



EFFECTIVENESS OF TECHNO-PEDAGOGICAL SKILLS OF SECONDARY SCHOOL TEACHERS ON ONLINE TEACHING DURING COVID-19 PANDEMIC

Chiranjit Setua 

This study investigates the effectiveness of techno-pedagogical skills of secondary school teachers in their online teaching. A sample consists of 42 CBSE and ICSE secondary school teachers. The research adopts a descriptive survey design for collecting data using the “Techno-Pedagogical Skill Assessment Scale” developed by Sibichen (2011). Structured interviews also formed a part of data collection. The results reveal a moderately positive correlation between techno-pedagogical skills and effective online teaching. 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. The positive impact of the COVID-19 pandemic on the techno-pedagogical skill of secondary school teachers is reported in the study.

KEYWORDS: Effective Online Teaching, Secondary School Teachers, TechnoPedagogical Skill

INTRODUCTION

Changeability is one of the most important and eternal characteristics of this age. The education system is being constantly changed and is evolving with time. In this context of the changeability of the education system, we can see that technology has penetrated the entire education system. Riel and Becker (2020) remarked that “the rapid speed of technological development brings new computer-mediated tools to the classroom door each year. Teachers must make continual decisions about how to best utilize these tools in teaching, learning, and assessment”. So, in the 21st century, this technology plays a key role in the teaching-learning process widely. As a result, we became acquainted with the term ‘Techno-pedagogical Skill’. According to Jeyaraj

Chiranjit Setua 

Research Scholar, Department of Education, Central University of Jharkhand, India.
Email: csetua@gmail.com. ORCID: <https://orcid.org/0000-0003-2623-8597>



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(2018), techno-pedagogy refers to the application of scientific principles and technological advancement in classroom practices, especially in teaching, learning and evaluation. Techno-pedagogical skills are the sum of multiple skills by which teachers integrate technology, pedagogy, and content matter as an effective method in classroom practices. Also, it can be said that for developing an effective teaching-learning process, the techno-pedagogical skill must be developed that includes planning, application, and assessment processes depending on technological, pedagogical, and content knowledge.

To understand the techno-pedagogical skill, we have to focus on the 'TPACK Model', developed by [Mishra and Koehler \(2006\)](#). The Venn diagram of the 'TPACK Model' is shown in Figure 1.

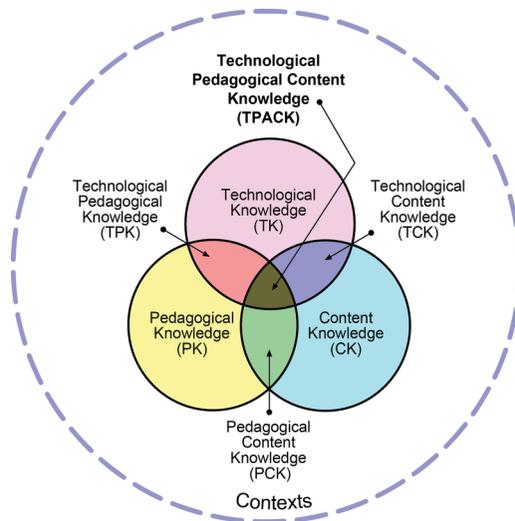


Figure 1. 1. Technological Pedagogical Content Knowledge (Retrieved from <https://educationaltechnology.net/wp-content/uploads/2018/05/tpack-model.jpg>)

From Figure 1, it is clear that the three separate bases of knowledge i.e., technological knowledge, pedagogical knowledge and content knowledge are in one integrated form. In the teaching-learning process technological knowledge refers to the knowledge of a teacher about how to use the technological tools, devices, and resources in the teaching-learning process. Pedagogical knowledge means the knowledge of a teacher for simply mastering the teaching-learning process in a classroom. Content knowledge means the in-depth knowledge of a teacher in his/her discipline. When these three bases of knowledge of a teacher come to the context of application form in classroom practices, then it is considered techno-pedagogical skills.

