Techno Pedagogical Competency and ICT Teaching Attitude among Secondary School Teachers

Dr Ruchi Bhargava (ruchibha1983@gmail.com)

Abstract

The present study investigates the study of techno pedagogical competency and ICT teaching attitude of secondary school teachers. The sample consisted 200 secondary school teachers both male and female from government and private schools of Amritsar district. In order to test, the hypothesis formulated for the present study. The scores obtained from different tests were subjected to statistical analysis and interpretation. Raw scores were tabulated and analyzed mean scores, standard deviation, standard error and correlation were used to arrive at the conclusions –

(i) There is no significant difference in Techno Pedagogical Competency among male and female secondary school teachers.

(ii) There is significant difference in ICT Teaching Attitude among male and female secondary school teachers.

(iii) There is no significant relationship between Techno Pedagogical Competency and ICT Teaching Attitude among secondary school teachers.

KEYWORDS: - Techno Pedagogical Competency, ICT Teaching Attitude
Education is defined as a systematic process of determining the extent in which the objectives are achieved by the pupils. According to Tagore, “Education is that which does not merely give us information but makes our life in harmony with all existence.” The education system has now witnessing a paradigm shift from the traditional chalk and board teaching methodology to digitizing the pedagogical approach through technical devices. A transformation would not only increase the capability of the teachers but would also widen the knowledge base of students so as make them competitive in the international arena.

Competent teachers have a good command of specialized knowledge of how to facilitate and represent subject matter to students in a meaningful way. They attempt to understand the preconceptions and background knowledge that students bring to each subject and are familiar of approaches and instructional materials that can be helpful. They understand where difficulties are likely to arise and modify their practice accordingly. Their instructional repertoire allows them to create multiple ways of approaching the subject. As the educational scenario goes through a vast change in the newly emerging society, the teachers need to be well equipped with knowledge which would create curiosity in students to learn new things (Dash, 2004).

Teacher Knowledge

Teacher knowledge can be defined as a body of professional knowledge that is made up of both knowledge of general pedagogical principles and skills and knowledge of the subject matter to be taught. Teacher professional knowledge is the teacher’s repertoire of different types of knowledge and skills that qualifies him or her to deliver his knowledge of the subject matter and distinguishes him or her from subject matter experts. As stated in Wilson and Berne (1999), professional teaching knowledge might include, at least, knowledge of the characteristics students, of subject matter, of cultural differences among groups of students, of learning, and of pedagogy. The various categories of teacher knowledge are shown in the Figure 1.
Various categories of teacher knowledge

Major Categories of Teacher’s Knowledge

❖ **General Pedagogical Knowledge**: General pedagogical knowledge is that kind of knowledge that teachers should have about the practices and methods of teaching and learning which encompass overall educational purposes, values and aims. This is a general form of knowledge that is related to all such issues of student learning, classroom management, lesson planning and implementation, and student evaluation. It includes knowledge about techniques or methods to be used in the classroom; the nature and characteristics of the students; and strategies for evaluating student understanding. A teacher with deep general pedagogical knowledge knows how students construct knowledge, acquire skills and develop new attitudes; they know how they develop habits of mind and positive dispositions towards learning.

❖ **Content Knowledge**: Content knowledge is knowledge about the actual subject-matter that is to be learned or taught. The content to be covered in middle school science or history is different from the content to be covered in an undergraduate course on art appreciation or a graduate seminar on astrophysics. Knowledge of content is of critical importance for teachers.
As Shulman (1986) noted, this would include: knowledge of concepts, theories, ideas, organizational frameworks, knowledge of evidence and proof, as well as established practices and approaches towards developing such knowledge.

- **Pedagogical Content Knowledge**: Pedagogical content knowledge is a term used to refer to the knowledge that teachers possess which enables them to better utilize their content knowledge by drawing on different pedagogical approaches most appropriate for delivering the most important concepts in the teaching of a particular subject matter. Pedagogical content knowledge is viewed as the most critical form of teacher knowledge for delivering the teaching content to enable students to understand it in a meaningful way.

- **Technological Content Knowledge**: Another form of teacher professional knowledge is technological content knowledge (TCK). We can define technological content knowledge as an understanding of the manner in which technology and content influence and constrain one another. It refers to the a special domain of teachers’ professional knowledge that is related to how technology can be integrated and utilized in teaching particular concepts and topics to provide students with a deeper and more comprehensive understanding of that concept or topic.

- **Technological Pedagogical Knowledge**: Technological pedagogical knowledge (TPK) as the knowledge of the ways in which various technologies can be used in teaching which includes an understanding that using technology may change the way teachers teach. Technological pedagogical knowledge is an understanding of how the application of particular technologies can change teaching and learning. This includes being with the pedagogical affordances and limitations of using a variety of technological tools as they relate to disciplinary and developmentally appropriate pedagogical approaches and strategies. Thus, a thorough understanding is required of the limitations and affordances of technologies and the disciplinary contexts within which they are used.

