



**Technological Pedagogical Content Knowledge and Self efficacy of
Secondary School Social Studies Teachers-A Study**

Thesis submitted for the award of the Degree of
Doctor of Philosophy
In
Education
By

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List of Abbreviations

ANCOVA	Analysis of Co-variance
ANOVA	Analysis of Variance
BCF	Bihar Curriculum Framework
BSEB	Bihar School Examination Board
CBSE	Central Board of Secondary Education
CK	Content Knowledge
ICT	Information and Communication Technology
MANOVA	Multivariate Analysis of Variance
NCF	National Curriculum Framework
NCFTE	National Curriculum Framework for Teacher Education
OSTES	Ohio State Teacher Efficacy Scale
PCK	Pedagogical Content Knowledge
PCK	Pedagogical Content Knowledge
PK	Pedagogical Content Knowledge
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
SST	Social Studies
TCK	Technological Content Knowledge
TK	Technological Knowledge
TOS	TYPE OF SCHOOL
TPACK	Technological Pedagogical and Content Knowledge
TPCK	Technological Pedagogical Content Knowledge
TPK	Technological Pedagogical Knowledge

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Chapter-1

Introduction

Chapter-1

1.1 Introduction

The emergence of digital technologies has influenced every part of our lives in remarkable ways. These technologies have penetrated directly or indirectly every section of our way of life in different forms (Hixon & Buckenmeyer, 2009). The current era is full of different technological innovations, and devices, which are influencing every facet of our life as well as teaching and learning. These days, technologies play an essential part in our day-to-day life. Whether it is in day-to-day activities, business, or other forms of life, technologies have touched every sphere of our life. Recently, its presence in our educational system especially, in our classroom, laboratory, library, students evaluation, etc. has been seen widely. The application of technology in the educational system has entirely transformed the traditional model of the teaching and learning practice by adapting & making massive application of educational technology in the educational system (Sathiyaraj, 2013).

The advent of digital technology has benefited the educational process in numerous ways. The vision of using emerging educational technologies to improve the educational aspects of students and learners has been taken into the interest by different researchers (Lee, Brescia & Kissinger, 2009). Many studies have confirmed the effect of technology on the educational process. Schrum et. al. (2007) and Sweeder & Bednar, (2001) confirmed that when educators incorporate technology into the teaching-learning practice, their students get more involved in the subject manner.

The current era is of 'Digital natives', the word coined by Prensky (2005) as cited by Owusu (2014) and Gomez (2016) which means the learners who have grown up in the presence of digital technologies like smartphones, tablets, laptops, internet, audio-videos devices, etc. They are surrounded by these digital technologies, as technology is an inseparable part of their life. They are already familiar with these technologies and using them in their life not only for entertainment purposes but also for informal learning activities. They are the 'native speakers' of digital technologies language as they have grown up in the digital age. While Oblinger and Oblinger (2005) termed them the 'Net generation' and Perillo (2007) named them the 'Generation Y'. These learners are now adaptive prosumers (Toffler, 1980) as cited by Gomez (2016). Considering the level of these learners' digital knowledge, it is imperative to stakeholders that these learners be taught with educational technologies.

While technologies have their quality to be effective but it is subject to users to use those technologies in a productive and efficient way so that required outcomes can be achieved. However, even though it is widely used in educational systems, questions remain on its effectiveness and its appropriate use. It is the teachers who have to incorporate these technologies to deliver the content. To study the effective application of technology in the educational process, it is the requisite of time to examine the teachers' use of technology. Prior to Shulman's (1986) pedagogical content knowledge, the knowledge of the content was only into consideration of effective instruction. Shulman (1986) argued and concluded that without appropriate pedagogical practices, content knowledge in isolation cannot be the basis of effective instruction. Taking it as the foundation, Mishra and Koehler (2006) have further inducted technological knowledge into Shulman's (1986) pedagogical content

knowledge (PCK) framework and developed a new framework Technological Pedagogical Content Knowledge (TPCK). They argued that three knowledge-content, pedagogy, and technology must be integrated for effective instruction. According to Mishra and Koehler (2006), the knowledge of TPCK is crucial for the effective use of technology to teach appropriately using pedagogical knowledge.

