Research Article

A Study on Techno Pedagogical Skills of College Teachers in West Bengal

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Abstract

The use of Technological Pedagogical Skills (TPS) can make quality education available and inexpensive to everyone. The use of TPS can make teaching and learning enjoyable because it alters how teachers and learners engage with one another. When teachers acquire technological pedagogical skills, they may try to apply them frequently in their instruction to improve the teaching-learning process. This study attempts to find out and compare the techno-pedagogical skills of college teachers with reference to gender, locality, stream, caste, and types of jobs. The descriptive survey method was used. One hundred forty college teachers were selected through simple random sampling techniques as samples from the Bankura district of West Bengal, India. Techno Pedagogical Skills scale consisting of 40 items based on four aspects: Technological Skills, Pedagogical Skills, Skills related to Subject or Content and Planning and Decision-making Skills was used in the present study as a tool for data collection. The data of the study were analysed by using the Statistical Package for Social Sciences (SPSS) 21 software. It was also found that there is no significant difference in the TPSs of college teachers with respect to their gender, locality, and caste. It is revealed that the TPSs of college teachers are at an average level. The study also discovered that there are statistically significant differences in the TPSs among the college teachers with respect to the type of jobs and stream. The study has implications for college principals, university administrators, and policymakers in providing training on TPSs to college teachers so that their capacity can be built.

Keywords: Technology, Pedagogy, Skill, Techno Pedagogical Skill, College Teachers

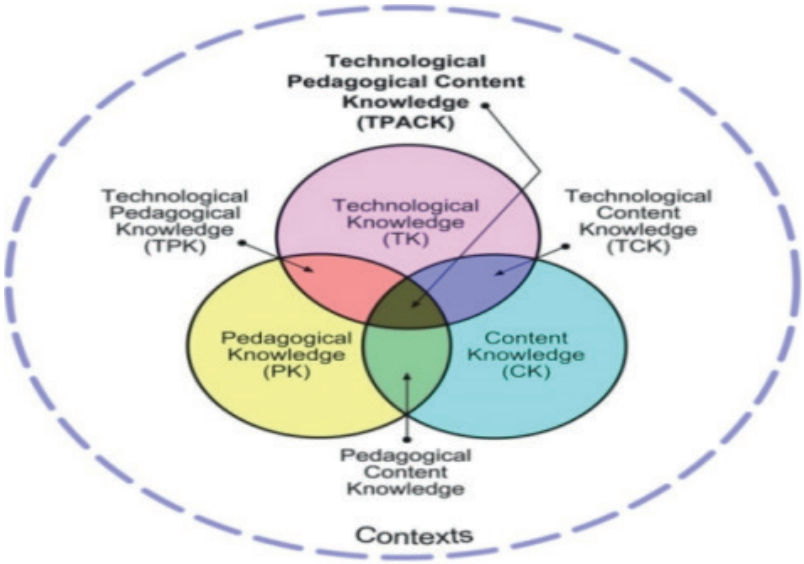
Introduction

Rabindranath Tagore, the great poet and educationist, rightly said, "Real education is that which does not merely give us information but makes our life in harmony with all existence". The literate citizen is increasingly expected to access and alter information via computer technology in the 21st century. It's critical to know how to manage electronic data from a growing number of sources and in a variety of forms (Gloria & Benjamin, 2014). As a teacher, one should grasp the value of technology because it allows students to understand the information more readily (Guru & Beura, 2019). The use of technology in education has been shown to be significant in terms of adjusting to period requirements, saving time, and enhancing efficiency (Cam & Koc, 2019).

Teachers who gain techno-pedagogical abilities may attempt to apply them frequently in their teaching, resulting in a simple and effective learning process (Anand, 2019). Technology has long been acknowledged as a powerful enabler with enormous potential for improving educational processes (Atkinson & Castro, 2008). The integration of technology into the educational process will result in appropriate modifications and advancements in both the educational and technological landscapes (Bala & Tao, 2018). The majority of teachers use the term "techno-pedagogy" to refer to online lectures. A platform comprising course management systems, asynchronous presentations, videoconferencing, and online evaluation tools is used by several of them (Courts & Tucker, 2012).The student can tailor their education thanks to the flexibility and choice brought about by technology (Hart, 2016). The content, pedagogy, and technology are the three pillars of techno pedagogy. Pedagogy is a term that refers to a collection of teaching and learning techniques, tactics, procedures, and methodologies (Ali, 2018). The ability to use ICT in a pedagogical environment is termed techno-pedagogical skills. Only a few researchers have looked into the methods utilized to help instructors build their techno-pedagogical skills (Grenon et al., 2019). Developing techno-pedagogical skills will make teaching and learning enjoyable since it will relieve pressure on teachers and allow students to engage more deeply in the process of learning (Lyonga et al., 2021). The use of techno pedagogy encourages teachers to use technology to communicate knowledge, and the learner maintains an on-going interest in learning new things (Prasanth & Rajan, 2022). Through the use of ICT by teachers, techno-pedagogical skills encourage students' further development, achievement of learning outcomes, and maintenance of the context of building classroom-based resources. As a result, the method of techno-pedagogy was a vital component of teacher education (Beaudin & Hadden, 2004).