- **Technological Pedagogical Content Knowledge**: TPCK is an emergent form of knowledge that goes beyond all three components (content, pedagogy, and technology). Technological pedagogical content knowledge is an understanding that arises from an interaction between content, pedagogy, and technology knowledge. For meaningful and skilled teaching with
technology, TPCK is by far more than to have knowledge of all three concepts separately. Technological pedagogical content knowledge promotes effective teaching with technology that involves an understanding of how best to represent concepts to students with the use of technology, an understanding of pedagogical techniques and approaches that use technologies in fruitful ways in teaching content, knowledge of what makes concepts difficult or easy to learn and how best to apply technology to redress some of the problems that students face in their learning, knowledge of students’ already existing knowledge and theories of epistemology, and knowledge of how to use technologies to build on existing knowledge.

**Techno Pedagogical Competency**

Techno Pedagogy decides whether an Education media product is successful or not. Pedagogy refers ‘Science and Arts of teaching’ Techno derived from Latin word ‘Texere’ means ‘weave or construct’. Techno-Pedagogy refers to weaving the techniques of teaching into the learning environment itself. Education Technology provides approximate designing learning situations, holding in view the objectives of the teaching and learning bring the best practices/means of instructions which effect on learning.

According to Lee and Tsai (2010) Techno pedagogical competency is the art of integrating sound pedagogic principles of teaching/learning with the use of technology. It refers to weaving the techniques of the craft of teaching into the learning environment itself.

Yurdakul (2011) stated that today the TPACK competencies are very much needed for teacher-educators because they facilitate the prospective teachers and make them to become techno-pedagogues. Hence teacher-educators should be provided opportunities to get practical and pedagogical skills by using the recent technologies during their teaching-learning process. In techno pedagogy, there are three areas of knowledge which include namely, content, technology and pedagogy: -

- **Content:** content is the subject matter or body of information which is to be learned or taught to the students. It refers to the facts, concepts, theories and principles that are taught and learned rather than reading and writing.

- **Technology:** Technology encompasses an understanding of how to use computer software and hardware such as internet, digital video and common technologies including overhead
projectors, interactive boards and e-books in education. It is about certain ways of thinking and functioning with technology, tools and its resources.

- **Pedagogy**: Pedagogy is an understanding of how teaching and learning can be transformed and carried out with the assistance of various strategies, procedures, processes and methods. Acquiring techno-pedagogical competencies will make teaching and learning more pleasurable and meaningful endeavour as it will lessen the pressure on the part of the teachers and enable the students to develop deeper domain of knowledge.

**Ways to enhance teacher’s techno-pedagogical competency**

The rapid development in Educational technology has redefined the teaching and learning process to a greater extent. So, the teachers should need to be familiar with the application of recent technological theories and devices in their teaching and develop the techno-pedagogical competencies. Technology can be integrated in the following four general classroom situations where teacher’s techno-pedagogical competencies are the prime requirement:

- Technology in preparation for teaching
- Technology in providing motivation
- Technology in presentation
- Technology in evaluation.

The presence of techno-pedagogical competency in teachers can be examined from the following techno-pedagogical skills:

- Proficiency in linguistic abilities
- Aptitude to develop teaching learning process
- Ability to improve multimedia based study materials
- Capacity to design multi-grade instruction
- Talent to plan specific pedagogy
- Supportive in Distance Education through e-learning
- Guide and Counsel for career options
- Ability to stimulate Self Learning
- Improve enrolment and examination process
- Assist in research activities
- Competence to reinforce for cognitive learning

ICT Teaching Attitude

If we teach today’s students as we taught yesterday’s, we rob them of tomorrow. – John Dewey

ICT stands for Information and Communication Technology. It is the combination of two terms i.e. Information Technology and Communication Technology. Information Technology is a scientific, technological and engineering discipline and management technique used in handing the information, its application and association with social, economic and cultural matters.
UNSECO (2002) Communication Technology is the electronic system that facilitates communication between individuals and the groups, who are not physically present at the same location. For this purpose, gadgets such as Telephone, Telex, Fax, Radio, T.V., Smart phones, video and recent computer based technologies including electronic data interchange and e-mail are used.

We are living in an era of information and knowledge explosion. This information explosion is so speedy that for an educated person it becomes difficult to keep abreast with the latest advancements. According to Tinio (2009), globalization and technological change have created a new global economy that is powered by technology, fuelled by information and driven by knowledge.