1.2 Theoretical background of Technological Pedagogical Content Knowledge (TPCK)

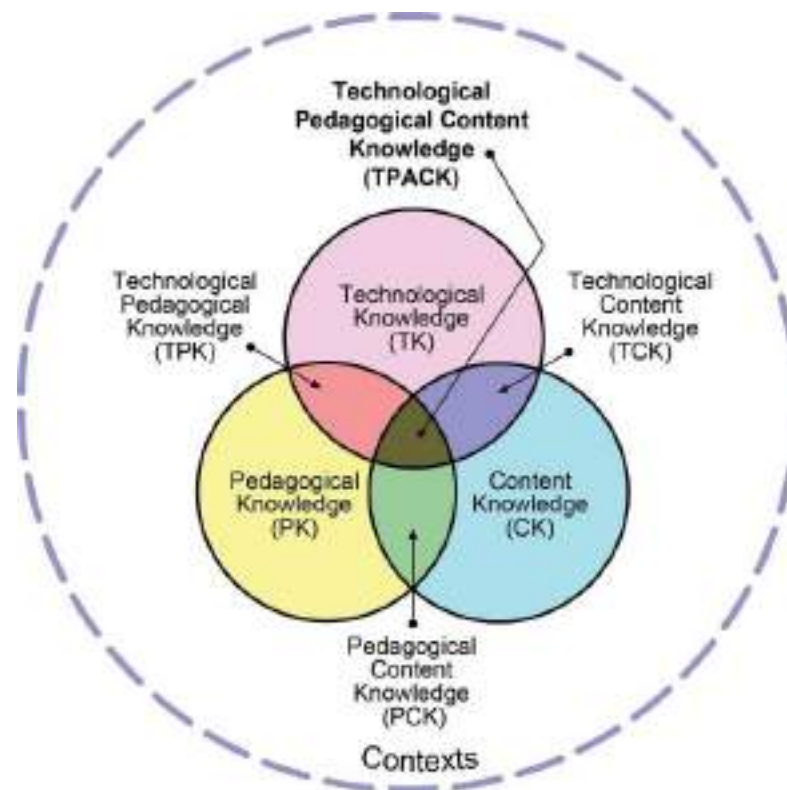
The technological pedagogical content knowledge (TPCK) framework is the extension of Shulman's (1986) pedagogical content knowledge. Shulman's pedagogical content knowledge (PCK) has been an area of interest for students, scholars, educators, etc. since it came into manifestation. The view of Shulman's pedagogical content knowledge has been studied, scrutinized, comprehended, and discussed by several researchers and different subject experts. Koehler and Mishra (2006) claimed that for effective teaching, effective technological integration need not only be limited to just content knowledge, technology knowledge, and pedagogical knowledge but also its integration with each other. The reason behind it is that effective teaching with technology comprises technological knowledge, pedagogical knowledge, and content knowledge in a system manner. For effective mixing of technology in education, it is imperative to blend these technological knowledge, pedagogical knowledge, and content knowledge in a unison manner rather than in a quantum manner. Therefore, Technological pedagogical content knowledge has been defined as a framework that describes how teachers incorporate technology into the teaching process and how to apply technology in an integrated manner within the framework of TPCK (Yildiz, 2017;

Mishra & Koehler 2006; Koehler et al, 2007). TPACK is formed when teachers know the use of technological tools to transfer the content knowledge using appropriate pedagogical strategies (Graham et al, 2009). Agyei & Voogt, (2012) defined it as the “knowledge and understanding of the interplay between content knowledge, pedagogical knowledge, and technological knowledge when using technology for the purpose of teaching and learning”. From the inception of TPACK, it has been an area of interest for researchers, educators, etc., and accepted as a useful framework for teachers. The TPACK acronym was renamed as TPACK to make it easier to call or pronounce (Thompson & Mishra, 2007).

