A Study of Techno-Pedagogical Content Competency of Secondary School Teachers in Relation to English & Science Subject of Tonk District

Abstract

The main purpose of present study was to find out the techno-pedagogical content competency of secondary school teachers in relation to English and Science Subjects. This study used a descriptive survey method to know the techno-pedagogical content competency of teachers. The sample of the present study includes 600 secondary school teachers of Tonk district. The sample is selected by using a simple random sampling technique. To know the techno-pedagogical content competency, a self-developed TPCC Scale was prepared. The data analysis was calculated mean, standard deviation, and t-test. Finding of the study revealed that there is no significant difference in techno-pedagogical content competency of secondary school teachers and there is found significant difference in techno-pedagogical content competency of urban and rural secondary school teachers in relation to English and science subjects.

Keywords Techno-pedagogical content competency, secondary school.

Introduction

Transition, transformation, and revolution is the scenario of today's educational system. Educational systems around the world are under increasing pressure to use the new information and communication technologies to teach students the knowledge and skills they need in the 21st century. According to the UNESCO World Education Report (1998), Teachers are teaching in a Changing World, describes the radical implications the new information and communication technologies have for conventional teaching and learning. It predicts the transformation of the teaching-learning process and the way teachers and learners gain access to knowledge and information.Technologies used by a teacher in the classroom have an important role in education in the 21st century. Technology can provide powerful environments to generate modern views of learning which may not change a teacher's beliefs and practice. Teaching and learning and with technology are hard, overwhelming, and always changing (Jacobsen, Clifford, & Friesen, 2001). Findings from a Canadian Teachers Federation National Survey (2013) reported that the use of technology helps them to teach in the way they desire to teach, and the use of technology in the classroom assists them in meeting their students' individual learning needs. The National Policy on Education, 1986 emphasizes using educational technology to enhance the standards of education.Today a classroom without technology is incredible. As a result of these developments and evolution, standards of learning would be higher in the 21st century than they have been in the 20th century. In order to prepare the students to control the 21st century world, they must be exposed to technology-based instruction in the class room. Teachers have to play a significant role in realizing the educational goals of this dynamic society. To be successful in the future school environment, teachers would need to acquire additional knowledge and skills. The role of a teacher is becoming more specific and demanding in a new world on account of the explosion of knowledge and expansion of skills. Teachers must learn how technology, pedagogy, and content interrelate and create a form of knowledge. For introducing such things in the classroom activities, teachers have to become techno-pedagogues. Teachers with appropriate techno-pedagogical skills can make teaching a congenial experience without feeling much pressure. (Shulman, 1987) had observed, "The key to distinguishing the knowledge base of teaching lies at the intersection of content and pedagogy". It is the way in which teachers integrate technology that has the potential to bring change in the education process. Conversion from teachers to techno- pedagogue would not only increase the capability of the teachers but would also widen the knowledge base of students so as to make them competitive in the international arena. Student-teachers at the pre-service level should master different technologies and their application software and integrate this technological

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application in teaching-learning. Teacher education requires directing and refining teachers concerning the efficient use of ICT. Hence, ICT can be creatively used for the professional development of ICT skills among pre-service and in-service teachers (NCF, 2005).Educational systems around the world are compelling to use the new information and communication technologies to teach students the knowledge and skills they need in the 21st century. Today there are new expectations for education where the focus is on having teachers be futurist leaders to ensure sustainable education. Meaningful and authentic use of technology for quality teaching and meaningful learning is an essential component of the 21st century education. Universal access to quality education is considered essential for development. The National Curriculum Framework (2005), stated that "ICT is used for connecting children and teachers with scientists working in universities, and research institutions." It would also help in demystifying scientists and their work.

Educational technology will never be transformative on its own, it requires teachers who can integrate technology into the classroom and improve student's learning. In other words, computers cannot replace teachers. Teachers are the core element in using technology appropriately and effectively. Technology is never a substitute for good teaching. Without Techno-Pedagogically Skilled instructors, no electronic delivery can achieve good results.