Techno-pedagogical skill is not only furnishing a common skill for the teacher rather it also arranges the effective teaching-learning process and also offers sound communication between students and teachers (Thakur, 2015). So, a teacher should know techno-pedagogy rather than pedagogy (Mishra & Koehler, 2008). Koehler and Mishra (2005) verified that an effective teaching-learning process is “not only based on the mere introduction of technology” but also “it is in the bridge of technology, pedagogy and content knowledge.” On the other hand, Rao and Jalajakshi (2021) emphasized that there is a need to update teachers on techno-pedagogical skills for fulfilling the needs of present generation learners. Then by using techno-pedagogical skills teachers can effectively conduct the teaching-learning process.

In the present context, techno-pedagogical skill has become the main predictor of the teaching-learning process. In India, since 24th March 2020, schools, colleges and other educational institutions have remained closed due to the COVID-19 pandemic. The physical presence of students and face to face teaching-learning process in a real classroom situation are barred. So, in this pandemic, teachers and students both have to depend upon technological tools, devices and resources for the teaching-learning process. Therefore, during this pandemic, teachers are completely dependent upon their techno-pedagogical skills and the teaching-learning process is being conducted through online mode. Teachers are using technological tools, devices, and resources for effective online teaching. Online teaching is defined as teaching that is conducted mostly online (Baran et al., 2011), which means according to Ko and Rossen (2017) if teaching is conducted through the internet for mastering a course partially or entirely then it will be called online teaching. Major (2010) stated that at the time of transition the faculty members adopt new skills and roles for online teaching. So, by providing technological guidance, support and proficiency with the help of technological tools and resources the excellence of professionals has to be enhanced for online teaching (Baran & Correia, 2014).

For the present study, the researcher selected the subjects as secondary school teachers from CBSE and ICSE board, because every teacher, student and institution of the CBSE and ICSE board have advanced ICT facilities. Every teacher has a computer, smartphone and internet facility. Even every student of CBSE and ICSE board has a smartphone, and internet facility and some of them have computers in their home as well. So, during this COVID-19 pandemic, students and teachers both are facilitated by these ICT tools and devices for the teaching-learning process and continuous online classes are going on without any barriers. Therefore, the researcher has tried to conduct a study on the effectiveness of techno-pedagogical skills of CBSE and ICSE secondary school teachers on online teaching during the COVID-19 pandemic.

REVIEW OF RELATED LITERATURE

In the teaching profession, the goal of teachers' techno-pedagogical skills not only depends upon their technological, pedagogical and content knowledge but also integral ability to plan, implement, evaluate and provide a remedy. So, to know the effectiveness of techno-pedagogical skills of secondary school teachers on online teaching, some reviews of related literature were conducted. These are as follows:

Americh et al. (2011) showed that there is a demand for higher-level training in Information and Communication Technology (ICT) for the teachers which is the main aspect of daily classroom practices at present. There is a need for ICT integration in daily classroom practices also. So, for the development of the teaching-learning process ICT integrated high-quality programmes should be provided as per the demand of different fields and for sound mastering of the teaching-learning process.

Gloria and Benjamin (2014) reported in their study that technology is a crucial and "constantly changing skill-set" which is required for the trainee teachers, teachers and teacher educators for selecting the appropriate techno-pedagogical strategies to engage the students effectively in the teaching-learning process. They also stated that techno-pedagogical strategies are allowing the understanding of how the technology can be integrated and related to the content. So, it is important to integrate technology into pedagogy for a sound teaching-learning process.

Jeyaraj and Ramnath (2018) revealed that the Technological Pedagogical and Content Knowledge of B.Ed. student-teachers in the Puducherry region are at a moderate level and there is a significant difference in Technological Pedagogical and Content Knowledge of B.Ed. student-teachers according to the variables; educational qualification, excess of e-content and Technology uses frequently in the teaching-learning process. Further, they stated that integration of the Technological Pedagogical and Content Knowledge helps the Teachers for providing an effective teaching-learning process and enhances their quality in the classroom.