However, it should not be misinterpreted that only having mere knowledge of these components is sufficient for effective teaching with technology rather it is the joining of knowledge of these components that make sure the actual teaching-learning with technology (Mishra & Koehler, 2006; Koehler & Mishra, 2009). Shulman (1986) talked about his Pedagogical content knowledge framework as a new type of knowledge and not just the application of two pieces of knowledge in an isolated manner. Much like that, making a relationship between pedagogical content knowledge with technology creates two new types of knowledge that are technological pedagogical knowledge and technological content knowledge and, when these two types of knowledge intersect with Shulman’s (1986) PCK, it creates a new form of knowledge which Mishra and Koehler labeled Technological pedagogical content knowledge. As TPACK is too a new system of knowledge that is not only the application of these pieces of knowledge separately. In addition, in this framework, there are no grades or levels of different knowledge rather it is the appropriate use of technology integration into the teaching-learning practice. No single knowledge of framework plays the same role as the

integration of all the knowledge. There is no universal knowledge in this regard as each situation, each teacher, each course is different. Each knowledge has its purpose which makes TPCK framework more effective and distinctive.

The TPCK framework which is recognized as a special structure of knowledge for teaching has seven components as- Technological Knowledge, pedagogical knowledge, content knowledge, pedagogical content knowledge, technological pedagogical knowledge, technological content knowledge, and technological pedagogical content knowledge.



Figure, 1.1 (TPCK) Reproduced by permission of the publisher, © 2012 by

tpack.org

The brief information of each knowledge is discussed as follows

1.2.1 Technological Knowledge (TK): In the 21st century, the penetration and advancement of technology have changed the way of life of every course of action including teaching-learning. It has changed the traditional tools, communication, and the nature of actions dramatically. Technological knowledge is defined as the knowledge of different technologies which can be practiced in the teaching-learning process (Margerum-Leys & Marx, 2002). Koehler et al, (2014) defined it as the knowledge about both conventional and new technologies that can be combined into teaching-learning to achieve the teaching objectives. Mishra & Koehler (2006, 2008), described technological knowledge as the knowledge of standard technologies like chalk, duster, blackboards, books and, more innovative digital technologies like a laptop, computers, internet, smartphones, audio-video technologies, etc. which help a teacher to make teaching easy. According to Cox & Graham (2009), “technological knowledge refers to the knowledge of emerging technologies only”. They claimed that this knowledge is limited to the capability of using emerging technologies. This comprises of required skills to run specific technologies.

In the current digital era, teachers need to be cognizant of prevailing technologies, and should have knowledge about the affordance of digital technologies and their prospective future application. In a recent study, Gomez (2016) defined TK as teachers’ depth of knowledge about technological software and hardware devices. This includes knowing the functions of different devices like computer/laptop, printer/scanner, and the ability to use basic sets of software programs like Word, spreadsheet, and PowerPoint presentation, including emerging digital technologies like the Internet, interactive smart board, cloud computing, online classes using different applications, etc. Technological knowledge is also defined as teachers’ capabilities in using digital

technology. Digital capability refers to the teachers' capability to use various digital technology and understanding of their appropriate applications in teaching learning.

Since, "technology is always in a state of flux" (Koehler & Mishra, 2009). The nature of digital technology is to keep moving from its previous state to the next state. In this sense, it is very difficult to define what actually technological knowledge is. For example, many of the technologies which were mentioned above may take another form of technology or even it completely disappear quickly. It will be always important to be aware of new technological knowledge and the ability to learn and apply it appropriately (Mishra & Koehler, 2006). Teachers need to be ready to adopt new technological innovations in their teaching-learning activities (Zaidi & Hussain, 2019). Teachers who are more open to learn may have more capability to perform technological integration with other components of TPCK. One who possesses higher technological capability may perform emerging technological tools easily. Because of its dynamic nature, technology is not only limited to just as a carrier but it is used in collecting, storing, analyzing, and communicating data from one end to various ends which are termed Information and Communication Technology (ICT). Therefore, in the context of TPCK framework technological knowledge encompasses all the digital emerging technologies which can be used to integrate the other knowledge of the framework appropriately.