Review of literature

Sindhwani (2019) studied on techno-pedagogical competency of teachers in relation to gender, academic stream and teaching experience. The result of the study was that significant differences have been found in techno pedagogical competency of teachers with respect to gender, stream and teaching experience. Demirok and baglama (2018) studied on examining technological and pedagogical content knowledge of special education teachers based on various variables. The results of the study showed that adequate levels of technological and pedagogical content knowledge levels of special education teachers and significant difference was observed between the teaching experience and the technological and pedagogical content knowledge levels. Patra and Guha (2017)found that the teachers with high level of PCK in Geography were significantly different from the teachers having moderate and low levels of PCK in geography in their self-efficacy. On the other hand, teachers with high level of PCK were significantly different from the teachers having low levels of PCK in geography in teacher effectiveness. Study also revealed that, teachers self-efficacy is positively related with teacher effectiveness in geography teaching.Pinamang and Penrose (2017) studied on pre-service teachers' content knowledge and pedagogical content knowledge in teaching geometric transformation. The results indicated a high level of content knowledge but low level of pedagogical content knowledge among the pre-service teachers in geometric transformation. A correlation analysis was also performed to identify the relationship between pre-service teachers' content and pedagogical knowledge in geometric transformation and the results indicated a weak positive significant relationship between pre-service teachers' content knowledge andpedagogical content knowledge.

Rationale of the Study

Techno-pedagogy is a key deciding factor for the hybrid approach of Meta teaching. The last two decades have witnessed the inclusion of developments in techno-pedagogical skills in education systems around the world. Use of techno-pedagogical skills can break down some of the barriers that lead to underachievement, student disaffection and educational exclusion (Das, 2007). However, when one looks around, in most of the educational institutes across the country lack of harnessing of this potential is visible. In spite of the fact that planning and implementation of initiatives for enhancing role of techno-pedagogical competency in education have received priority, analysis of the existing scenario reveals number of factors which have been impeding the integration of technology in educational sector.A teacher with deep pedagogical knowledge understands how students construct knowledge, acquire skills, and develop habits of mind and positive dispositions toward learning. The techno pedagogical skills help the teacher to teach the content effectively within the stipulated time period.It induces vivid or simulate learning environment. This type of effective learning helps the learner to understand the concept thoroughly with better retention of the learned concept for longer duration. The teacher with good techno-pedagogical competencies yields better job opportunities and position along with better salary package. Techno-pedagogy knowledge of teacher helps to reduce stress and frustration of the teacher with respect to their routine work load. Techno pedagogical competency

reduce the pressures on the part of teachers and students as wellto get wider knowledge. This gives opportunity to get quality education to unreached students.Gloria and Edward William Benjamin (2014) confirmed that the teachers need to update themselves towards techno pedagogical competency so as to nurture the technological competence among the students of future generation. Technology is the wave of the future, of course it's actually wave of the present. Students of this generation are digital learners, they have knowledge towards technology, and they spend more time with technology. In order to tackle them and create productive citizen as a teacher, he / she needs techno pedagogical competencies.Every teacher should know how to use technology, pedagogy and subject area content effectively in their daily classroom teaching. It is clear that merely introducing technology to the educational process is not enough. One must ensure technological integration since technology by itself will not lead to change. Rather, it is the way in which teachers integrate technology that has the potential to bring change in the education process. For teachers to become fluent in the usage of educational technology means going beyond mere competence with the latest tools to developing an understanding of the complex web of relationships among users, technologies, practices, and tools. Teachers must understand their role in technologically-oriented classrooms. Therefore, it is important for teacher to get familiar with the recent technologies to use them effectively in their teaching.Hence, there is urgent need to examine the content and techno-pedagogical content competency of teachers.