Technological Pedagogical and Content Knowledge (TPACK) has had a significant impact on the field of educational technology research (Cox & Graham, 2009).In the framework of technological pedagogical and content knowledge (Figure 1), the paradigm known as technological pedagogical content knowledge (TPACK) describes how teachers can use technology more successfully. In this context, the TPACK competencies of teachers are crucial (Yildiz & Baltaci, 2017). According to Koehler and Mishra (2009) "TPK requires a forward-looking, creative, and open-minded seeking of technology use, not for its own sake but for the sake of advancing student learning and understanding" (p. 66). As a result, teachers anticipate that technology will be employed in the classroom teaching-learning process to assist them in studying, developing important ICT skills, and mastering the technology fluency required in their individual subject domain (Keshwan, 2015). So, technological pedagogical competency is an important capacity of teachers that must be cultivated in order to convey knowledge to students in a meaningful way (Ali, 2018).

Figure-1: Technological Pedagogical Content Knowledge



Source: TPACK (Koehler & Mishra, 2009)

Need of the Study

The National Education Policy 2020 has emphasized including ICT in all levels of education. Technology must be used as teaching, learning and assessment aid for all levels of education. It has the potential to transform the nature, process and product of education across levels of education and subjects. Hence, it is an important area of educational research which has been focused by both national and international researchers. Some of the important research findings are discussed here.

Jain and Singh (2023) focused on the effect of generative AI on techno-pedagogical skills and the effect of generative AI on the happiness of prospective teachers. A mixed-methods approach was employed to investigate the effect of using generative AI tools in teaching. There were thirty prospective teachers in the study's sample. The study revealed the positive effect of employing generative AI-based applications on prospective teachers' happiness and techno-pedagogical skills. This study demonstrates that generative AI technologies are able to support prospective teachers' techno-pedagogical skills and happiness. Kulaksiz and Karaca (2022) discovered that TPACK is context-oriented in addition to being a set of stand-alone knowledge and skills. Setua (2022) revealed that there is an averagely positive relationship between effective online teaching and technological pedagogical skills. They also found that there is a significant difference between the high level and low level of techno-pedagogical skills of secondary school teachers with their effective online teaching. Yusuf et al. (2021) reported the gender differences in student teachers' perceptions of their Technological Knowledge (TK) and Technological Content Knowledge (TCK) favouring male respondents. Melo (2020) investigated Pedagogical Content Knowledge (PCK) or becoming a physics teacher in a Colombian secondary school. The study found that knowledge about the curriculum and teaching practices evolved following

the intervention program. However, information regarding evaluation and learners did not. Beri and Sharma (2019) concluded that the technological pedagogical competency of teacher educators in private colleges is higher than that of teacher educators in government/government-aided colleges. They also discovered that teacher-educators with a science background have significantly higher Techno-Pedagogical Competencies than those with an arts background. Bala and Tao (2018) revealed that senior secondary school teachers in the Phagwara district have excellent techno-pedagogical competence and a low level of fear about using instructional aids in the classroom. Yildiz and Baltaci (2017) revealed that teachers had made significant improvements in the design, implementation, and problem-solving internee of TPACK competencies. Ozdemir (2016) discovered that pre-service teachers who took technology and material development courses improved their TPACK. Thakur (2015) mentioned in his paper how to integrate technology and pedagogy so that both teachers and students are aware of how technology can be used to shape educational demands.

The above discussion indicated that many types of research are carried out on teaching competence, the use of technology in teaching, as well as on techno-pedagogical content knowledge among school teachers at the secondary level. Few studies have also been carried out on the Techno-Pedagogical Skills of B.Ed. students. However, no researchers reported that it was carried out on the Techno Pedagogical Skills (TPS) of college teachers in West Bengal. Hence, this gap led to the study of techno-pedagogical skills among college teachers in a particular region of West Bengal.