Leema and Saleem (2017) stated that the techno-pedagogical skill of a teacher reduces the pressure on the teaching-learning process, and it also enables the students to clear the concept about a particular domain of knowledge. So, the responsibilities of the teacher education curriculum are to enhance this type of competencies of teachers. Again, they emphasized that still there is a need to improve this type of competency in many areas and give some important suggestions for a better infusion of techno pedagogical skills for teacher education. As a concluding remark, they said that techno-pedagogical skill has provided outstanding weightage to enhance the teachers'

teaching competency.

[Ozdemir \(2016\)](#) found out in his study that there is a positive effect of pre-service teacher education on Technological Pedagogical and Content Knowledge of B.Ed. trainee teachers. They emphasized that the opportunity for adopting and using technology in daily classroom practices should be given to the trainee teachers for an effective teaching-learning process in the real classroom situation. Thus, technology has become one of the most important criteria for assessing teaching competency at present.

[Renato \(2008\)](#) showed that most teachers are gradually trying to integrate the use of Information and Communication Technology (ICT) resources into their traditional teaching and also, they can develop their confidence level as well as get success in classroom practices. They also mentioned that this competency is varied on the individual differences of the teachers and on different schools where they teach.

[Sibichen \(2018\)](#) revealed that the integration of Information and Communication Technology (ICT) in the teaching-learning process provides a powerful and fruitful environment for eliciting the modern views of learning. The student teachers who have attended the computer course effectively integrate technology in classroom practices and they know how to use the technological tools, devices, and resources effectively in the teaching-learning process. Thus, techno-pedagogical skill has redefined the modern teaching-learning process and this techno-pedagogical skill is playing a key role in the present education system.

[Thakur \(2015\)](#) discussed in detail how the techno-pedagogical skill is playing a role to release the challenges of higher education, saying the techno-pedagogical skill is a 'hybrid skill'. Through using this skill, the challenges of existing ICT services can be overcome and also it enhances the teaching competencies of teachers and develop the internal capacity for the use of techno-pedagogical skills teachers.

[Thierry \(2007\)](#) found out that when a trainee teacher takes the help of Information and Communication Technology (ICT) then they get an opportunity to adopt various ways of conducting sound pedagogical practices and it enhances their competencies to face any difficult situation which can occur in real classroom practices.

[Vijaya \(2017\)](#) suggested that there is an urgent need of integrating technology into teaching for all the teachers to provide quality education to the present generation of learners. Due to the lack of availability of proper ICT facilities in institutions, the teachers of higher education use the internet in their homes for referring information to their learners.

[Nachimuthu and Vijayakumari \(2009\)](#) stated that there are some issues

related to online education, such as appropriate infrastructure, availability of funds, competent trainers etc. It becomes greater when online education is conducted in rural areas. They revealed that there are more opportunities for online education than in the traditional education system.

Larreamendy-Joerns and Leinhardt (2006) showed that online instructions provide various ways and methods to instruct the students with presentations which is most straightforward. It also enhances the interests of the learners and provides a motivating atmosphere for students. According to their study, this method is very effective and it has been very much characterized. Further, it proposed three focal points: presentational, execution coaching and epistemic engagement.

Rhode (2009) found out that online and traditional learning environment varies significantly. Online learning is mainly self-paced, and it provides more flexibility to both teachers and students than face to face learning.

Koehler and Mishra (2005) stated that teachers need to focus not only on their competencies in the context of online teaching for the teaching-learning process but also, they must focus more to engage in pedagogical inquiry and focus on understanding the complex relationships of technologies, pedagogies and the content matter of their discipline in the context of online teaching.

After going through those aforesaid reviews of related literature, it is clear that techno-pedagogical skills are very important skills for teachers and also for the online teaching-learning process in any situation. So due to the very crisis scenario, caused by the COVID-19 pandemic, a modest effort was made to conduct a study on the effectiveness of techno-pedagogical skills of secondary school teachers on online teaching during the COVID-19 pandemic.