Statement of the Problem	A Study of Techno-Pedagogical Content Competency of Secondary School Teachers In Relation To English & Science Subject of Tonk District
Objective of the Study	1. To study the techno-pedagogical content competency of male and female secondary school teachers in relation to English subject. 2. To study the techno-pedagogical content competency of government and private secondary school teachers in relation to English subject. 3. To study the techno-pedagogical content competency of urban and rural secondary school teachers in relation to English subject. 4. To study the techno-pedagogical content competency of male and female secondary school teachers in relation to Science subject. 5. o study the techno-pedagogical content competency of government and private secondary school teachers in relation to Science subject. 6. To study the techno-pedagogical content competency of urban and rural secondary school teachers in relation to Science subject.
Hypotheses of the Study	1. There is no significant difference in techno-pedagogical content competency of male and female secondary school teachers in relation to English subject. 2. There is no significant difference in techno-pedagogical content competency of government and private secondary school teachers in relation to English subject. 3. There is no significant difference in techno-pedagogical content competency of urban and rural secondary school teachers in relation to English subject. 4. here is no significant difference in techno-pedagogical content competency of male and female secondary school teachers in relation to Science subject. 5. There is no significant difference in techno-pedagogical content competency of government and private secondary school teachers in relation to Science subject. 6. There is no significant difference in techno-pedagogical content competency of urban and rural secondary school teachers in relation to Science subject.
Research Method	The descriptive survey method was employed in the present study
Sample and Sampling Method	The present study was conducted on different secondary school teachers ofTonk district. The sample consisted of 600 secondary school teachers from Six block (Tonk, Deoli, Malpura, Newai, Todaraisingh, Uniyara) of Tonk district. The investigator used a simple random sampling technique.
Tool used for the study	The investigator used the following tools for collecting the data: -Self-made Techno-Pedagogical Content Competency scale.

Statistical Techniques   To analyse and interpret the data obtained t-test has been used as statistical techniques: -

Analysis and Interpretation

Hypotheses:1   There is no significant difference in techno-pedagogical content competency of male and female secondary school teachers in relation to English subject.relation to English subject.

Table 1
Techno-pedagogical content competency of male and female secondary school teachers in relation to English subject

Groups	N	df	Mean	SD	t value	Significance value a=0.05	Result
Male teachers	158	2.98	187.15	28.59	2.47	1.97	Rejected
Female teachers	142		194.75	24.57			

Interpretation   It is inferred from the above table that, the obtained 't' value i.e.,2.93 is more than the table value with df - 298 at .05 level i.e.,1.97. Which proves the significant difference in techno-pedagogical content competency of male and female secondary school teachers in relation to English subject. Hence the null hypotheses 'There is no significant difference in techno-pedagogical content competency of male and female secondary school teachers in relation to English subject' is rejected.While comparing the mean scores of techno-pedagogical content competency of English teachers, the female teachers (mean 194.75) are better than the male teachers (mean 187.15).Thus, it can be concluded that gender of the English teachers shows a significant difference in techno-pedagogical content competency.It may be due to the fact that female teachers are effectively use the technology in their teaching.

Hypotheses: 2   There is no significant difference in techno-pedagogical content competency of government and private secondary school teachers in relation to English subjects.

Table 2
Techno-pedagogical content competency of government and private secondary school teachers in relation to English subject

Groups	N	df	Mean	SD	t value	Significance value a=0.05	Result
Government teachers	186	298	190.96	26.88	1.27	1.97	Accepted
Private teachers	114		186.99	25.87			

Interpretation   It is inferred from the above table that, the obtained 't' value i.e.,1.27 is less than the table value with df - 298 at .05 level i.e.,1.97. Which proves the techno-pedagogical content competency of government and private secondary school teachers are not significant in relation to English subject. Hence the null hypotheses 'There is no significant difference in techno-pedagogical content competency of government and private secondary school teachers in relation to English subject' is accepted.
While comparing the mean scores of techno-pedagogical content competency of English teachers, the government teachers (mean 190.96) are better than the

private teachers (mean 186.99).Thus, it can be concluded that the techno-pedagogical content competency of government and private secondary school teachers are homogeneous. It may be due to the fact that government and private secondary school teachers alike have techno-pedagogical content competency.

Hypotheses: 3

There is no significant difference in techno-pedagogical content competency of urban and rural secondary school teachers in relation to English subjects.

Table 3
Techno-pedagogical content competency of urban and rural secondary school teachers in relation to English subject

Groups	N	df	Mean	SD	t value	Significance value a=0.05	Result
Urban teachers	133	298	195.78	25.13	3.54	1.97	Rejected
Rural teachers	167		185.77	23.20			

Interpretation

It is inferred from the above table that, the obtained 't' value i.e.,3.54 is more than the table value with df - 298 at .05 level i.e.,1.97. Which proves the significant difference in techno-pedagogical content competency of urban and rural secondary school teachers in relation to English subject. Hence the null hypotheses 'There is no significant difference in techno-pedagogical content competency of urban and rural secondary school teachers in relation to English subject' is rejected.