Objectives

1. To find out the Techno Pedagogical Skills (TPS) of college teachers.
2. To find out the difference in TPS of college teachers with respect to gender (Male & Female) and Locality (Rural & Urban).
3. To find out the difference in TPS of college teachers with respect to the type of jobs (Permanent, State Aided College Teacher-I, State Aided College Teacher-II and Visiting Faculty), Caste (General, SC, ST and OBC) and Stream (Arts, Science and Commerce).

Hypotheses

1. The college teachers will have low Techno Pedagogical Skills.
2. There is no significant difference in the TPS of college teachers with respect to their gender (Male & Female) and locality (Rural and Urban).
3. There is no significant difference in TPS of college teachers with respect to their type of jobs (Permanent, State Aided College Teacher-I, State Aided College Teacher-II and Visiting Faculty), caste (General, SC, ST and OBC) and stream (Arts, Science, and Commerce).

Methodology

The survey method was used to examine the current state of TPS of college teachers. The study was confined to the Bankura district of West Bengal, India. Only state-aided general college teachers (Govt. of West Bengal) were considered in the present study. The male and female, rural and urban, arts, science, and commerce streams, different castes, permanent, visiting, and state-aided college teachers were

involved in this study. A total of 140 college teachers from the Bankura district were taken as the representative sample of the whole population (Table 1). A simple random sampling technique was adopted to select college teachers from the Bankura district of West Bengal. The details of the sample are given in table-1.

Table-1: Details of Sample

Variable		N	Total
Gender	Male	104	140
	Female	36	
Locality	Rural	95	140
	Urban	45	
Stream	Arts	92	140
	Science	44	
	Commerce	4	
Caste	General	98	140
	SC	11	
	ST	2	
	OBC	29	
Type of Jobs	Permanent	76	140
	SACT-I	17	
	SACT-II	44	
	Visiting Faculty	3	

The Techno Pedagogical Skill Scale was constructed by the investigators to know the techno-pedagogical skills of college teachers. The investigators built the original tool using four dimensions and forty statements. The dimensions were Technological Skills (10 Items), Pedagogical Skills (10 Items), Skills related to Subject or Content (10 Items) and Planning and decision-making Skills (10 Items). Every item was in statements with five choices such as Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree. All statements on the scale were positive in measuring techno pedagogical skills. In each dimension, there were groups of statements. Each element explained certain behaviours. In the scoring procedure, the score of 5 for Strongly Agree, 4 for Agree, 3 for Neutral, 2 for Disagree and 1 for Strongly Disagree. The test-retest reliability of the scale was found to be 0.87 with a time gap of 10 days. Content validity has been established for the scale by referring it to experts in the field. The college teachers submitted their responses both via Google Forms

and offline once they had finished their responses according to the instructions. Non-parametric tests such as Mann-Whitney U and Kruskal-Wallis tests were used to analyse the collected data and verify the hypotheses.

Result and Discussion

The collected data were analysed as per the objectives and hypotheses of the study by using non-parametric measures, which are presented in the following paragraphs.

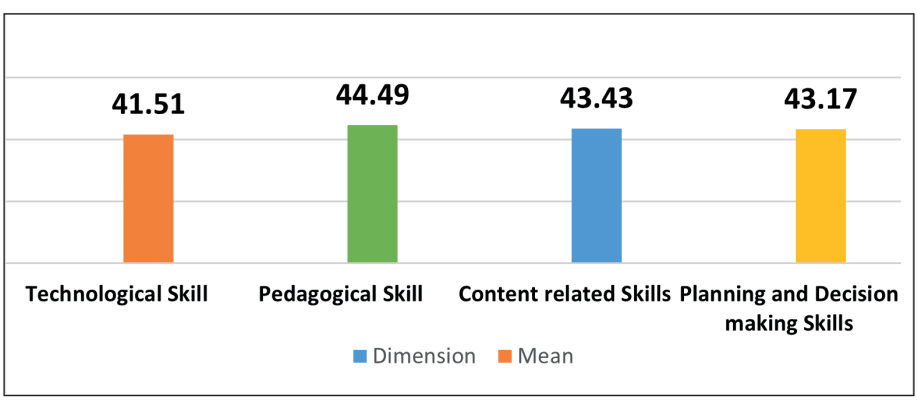
Level of Techno-Pedagogical Skills of College Teachers

Table-2: The Level of Techno Pedagogical Skills of College Teachers

Percentile Range	Raw Scores Range	No. of Sample	% of Sample	Level of Techno-Pedagogical Skills
Above P75	Above 185	33	23.57	High
P25 to P75	162 – 185	74	52.86	Moderate
Below P25	Below 162	33	23.57	Low

From the Table 2, it is found that 33 (23.57 per cent) college teachers had low levels of Techno Pedagogical Skills, 74 (52.86 per cent) college teachers had moderate levels of Techno Pedagogical Skills, and 33 (23.57 per cent) college teachers had high levels of Techno Pedagogical Skills. The trend of the level of Techno Pedagogical Skills revealed in the study insisted that the researchers conclude the result to be neither high nor low but satisfactory or moderate.