1.2.2 Pedagogical knowledge (PK): Every teacher wants that his teaching should be effective. To be an effective teacher, it is essential to have a range of pedagogical knowledge for effective teaching learning. It consists of many things like from where to start, how to do it, how the learners will be attentive, and in which way students get

benefitted. Pedagogical knowledge refers to the understanding of the teaching approaches, processes, and practices, approaches of teaching and learning, and procedures of classroom management. It is the knowledge of the nature of instructions, it includes how contents are arranged, and how it is presented to students to make them effective. It also encompasses teaching-learning strategies, assessment, and evaluation of students' learning outcomes (Mishra & Koehler, 2007). It is the art and science of teaching. It is the pedagogical knowledge that shapes teachers' behaviors and their teaching approaches by taking into consideration of different learning concepts, knowing the students' strengths and weaknesses, making appropriate planning, and considering individual differences of learners (Shulman, 1987).

A teacher with a deep understanding of pedagogical knowledge will certainly have more understanding of how their students construct knowledge, how they keep interested in their subject matter etc. (Mishra & Koehler, 2006; Harris et al 2009). Social studies teachers make teaching objectives achievable by applying the appropriate method of social studies. Project method, field-trip method, dramatization, discussion, problem-solving, experiential learning, etc. are some of the methods of social studies. These appropriate methods can be determined by teachers as per the students' level of grade, level of understanding, interest, etc.

1.2.3 Content Knowledge (CK): Content knowledge refers to the information about the subject, or topic which are to be taught or learned. Basically, it is the knowledge of what to teach or learned. The content knowledge cannot be the same for different levels, different age groups, and different subject matter. The content which is taught at the high school level will be certainly different from the content that is taught at the higher

education level. Teachers should have respective knowledge regarding what to teach, including basic concepts, facts, theories, frameworks of respective subject matters, knowledge of explanatory structure which can be used to apply analogy with ideas, knowledge of the procedures of the validation and evidence (Shulman, 1986).

Content knowledge has critical importance for teachers. Teachers of secondary school social studies subject must have the content knowledge of history, geography, political science, and economics. These subjects further cover the content of culture and society, heritages, places and environment, production, distribution, consumption, etc. Teachers must have an understanding of the nature of different knowledge and should have the ability to correlate with the knowledge of other related disciplines. Teachers should be aware of contemporary knowledge of subject matters. They should be ready to adopt new creations and innovations which are happening all over the world. There are many common terms that are used in different subjects of discipline, it depends on the teachers' knowledge of how they apply to the specific subject matter. Without a deep understanding of the subject matter, it can lead to the misrepresentation of the subject to learners (Ball & McDiarmid, 1990).

1.2.4 Pedagogical Content Knowledge (PCK): It is the merger of pedagogical knowledge with content knowledge. The merger of these two pieces of knowledge shapes the new form of knowledge that is Pedagogical content knowledge which was coined by Shulman (1987). Pedagogical content knowledge refers to the teachers' knowledge of appropriate pedagogical techniques to deliver the content matter making it more effective. PCK encompasses the demonstration and making of the concepts of the content, facts, and theories, pedagogical techniques, how to present them to the

students, understanding of students' strengths and weaknesses, making subjects interesting and effective, and understanding of students' misconceptions regarding subjects and methodologies. This knowledge contains the knowledge of what techniques, approaches, and methods fit the contents, and how the content can be presented to the students for better teaching learning (Mishra & Koehler, 2006).

