP) in Arunachal Pradesh's Capital Complex. Using a self-developed Intuition Scale, results showed that teachers had an average level of intuition, with significant gender differences, but no differences based on qualifications.

Chauhan (2024) examined the relationship between techno-pedagogical competency and attitude towards teaching among college teachers. Using standardized tools, the study found a positive correlation between the two variables and significant differences based on gender, experience, locality, and institution type.

Nayak and Choudhury (2024) conducted a comparative study on techno-pedagogical competencies between arts and science teacher-educators. Findings revealed no significant difference between the two streams, indicating that both possess similar competency levels. A self-developed scale was used via Google Forms.

Prabu and Rajalakshmi (2024) Surveying 825 prospective teacher educators from Tamil Nadu, this study employed the standardized TTPCS. Results highlighted significant differences in techno-pedagogical competency based on gender, medium of instruction, institution type, subject group, and father's education.

Peseyie (2025), in Mokokchung, Nagaland, assessed Technological Pedagogical Content Knowledge (TPACK) of high school teachers. Using a scale developed by Lata and Sharma (2017), it found that teachers had above-average TPACK levels, with no significant differences based on gender, locality, or school management type.

Revati (2025) conducted a comparative study on government and private secondary school teachers in Kottayam found that private, male, and urban teachers had higher techno-pedagogical skills. It emphasized the need to improve facilities and training in government and rural schools to bridge the gap.

Objective of the study

The investigator has laid the following objective for the present study:

1. To study the level of Techno pedagogical competency among secondary school teachers.
2. To study the level of Techno pedagogical competency among secondary school teachers with respect to gender (Male & Female).
3. To study the level of Techno pedagogical competency among secondary school teachers with respect to settlement (rural and urban areas).

Hypotheses of the study:

With respect to objective 2 and 3 following are the hypotheses of the study

1. There is no significant difference in the level of Techno pedagogical competency between male and female Secondary school teachers.
2. There is no significant difference in the level of Techno-pedagogical competency between teachers of rural and urban Secondary school teachers.

Method of Study

This study adopted a descriptive cum survey research design to assess the techno-pedagogical competency of secondary school teachers. A structured questionnaire was used to collect detailed and factual information regarding teachers' ability to integrate technology into their instructional practices.

Population

The population for the study included all secondary school teachers working in the 32 government and private secondary schools located across the East Siang district of Arunachal Pradesh.

Sample and Sampling Technique

Stratified random sampling technique was used to ensure balanced representation of rural and urban schools. From each category, four schools were selected using the lottery method, totaling eight schools. From these, a sample of 100 secondary school teachers was drawn for the study.

Description of the Tool Used

The study utilized the standardized Teacher's Techno-Pedagogical Competency Scale (TTPCS) developed by S. Rajasekar and K. Sathiyaraj (2013). This tool was employed to assess the level of techno-pedagogical competency among secondary school teachers in East Siang district.

Analysis and interpretation of objectives and hypotheses

Objective 1: To study the level of techno-pedagogical competency among secondary

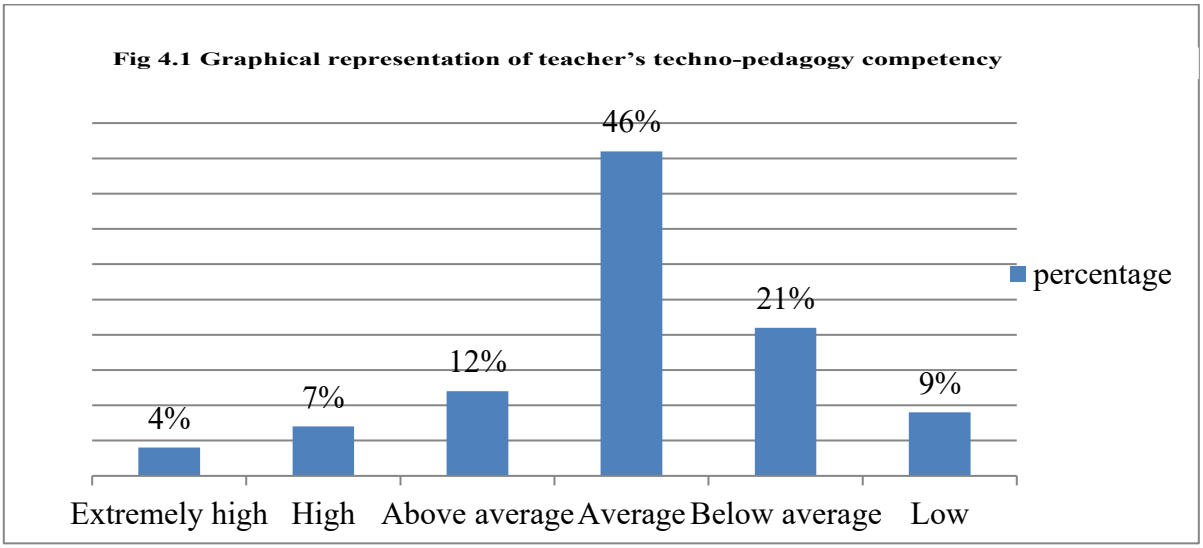
School teachers of east Siang district

Table no.4.1.2 Norms for interpretation of the level of teacher's techno-pedagogical competency.