Figure-2: Dimension-wise Mean of Techno Pedagogical Skills Score of College Teachers



From Figure 2, it is also explored that the pedagogical skills (Dimension-2) of College Teachers are comparatively higher than other skills or dimensions and technological skills of college teachers are relatively very low than other skills.

Comparison of TPS of College Teachers with Reference to Sex and Locality

Table-3: Mann-Whitney U Test

Variables		N	Mean	Mann Whitney U Value	Z value	p	Remarks
Gender	Male College Teachers	104	71.87	1730.000	-.677	0.498	Not Significant
	Female College Teachers	36	66.56				
Locality	Rural College Teachers	95	69.36	2029.500	-.482	0.630	Not Significant
	Urban College Teachers	45	72.90				

The above test statistics (Table 3) show that the Mann-Whitney U value =1730.000, Z value = -.677, p= 0.498 (p> 0.05). Hence, it is not significant, and H02 (Male & Female) is accepted. Therefore, it can be said that there is no significant difference between Male and Female College teachers in their scores in Techno Pedagogical Skills. It was also found that the mean Techno Pedagogical Skills score of male college teachers is greater than that of female college teachers.

The above test statistics (Table 3) show that the Mann-Whitney U value=2029.500, Z value=-.482, p=0.630 (p>0.05). Hence, it is not significant, and H_{02} (Rural and Urban) is retained. Therefore, it can be said that there is no significant difference between rural and urban college teachers in terms of their scores in techno-pedagogical skills. It is also found that the mean Techno Pedagogical Skills score of urban College Teachers is greater than rural College Teachers.

Comparison of TPS of College Teachers with Reference to Type of Jobs

Table-4: Results of Kruskal-Wallis Test for Type of Jobs

Groups	N	Mean Rank	Chi-square	df	p	Remarks
Permanent	76	82.47	15.814	3	.001	Significant
SACT-1	17	63.35				
SACT-II	44	52.51				
Visiting Faculty	3	71.67				

The above test statistics (Table 4) show that the Chi-Square value =15.814, df =3, p=.001 (p<0.05). Hence, it is significant and H03 (Permanent, SACT-I, SACT-II, Visiting Faculty) is rejected. Therefore, it can be said that there are significant differences in TPS among Permanent, SACT-I, SACT-II and Visiting College

teachers. It was also found that the mean Techno Pedagogical Skills score of permanent teachers is higher than others.

Comparison of TPS of College Teachers with Reference to Caste

Table-5: Kruskal-Wallis Test for Caste

Groups	N	Mean Rank	Chi-square	df	p	Remarks
General	98	71.22	7.451	3	.059	Not Significant
SC	11	88.14				
ST	2	6.75				
OBC	29	65.78				

The above test statistics (Table 5) show that the Chi-Square value is 7.451, df =3, p= .059 (p>0.05). Hence, it is not significant that H03 (General, SC, ST and OBC) is accepted. Therefore, it can be said that there are no significant differences among General, SC, ST, and OBC College Teachers in their scores in Techno Pedagogical Skills. That is to say that the Techno Pedagogical Skills of Schedule Caste (SC) college teachers are comparatively higher than those of another caste.

Comparison of TPS of College Teachers with Reference to Stream

Table-6: Results of Kruskal-Wallis Test for Stream

Groups	N	Mean Rank	Chi-square	df	p	Remarks
Arts	92	62.41	11.539	2	0.003	Significant
Science	44	87.64				
Commerce	4	68.13				

The above test statistics (Table 6) show that the Chi-Square value is 11.539, df =2, p= .003 (p<0.05). Hence, it is significant. The H_{03} (Arts, Science, and Commerce) is rejected. Therefore, it can be said that there are significant differences among Arts, Science, and Commerce College Teachers in their scores in Techno Pedagogical Skills. That is to say that the Techno Pedagogical Skills of science college teachers are relatively higher than arts and commerce teachers.