OBJECTIVES OF THE STUDY

The objectives of the study are as follows:

1. To study the relationship between techno-pedagogical skills and effective online teaching of secondary school teachers of CBSE and ICSE board.
2. To study the significant difference between high level and low level of techno-pedagogical skills of secondary school teachers in relation to their effective online teaching.
3. To find out the positive impacts of the COVID-19 pandemic on techno-pedagogical skills of secondary school teachers as per their opinion at present and in future.

HYPOTHESES FOR THE STUDY

The following hypotheses have been framed for the study:

H₀ 1: There is no significant relationship between techno-pedagogical skills and effective online teaching of secondary school teachers of CBSE and ICSE board.

H₀ 2: There is no significant difference between the high level and low level of techno-pedagogical skills of secondary school teachers in relation to their effective online teaching.

RESEARCH DESIGN

For the present study, the researcher adopted a Descriptive Survey Design for conducting research.

SAMPLE FOR THE STUDY

To accomplish this study, 42 (forty-two) secondary school teachers of CBSE and ICSE boards from the city of Kharagpur, West Bengal, India, were selected as a sample through a random sampling method.

TOOLS USED

To know the level of techno-pedagogical skills of secondary school teachers, a standardized tool, namely the “Techno-Pedagogical Skill Assessment Scale” was used which was developed by Sibichen (2011). The maximum value of this scale is 245. The low and high levels of techno-pedagogical skills were calculated for those teachers who scored 1 to 150 and 151 to 245 respectively.

For gathering data about effective online teaching and the opinions of teachers about the positive impact of the COVID-19 pandemic on their techno-pedagogical skills, structured interviews were conducted with a self-made questionnaire containing 12 items and an open-ended question respectively. The items of the self-made questionnaire comprised a 3-point scale: little extent, some extent and good extent with a score of 1, 2 and 3 respectively. It was standardized by using content validity and using the test-retest method with a reliability coefficient of 0.86. The maximum score possible on this scale was 36.

DATA ANALYSIS AND INTERPRETATION

To find out the result of Objective 1, the correlation between techno-pedagogical skills and effective online teaching of secondary school teachers, the mean value of the level of techno pedagogical skills of secondary school teachers and their effective online teaching were calculated. Also, the correlation between the two means was calculated by using Pearson's Product Moment Method. The results are given in Table 1.

Table 1

Correlation Between Techno-Pedagogical Skills and Effective Online Teaching of Secondary School Teachers.

Variables		N	Mean	SD	r	Remarks
Independent	Level of Techno-pedagogical Skills	42	155.48	8.89	0.43	Moderately positive correlation
Dependent	Effective Online Teaching	42	24.88	4.48		

From the data in Table 1, the mean scores of Techno-pedagogical skills and effective online teaching of secondary school teachers are 155.48 and 24.88 respectively. The calculated coefficient of the correlation value is 0.43.

It can be interpreted that there is a positive correlation between the level of techno-pedagogical skill and effective online teaching of secondary school teachers of CBSE and ICSE board, but moderate in nature. From the mean value of techno-pedagogical skills, it can be said that the level of techno-pedagogical skills of secondary school teachers is at a high level. So having a better level of techno-pedagogical skills, secondary school teachers provided effective online teaching in a better way. Thus, it can be said that the techno-pedagogical skill of secondary school teachers is playing a key role in the effective online teaching-learning process in the COVID-19 pandemic.

To find out the result of Objective 2 i.e., a significant difference between high level and low level of techno-pedagogical skills of secondary school teachers in relation to their effective online teaching, the mean value of effective online teaching was calculated for those secondary school teachers who have the high level of techno-pedagogical skills and who have the low level of techno-pedagogical skills separately. After that, a significant difference between the two means of effective online teaching was calculated by using a

t-test. The results are given in Table 2.

Table 2

Significant Difference Between High Level and Low Level of Techno-Pedagogical Skills of Secondary School Teachers in Relation to Their Effective Online Teaching.