SR.NO	RANGE OF z-SCORES	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	-1.26 to -2.00	F	Low
7	**-2.01 and below**	**G**	**Extremely low**

Table no. 4.1.1 Showing the percentage of teacher's techno-pedagogical competency.

SR.NO	LEVEL OF COMPETENCY	PERCENTAGE
1	**Extremely high**	**4%**
2	High	7%
3	Above average	12%
4	**Average**	**46%**
5	Below average	21%
6	Low	9%
7	**Extremely low**	**1%**



Interpretation:

According to the norms of the techno-pedagogical competency scale the distribution of techno-pedagogical competencies among the teachers in the sample reflect a range of competencies. 4.1.1 reveals that a small proportion demonstrate strong competencies with 4% showing extremely high competencies, 7% high competencies and 12% above average competencies. However, the majority of 46% fall in the

average category indicating they possess basic techno-pedagogical skills. On the other hand, 31% of teachers have below average or low competencies with 21% in the below average range, 9% of teachers possess low competencies and other 1% possess extremely low techno-pedagogical competencies.

Objective 2: To study the level of techno-pedagogical competency of secondary school Teachers with respect to Gender.

Hypothesis 1: There is no significant difference in the level of Techno-pedagogical Competency between male and female.

Table no 4.1.3 Showing mean score, standard deviation, error of difference, t-value, degree of freedom and significance of level techno-pedagogical competencies among secondary school teachers in relation to Gender

GROUP	N	M	SD	SE_d	t-value	df	Level of significance
MALE	50	90.83	28.78	5.58	0.61	98	Not significant at 0.05 level
FEMALE	50	87.42	27.09				

N_1= Number of male teachers

N_2= Number of female teachers

SD= Standard deviation

SE_d= Standard error deviation

Df= Degree of freedom

Significant Level= 0.05

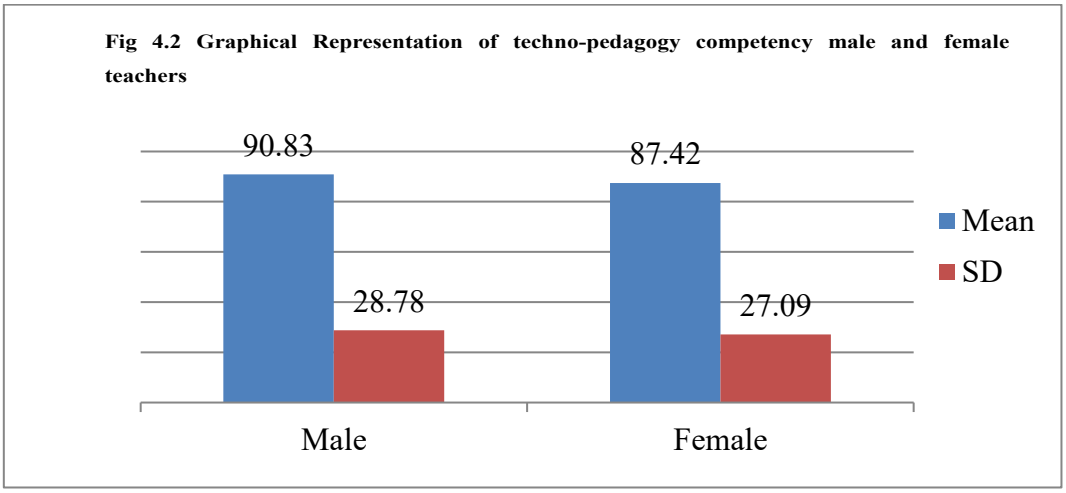


Fig 4.2 Graphical Representation of techno-pedagogy competency male and female teachers

Interpretation:

Table no.4.1.3: show that the Mean techno-pedagogical competency score of male teachers is (90.83) with standard deviation of (28.78) while female teachers mean score is (87.42) with a standard deviation of (27.09), A t-test was conducted; the calculated t-value is 0.61, with a degree of freedom (df) of 98. The level

of significance is set at (1.98) comparing the calculated t-value (0.61) with the critical t-value (1.98) it is evident that the calculated t-value is less than the critical t-value. This indicates that difference in the mean techno-pedagogical competency scores between male and female teachers is not statistically significant.

Therefore, the null hypothesis that "there is no significant in the level of techno-pedagogical competency between male and female teachers "is **Accepted**. This suggests that male and female teachers have similar levels of techno-pedagogical competency.

Objective 3: To study the level of techno-pedagogical competency among secondary school teachers with respect to settlement.

Hypothesis 2: There is no significant difference in the level of techno-pedagogical competency between teachers of rural and urban areas.