PCK is the transformation of content knowledge with the help of appropriate instructional methodologies. Social studies teachers' pedagogical content knowledge helps them to transform the content knowledge like culture and heritage, places, production and distribution, social organizations, etc. using appropriate pedagogical techniques and methods which make them more interesting and effective. Social studies teachers must have the social studies content knowledge and ability to integrate it with specific pedagogical contexts to establish an adaptive and open learning environment that encourages students to understand the subject in a better way. During the teaching-learning practices in the classroom environment, teachers explain the key areas of the particular subject matter, correlate it with suitable examples, and make things interesting (Grossman, 1990).

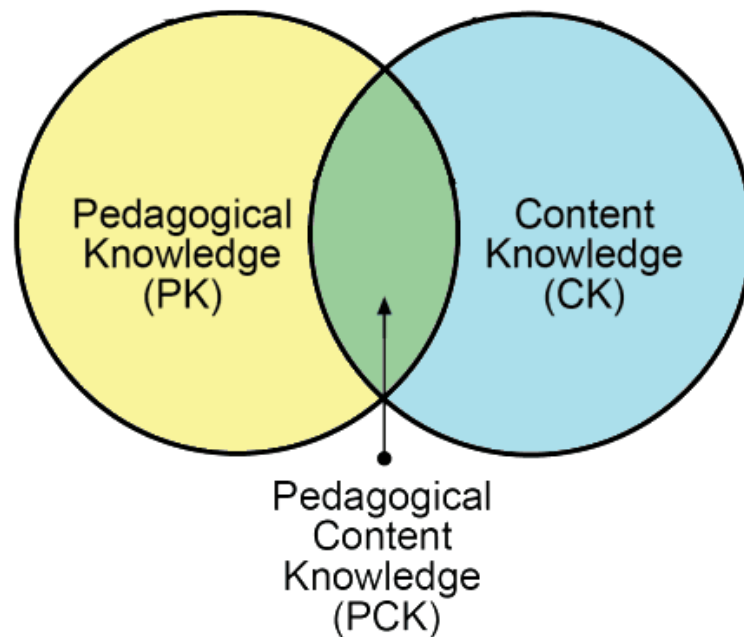


Figure 1.2 (PCK), Source: <https://fcit.usf.edu/matrix/tpack-and-the-technology-integration-matrix/>

1.2.5 Technological Content Knowledge (TCK): This domain knowledge refers to the integration of technological knowledge with the content which is to be taught. Mishra & Koehler (2008) defined “TCK as the understanding of the method by which technology and content build a relationship with each other”. TCK reflects an acquaintances of the mode in which technology and content provide guidance and restrain each other too. Teachers need to have an understanding of the technological application and constrain. Not only, teachers should have expertise in what they have to teach but also they have a proper knowledge of the method in which the subject matter can be effectively presented by the incorporation of appropriate technological integration. Teachers are estimated to have the right knowledge about the technology that is optimally suited for the particular subject matter for the effective transformation of content knowledge.

Teachers having a deep understanding of technological content knowledge should have more capabilities to apply both content and technological knowledge in a manner to get optimum learning achievements. To be an effective teacher, it is needed to have deep acquaintances of the method in which the teaching-learning process can be modified by the appropriate application of technological innovations (Sharma, 2017). For example, Microsoft Word and Microsoft Excel both can be used to explain specific subject matter but it depends on teachers' knowledge regarding their application. If the nature of the content is data-based then it will be better to use Microsoft Excel as it provides more tools to analyze and present the data. Teachers must have an understanding of which technologies are most appropriate for specific subject matter, how content influence or constrain particular technological applications, and vice versa (Harris et al. 2009).