Discussion of Result

The study found that the Techno Pedagogical Skills of college teachers are moderate in level. This is due to the fact that most teachers know the content and pedagogy very well but lack the inclusion of technology. Few teachers plan and decide their instruction effectively. The present finding corroborates the findings of the study conducted by Sathiyaraj & Rajasekar (2013), Sekhar (2016), Jeyaraj & Ramnath (2018), and Kumar (2018), contradicts the findings of Thakur (2015), Bhuyan and Tripathy (2020).

It is found that the Techno-Pedagogical Skills of male college teachers are comparatively higher than those of female college teachers. This is due

to the fact that male college teachers are smarter in utilizing the content through the integration of technology in the classroom situation than female college teachers. It is also found that male teachers are more interested in their teaching through technology, while female college teachers are not comfortable using technology in their teaching. The present study also supported the earlier finding of Anand (2019), who concluded that the techno-pedagogical skill of male faculty members is better than that of female faculty members.

The study revealed that urban college teachers have comparatively higher techno-pedagogical skills than rural college teachers. It is also evident that teachers at urban colleges are more interested in employing technology to enhance their instruction than teachers at rural colleges. At the time of data collection, it is seen that adequate technological facilities are available in urban colleges than the rural colleges. The present study also supported the earlier finding of Parkash & Hooda (2018), who concluded that the techno-pedagogical competency of urban government school teachers is better than that of rural government higher secondary school teachers.

It was found that permanent college teachers are comparatively more skilled in techno-pedagogy than their counterparts. For this reason, permanent teachers use technology in the classroom more intelligently than other college teachers, which makes them better at utilizing the course material. Additionally, it has been discovered that permanent teachers are more enthusiastic about employing technology in their instruction than other college teachers.

The current study revealed that the college teachers belonging to the SC community were having higher Techno-Pedagogical Skills than their counterparts. It is the result of the SC college teachers' superior knowledge of how to use the subject by incorporating technology in the classroom environment as compared to other category teachers. Additionally, it has been discovered that SC college teachers are more interested in adopting technology to enhance their instruction than other category teachers in the colleges.

The present study exposed that science college teachers have higher techno-pedagogical skills than their counterparts. The reason for this is that science college teachers are more adept than other college teachers at utilising the subject by integrating technology in the classroom. It's because science college teachers are more adept than other college teachers at utilizing the subject matter in a classroom setting by integrating technology. The findings of the study are corroborated by the studies of Sathya & Venkateswaran (2017), Yildiz (2017) and Kumar (2018).

Educational Implications

Techno-pedagogical skills are very essential to make teaching learning effective and qualitative at all levels of education. The study revealed that the college teachers in West Bengal have moderate/average Techno Pedagogical Skills. As this study was a humble attempt to know the level of techno-pedagogical skills of college teachers, it will assist policymakers in addressing the challenges of developing the much-said among college teachers. Along with that, the improvement of the skills of teachers will improve the overall quality of education. The government could take the initiative to improve college teachers' TPS skills and could initiate adequate online/ or blended courses for their improvement. Govt. can start various initiatives such as workshops, seminars,

ICT-based orientation programmes and skill-building programmes related to TPS to enhance college teachers' skills in technology and pedagogy. According to the findings of the study female, rural, ST, arts, and SACT-II college teachers need special training to equip them with new inventions to improve. It was also revealed that a fundamental understanding of integrating technology and content with pedagogy in education is necessary for college teachers. It will assist the governing bodies in providing the essential infrastructure, such as sufficient classrooms, computers, internet access, and communication tools for college teachers, to ensure efficient operation.

Conclusion

The passage of time causes everything in our nature to change. This transition is a continuous process where everything changes automatically; it cannot be detected by drawing sectional lines. The transition from the traditional Gurukul system to a formal schooling system in the sphere of education has an impact on the teaching process, how students connect with one another, and how they participate in the teaching-learning process. The old lecture style and teacher-centred education system are replaced by a student-centred approach in which interaction is the key to learning. A classroom without technology nowadays is inconceivable since students of this generation are "digital natives." A teacher becomes a techno pedagogue when they combine technology with pedagogy. When transmitting lessons to students through a voyage of a virtual world, teachers should be fully aware of the usage of emerging technology. Every educational professional should be able to effectively integrate subject-specific content, pedagogy, and technology into their classroom interactions. A significant barrier to integrating these three key components is discovered to be teachers' lack of awareness of technological pedagogical abilities. It is possible to conclude that technological-pedagogical skills is an important capacity of teachers that must be cultivated in order to convey knowledge to students in a meaningful way.

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