While comparing the mean scores of techno-pedagogical content competency of English teachers, the urban teachers (mean 195.78) are better than the rural teachers (mean 185.77).Thus, it can be concluded that locality of school shows a significant difference in techno-pedagogical content competency of English teachers. It may be due to the fact that the availability of technical resources is better in urban areas as compared to rural areas.

Hypotheses: 4

There is no significant difference in techno-pedagogical content competency of male and female secondary school teachers in relation to Science subject

Table 4
Techno-pedagogical content competency of male and female secondary school teachers in relation to Science subject

Groups	N	df	Mean	SD	t value	Significance value a=0.05	Result
Male teachers	154	298	191.62	25.23	1.68	1.97	Accepted
Female teachers	146		196.26	22.35			

Interpretation

It is inferred from the above table that, the obtained 't' value i.e.,1.68 is less than the table value with df - 298 at .05 level i.e.,1.97. Which proves the techno-pedagogical content competency of male and female secondary school teachers are not significantly different in relation to science subject. Hence the null hypotheses 'There is no significant difference in techno-pedagogical content competency of male and female secondary school teachers in relation to science subject' is accepted.While comparing the mean scores of techno-pedagogical content competency of science teachers, the female teachers (mean 196.26) are better than the male teachers (mean 191.62).Thus, it can be concluded that gender of the

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science teachers shows no significant difference in techno-pedagogical content competency.It may be due to the fact that science teachers have believed that techno-pedagogical content competency is helpful in teaching the science subject.

Hypotheses: 5

There is no significant difference in techno-pedagogical content competency of government and private secondary school teachers in relation to Science subject.

Table 5

Techno-pedagogical content competency of government and private secondary school teachers in relation to Science subject

Groups	N	df	Mean	SD	t value	Significance value a=0.05	Result
Government teachers	173	298	197.53	21.40	1.62	1.97	Accepted
Private teachers	127		192.98	25.24			

Interpretation

It is inferred from the above table that, the obtained 't' value i.e.,1.62 is less than the table value with df - 298 at .05 level i.e.,1.97. Which proves no significant difference in techno-pedagogical content competency of government and private secondary school teachers in relation to science subject. Hence the null hypotheses 'There is no significant difference in techno-pedagogical content competency of male and female secondary school teachers in relation to science subject' is accepted.

While comparing the mean scores of techno-pedagogical content competency of science teachers, the government teachers (mean 197.53) are better than the male teachers (mean 192.98).Thus, it can be concluded that gender of the English teachers shows a significant difference in techno-pedagogical content competency.It may be due to the fact that Techno-pedagogy is a key deciding factor for the hybrid approach of meta-teaching.

Hypotheses: 6

There is no significant difference in techno-pedagogical content competency of urban and rural secondary school teachers in relation to Science subject.

Table 6

Techno-pedagogical content competency of urban and rural secondary school teachers in relation to Science subject

Groups	N	df	Mean	SD	t value	Significance value a=0.05	Result
Urban teachers	121	298	199.33	23.89	2.24	1.97	Rejected
Rural teachers	179		193.08	23.09			

Interpretation

It is inferred from the above table that, the obtained 't' value i.e.,2.24 is more than the table value with df - 298 at .05 level i.e.,1.97. Which proves the significant difference in techno-pedagogical content competency of urban and rural secondary school teachers in relation to science subject. Hence the null hypotheses 'There is no significant difference in techno-pedagogical content competency of urban and rural secondary school teachers in relation to science subject' is rejected.

While comparing the mean scores of techno-pedagogical content competency of science teachers, the urban teachers (mean 199.33) are better than the rural teachers (mean 193.08).Thus, it can be concluded that locality of school of science teachers shows a significant difference in techno-pedagogical content competency.It

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may be due to the fact that techno-pedagogical skill is a challenging task for teachers.

Conclusion

This study concludes that secondary school teachers of Tonk district have not differ significantly in techno-pedagogical content competency with respect to their gender and type of school but on the other hand significant difference was found in techno-pedagogical content competency of secondary school teachers with respect to location of the school.

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