Table no.4.1.4 Showing mean score, standard deviation, error of difference, t-value degree of freedom and significance of level techno-pedagogical competencies among secondary school teachers in relation to settlement (Urban and Rural)

Settlement	N	M	SD	SE_d	t-value	df	Level of significance
Urban	49	97.81	35.77				
Rural	52	83.76	14.99	5.52	2.54	98	Sig at 0.05

N_1= Total no of urban teacher

N_2= Total no of rural teacher

M= Mean

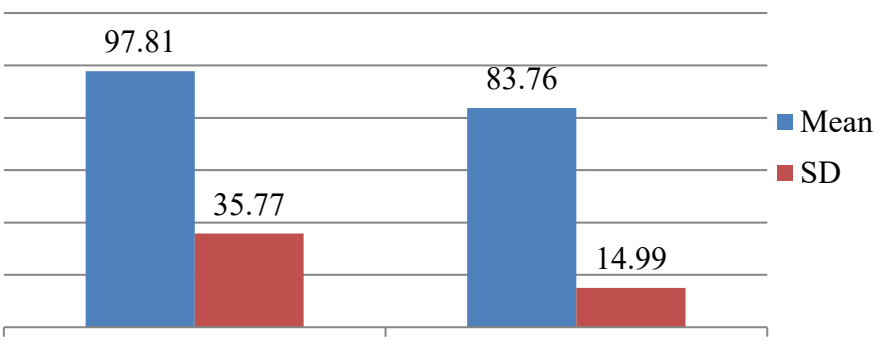
SD= Standard deviation

SE_d= Standard error deviation

Df= Degree of freedom

Significant level=0.05

Fig 4.3 Graphical representation of techno-pedagogy competency of urban and rural teachers



Interpretation:

The above table no 4.1.4. reveals that the calculated "t" value (2.54) is greater than the table "t" value at 0.05(1.98) level of significance. Thus, the null hypothesis stating "there is no significant difference in the level of techno-pedagogical competency between teachers of rural and urban area" is **rejected**. The finding implies that, there is significant difference between the techno-pedagogical competency among the urban and rural teachers of secondary schools of East Siang district. The result further indicates that mean score of techno-pedagogical competency among urban teachers (79.81) is higher than the rural teachers (83.76)

Major finding of the study

i. The study reveals that a small proportion of teachers demonstrate strong competencies with 4% showing extremely high competencies, 7% high competencies and 12% above average competencies. However, the majority of 46% fall in the average category indicating they possess basic techno-pedagogical skills. On the other hand, 21% in the below average range, 9% of teachers possess low competencies and other 1% possess extremely low techno-pedagogical competencies. Overall status of secondary school teachers' techno-pedagogical competency in the east Siang district of Arunachal Pradesh is found to be average.

ii. Notably it was found that there is no significant difference in the level of techno-pedagogical competencies between male and female teachers.

iii. The study found that there is significant difference in the level of techno-pedagogical competencies between the rural and urban teacher.

Discussion

The study reveals that most secondary school teachers in East Siang district have average or below-average techno-pedagogical competencies, with only 7% showing high and 12% above-average levels. This indicates that many teachers are not fully prepared to integrate technology effectively into their teaching practices. A major reason may be the lack of awareness about modern pedagogical trends and outdated knowledge (Biswas & Sankar, 2024). Limited access to digital resources and insufficient training also contribute to low competency levels, as only 1319 of 3490 schools in Arunachal Pradesh have functioning computer facilities, and just 1065 schools have internet access (UDISE+, 2023-24). The study found no significant gender difference in competency, suggesting the issue is systemic rather than gender-specific (Sobha & Joshi, 2020; Yadav & Ganie, 2019).

However, a significant gap exists between rural and urban teachers, with urban teachers performing better due to greater resource availability and support (Mondol, 2024; Beri & Sharma, 2019; Ravati, 2025). Challenges in rural residential schools like restrictions on mobile phone use also hinder full technology integration, affecting teachers' overall competency.

Conclusion

Techno-pedagogical competency is essential in modern education as it enhances teaching effectiveness and fosters 21st-century skills like critical thinking, collaboration, and problem-solving. This study found

that most secondary school teachers in East Siang district possess average or below-average competency, with only a small percentage demonstrating high proficiency. The findings showed no significant gender difference, but urban teachers outperformed rural teachers, likely due to better infrastructure and access to resources (Biswas & Sankar, 2024; UDISE+, 2023-24; Mondol, 2024; Beri & Sharma, 2019). NEP 2020 emphasizes technology integration through initiatives like NETF, virtual labs, and teacher training, supported by earlier frameworks such as the Kothari Commission, NCF 2005, ISTE, and UNESCO ICT standards (Kabakci Yurdakul et al., 2014).

Government programs like NISHTHA, PRAGYATA, TPD, and PM-SHRI aim to enhance teachers' digital skills and upgrade schools for holistic development. However, beyond policies, a positive teacher attitude and willingness to adopt technology are critical for successful integration. Continuous professional growth and openness to innovation will empower educators and enrich student learning in a tech-driven world.

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