According to Prytherch (2000), ICTs are networks that provide new opportunities for teaching, learning and training through delivery of digital content. Blurton, C. (2002) defined that ICTs stand for information and communication technologies and are defined as a “diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information.”

The progress in information and communication technology has changed the scenario of education system. It has been observed that development in ICT has become a crucial factor to cater the demand of changing education system (Chao, 2015). The different uses of ICT help in strengthening the quality of education to make teaching-learning an active process that is connected to real life situation. The use of ICT in education will not only improve the learning process but will also change the content of education, institutional infrastructure and the pattern of education system. ICT is a tool that supports the learning process and holds the promise to new solutions for the challenges that education is facing today (Oduma & Ile, 2014). Education is a social activity and quality education is associated with competent teachers having high degrees of personal contact with learners. The role of ICT in education is becoming more important as we are moving rapidly into the world of digital media and information.
Flow diagram showing impact of ICT on education

Summarily, the above figure shows the impact of ICT on education in bringing the transformation of society from industrial to information-based society. This transformation reveals the new definition of education that leads to new forms of development and professional training. For this, change in the attitude of teacher educators, teachers as well as of the society towards learning process is required.

Need & Significance

Teaching holds the most crucial position and helps in the success of any educational system. A teacher is the topmost academic and professional person in the educational pyramid who shapes the learners. Technology is a broad and constantly changing skill-set required of faculty, and selecting the appropriate techno-pedagogical strategies to effectively engage students in the content is a separate skill-set. Media literacy influences student development, and developing a critical analysis of media consumption is an important skill for students. In understanding how technology and media intersect with learning, consider the compatibility between theories of technology and education, and how that relates to the content.
A Techno pedagogical skills and ICT attitude in Teachers is a challenging task because mediated communication demands more of perfection on the part of teachers with ICT skills. The four most common mistakes in introducing techno pedagogical skill into teaching are

i. Installing learning technology without reviewing student needs and content availability;
ii. Imposing technological systems from the top down without involving faculty and students;
iii. Using inappropriate content from other regions of the world without customizing it appropriately; and
iv. Producing low quality content that has poor instructional design and is not adapted to the technology in use (UNESCO, 2009).

Teacher is main players in any initiative aimed at improving teaching and learning process in the classroom. Moreover, ICT’s and techno pedagogical competency at school levels will have partial impact if teachers are not actively involved in all phases of the ICT integration to the curriculum. Teachers are required to decide how to make appropriate educational use of ICT and techno pedagogical competency in the classroom. In other words, teachers need to upgrade their skills and knowledge in the field of ICT as well as techno pedagogical competency in other related subjects.

Present educators are also believed that modern technologies can advance and shape educational goals to meet the needs of the present time. Now in Covid-19 situation when the total education system has break down, institutions have been all closed since March,2020 the requirement of technological skills of the teachers have come to the front as the online teaching occurs to be the only measure for impart lesson. So this study wanted to assess the journey of teachers from pedagogy to techno-pedagogy, importance of techno-pedagogical knowledge for teachers, role of teachers and the challenges related to techno-pedagogical practices in Covid 19. Some probable measures of using techno-pedagogy more effectively are also trying to suggest here for the development of teachers’ techno-pedagogic skills amidst Covid-19 situation. Hence, the main aim of this study is to find out attitudes toward the use of ICT and techno pedagogical competency in classroom among the secondary school teachers.

Objectives
1. To study the Techno Pedagogical Competency among secondary school teachers with respect to gender.
2. To study the ICT Teaching Attitude among secondary school teachers with respect to gender.
3. To study the relationship between Techno Pedagogical Competency and ICT Teaching Attitude among secondary school teachers.

**HYPOTHESES**

1. There will be no significant difference in Techno Pedagogical Competency among male and female secondary school teachers.
2. There will be no significant difference in ICT Teaching Attitude among male and female secondary school teachers.
3. There will be no significant relationship between Techno Pedagogical Competency and ICT Teaching Attitude among secondary school teachers.

**Sample**

The sample was consisted of 200 secondary school teachers both male and female from government and private schools of Amritsar district, who was selected randomly.

**Design**

The present study falls under the domain of descriptive research as it intends to study the Techno Pedagogical Competency and ICT Teaching Attitude among secondary school teachers.

**Tools Used**

Following tools were used: -

1. Teachers Techno Pedagogical Competency Scale (TTPCS) (Dr S rajashekar and K.Sathiyaraj;2013)
2. ICT Teaching Attitude Scale (Dr T Pradeep Kumar ;2012)

**Procedure**

In order to test, the hypothesis formulated for the present study. The scores obtained from different tests were subjected to statistical analysis and interpretation. Raw scores were tabulated and analyzed mean scores, standard deviation, standard error and correlation were calculated.
Analysis and Interpretation of the Results
In order to verify the hypotheses 1, 2, and 3 t-test was employed and the results are displayed in the following tables

HYPOTHESIS -1

Hypothesis – 1 was framed to examine that “There will be no significant difference in Techno Pedagogical Competency among male and female secondary school teachers.”