Variables		N	Mean	SD	t	Remarks
Independent	Dependent					
High level of Techno-Pedagogical Skills	Effective Online Teaching	33	26.09	3.91	3.99	H ₀ 2 is rejected at a 0.05 level
Low level of Techno-Pedagogical Skills		09	20.44	3.71		

The results in Table 2 indicate that there are 33 secondary school teachers at a high level of techno-pedagogical skills with a mean score of 158.64 and only 9 secondary school teachers at a low level of techno-pedagogical skills with a mean score of 143.88. The Mean scores of Effective online teachings of 33 secondary school teachers (those who are at a high level) and 9 (those who are at a low level) are 26.09 and 20.44 with standard deviations of 3.91 and 3.71 respectively. The calculated 't'-value is 3.99 which is higher than the table value at a 0.05 level of significance. Thus, the null hypothesis is rejected.

It can be interpreted that there is a significant difference between the high level and low level of techno-pedagogical skills of secondary school teachers in relation to their effective online teaching. In other words, the techno-pedagogical skills of secondary school teachers influenced their effective online teaching. When the level of techno-pedagogical skills of secondary school teachers was high then the teachers provided online teaching more effectively than those who had a low level of techno-pedagogical skills. So, it can be said that there is a positive effect of techno-pedagogical skills of secondary school teachers on their effective online teaching.

To find out the result of Objective 3, positive impacts of the COVID-19 pandemic on techno-pedagogical skills of secondary school teachers as per their opinion at present and in future, interviews were conducted with an open-ended questions. The result reveals that according to the secondary school teachers, there are lots of negative impacts of the COVID-19 pandemic on education, society, economy and mental health of human beings etc. However,

some positive impacts of the COVID-19 pandemic on techno-pedagogical skills at present and in future are also there which are related to the teaching-learning process as well as online teaching in a real virtual classroom situation. These are:

- Normal learning continued in this crisis with the help of the techno-pedagogical skills of school teachers.

- Teachers became more friendly with real virtual classroom situations. They also added that not only teachers but also the students become more friendly with real virtual classroom situations.

- Teachers are using the opportunity to use the technological tools, devices, and resources frequently in a real virtual classroom situation to teach the students from home and also ensure the continuity of the teaching-learning process.

- The online teaching sessions of the teachers are making them more competent in techno-pedagogical skills.

- They have got a better chance to deal with content, pedagogy and students through the use of technology.

- They feel that they have become more friendly with ICT in this crisis period.

- One of them told that COVID-19 is checking the readiness and awareness of their techno-pedagogical skills.

- According to some teachers, they were not so well prepared for online classes, but now they are becoming well prepared at present and for future scenarios also.

- Effective uses of techno-pedagogical skills will make the teachers more competent for any similar crisis in future.

- They believe that in future they can easily deal with the teaching-learning process with the help of techno-pedagogical skills.

- As per teachers' interviews, those who were less skilled or unskilled in some areas, have got an opportunity to enhance their techno-pedagogical skills.

- Teachers have been able to use different software more effectively, such as Google Meet, ZOOM Cloud Meetings, Google Forms, Google Classroom, Whiteboard etc. during the teaching-learning process.

- Teachers can know the various sources about teaching-learning material, such as different educational sites, AGORA, internet archives, CommonCraft videos on YouTube, eduSource and MERLOT etc.

CONCLUSIONS

From this study, it is concluded that the techno-pedagogical skills of secondary school teachers play a key role in the online teaching-learning process for any situation. During the COVID-19 pandemic situation, it has played a vital role in providing an effective and continuous online teaching-learning process. But only technology cannot play this role separately without techno-pedagogical skilled teachers. When the teachers effectively integrate technology into their pedagogical skills for the online teaching-learning process keeping in mind its advantages and disadvantages, then the online teaching-learning process becomes successful, and the main educational objectives can be easily achieved without any barrier. On the other hand, the COVID-19 pandemic has had a positive impact on the techno-pedagogical skills of secondary school teachers also.

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