The mean, S.D., t-ratio of Techno Pedagogical Competency among male and female secondary school teachers were calculated to test the hypothesis. The hypothesis was examined at 0.01 level and 0.05 level of significance. The result of this analysis is being shown below:

Table 1

<table>
<thead>
<tr>
<th>Particulars</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE_d</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>100</td>
<td>146.79</td>
<td>25.63</td>
<td>1.64</td>
<td>0.231*</td>
</tr>
<tr>
<td>Male</td>
<td>100</td>
<td>144.38</td>
<td>20.75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Not significant at both levels of confidence

The graphical presentation of above views have been given in figure 1

Table 1 shows that mean scores for Techno Pedagogical Competency among females are 146.79 which are higher than Techno Pedagogical Competency among males mean scores which are 144.38. The t-value testing the significance of means difference of Techno Pedagogical Competency among male and female secondary school teachers are 0.231 which is comparison to the table value is not significance at both level of significance.

From above interpretation of results, it is clear that there exists no significance difference in Techno Pedagogical Competency among male and female secondary school teachers. Thus hypothesis 1 “There will be no significant difference in Techno Pedagogical Competency among male and female secondary school teachers.” is accepted.
Hypothesis – 2

Hypothesis – 2 was framed to examine that “There will be no significant difference in ICT Teaching Attitude among male and female secondary school teachers.”

The mean, S.D., t-ratio of ICT Teaching Attitude among male and female secondary school teachers were calculated to test the hypothesis. This hypothesis was examined at 0.01 level and 0.05 level of significance. The result of this analysis is being shown below:

Table 2

<table>
<thead>
<tr>
<th>Particulars</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE_d</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>100</td>
<td>114.52</td>
<td>15.13</td>
<td>0.919</td>
<td>9.75*</td>
</tr>
<tr>
<td>Male</td>
<td>100</td>
<td>111.1</td>
<td>9.32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at both levels of confidence
The graphical presentation of above views have been given in figure 2

Table 2 shows that mean scores for ICT Teaching Attitude among females are 114.52 which are higher than ICT Teaching Attitude among males mean score are 111.1. The t-value testing the significance of means differences of ICT Teaching Attitude among male and female secondary school teachers is 9.75 which in comparison to the table value is significant at both level of significance.

From the above interpretation of results, it is clear that there exists significant difference in ICT Teaching Attitude among male and female secondary school teachers. Thus hypothesis 2 “There will be no significant difference in ICT Teaching Attitude among male and female secondary school teachers” is rejected at both levels of significance.

Figure 2- Showing Mean score of ICT Teaching Attitude among male and female secondary school teachers
Hypothesis – 3

“There will be no significant relationship between Techno Pedagogical Competency and ICT Teaching Attitude among secondary school teachers.”

In order to test hypothesis Karl Pearson coefficient of correlation was applied between Techno Pedagogical Competency and ICT Teaching Attitude. The result of the analysis was reported table 3 shows Pearson coefficient of correlation between Techno Pedagogical Competency and ICT Teaching Attitude of secondary school teachers.

Table 3

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Techno Pedagogical Competency</td>
<td>200</td>
<td>145.62</td>
<td>23.77</td>
<td>398</td>
<td>0.0066</td>
</tr>
<tr>
<td>ICT Teaching Attitude</td>
<td>200</td>
<td>114.96</td>
<td>13.48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Not significant at both level of confidence

From table 3 the coefficient of correlation between Techno Pedagogical Competency and ICT Teaching Attitude of secondary school teachers comes out to be 0.0066. The obtained value of ‘r’ is less than the value .38 at 0.05 level of confidence. It becomes vivid that there is insignificant relationship between the two variables i.e. Techno Pedagogical Competency and ICT Teaching Attitude of secondary school teachers.

From careful analysis of the result shown in the table 3 as well as statistical computation of ‘r’ value, we come to this conclusion that the hypothesis 3 which states that “There will be no significant relationship between Techno Pedagogical Competency and ICT Teaching Attitude of secondary school teachers” is accepted both at 0.01 and 0.05 levels of confidence.

CONCLUSIONS
There is no significant difference in Techno Pedagogical Competency among male and female secondary school teachers.

There is significant difference in ICT Teaching Attitude among male and female secondary school teachers.

There is no significant relationship between Techno Pedagogical Competency and ICT Teaching Attitude among secondary school teachers.
References