1.2.6 Technological Pedagogical Knowledge (TPK): This component of TPCK comes into existence when various technologies are used to deliver diverse teaching-learning approaches. It describes the knowledge about how instructional processes change when specific technological tools are applied. Educators must be aware of the knowledge about different technologies and be in a position to use them as pedagogical strategies, approaches, and methods in their teaching-learning practices (Shin et al, 2009). This comprises an acquaintance of the various range of technological tools which are available for different purposes, the ability to identify those tools which are more appropriate, strategies to use technological affordances, and the ability to use them in teaching learning practices. It facilitates pedagogical practices using different technological tools like computers, the internet, etc. It consists of an understanding of technological tools to manage classroom management, lesson planning, maintaining students' records, students' participation in discussion of a topic using collaborative

learning tools, students' evaluation process, etc. Using technological tools in pedagogical practices means understanding of affordances and limitations of a range of various technological tools. It includes the ability to understand the technological application in the teaching-learning process which affects the procedures and tactics and how effectively teaching & learning objectives can be accomplished using appropriate technologies (Owusu, 2014).

1.2.7 Technological Pedagogical Content Knowledge (TPCK): TPCK is the meeting of all three components of knowledge. TPCK emerges when all three components- technology, pedagogy, and content interact with each other. The integrated form of this knowledge is beyond the knowledge of these components in an isolated manner. Mishra and Koehler (2008) discussed that TPCK is the foundation of effective teaching with technology and it needs an acquaintance of the depiction of notion applying technologies to deliver the content in a constructive way; requires an understanding of pedagogical practices to make the teaching-learning process effective; knowledge of those pedagogical techniques and technologies which can be useful to represent the contents knowledge; knowledge of what makes concept interesting or challenging and understanding of technological application which can be useful to solve the problems learners face; understanding of students' previous knowledge, individual differences, etc.

Development of good content needs a thoughtful intertwining of all the components of Technological pedagogical content knowledge framework. Teachers require to have an understanding of technological knowledge, pedagogical knowledge, and content knowledge in a unison manner rather than in a quantum manner. For effective teaching-

learning, teachers need to be in a position to understand the complex relationship among all the knowledge of three key components. It should be noted that there is no universal technological solution for every teaching-learning problem, every age group, and every level of class. Teachers must have an understanding of those technological tools which can transform the content knowledge in an effective manner. Effective teaching requires building an acute level of understanding of the multifaceted integration of technology, pedagogy, and, content knowledge and using this knowledge to make appropriate teaching-learning practices.

1.3 TPCK with an example

Social studies teachers' TPCK can be described by selecting a topic 'Resources and their development' using appropriate technology that is 'smart board and internet':

TPCK example:

Knowledge type	Example
Content Knowledge	Teachers' knowledge regarding Resources, their types, need for resource planning etc.
Pedagogical Knowledge	Teachers' knowledge of suitable methods of teaching 'Resources and their development'.
Technological Knowledge	Teachers' ability to use smartboard and its different tools, connecting it to internet etc.
Technological Content Knowledge	Understanding of technological application with the content. In this case, a teacher can search different sources to get a better understanding of the topic, and should have knowledge of storing the different media files like images, videos etc.
Pedagogical Content Knowledge	Knowledge of suitable pedagogical techniques to deliver the content in an effective manner. Teachers can use teaching-learning materials, and teaching aids to make content interesting. There may be a discussion about the different

	types of resources that are used commonly in day to day life.
Technological Pedagogical Knowledge	Understanding of technological application with suitable pedagogical techniques. Should have the aptitude to understand the affordances and constrain of technologies. Teachers may evaluate whether the students learning outcomes in that particular way of teaching is effective or not.
Technological Pedagogical Content Knowledge	This is the integration of all the components of TPCCK. Teachers make all the knowledge in an integrated way so that students get maximum learning. Resources and their development, and its type are taught with deep understanding, using appropriate pedagogical techniques with smart board and the internet. Teachers use PowerPoint presentations, and various related online teaching learning materials to make content effective.

Improving the quality of teaching is a challenging task. It depends on various hard work and practices. It includes appropriate teaching methods, infrastructure, educational policy, financial support, and many more. The application of any resource ultimately depends on human resources. Among all the resources, it is the teachers who are the most important resources for teaching-learning, because they merge all the educational activities together to make teaching effective. It is the teachers who play a significant role in transforming changes in the students. However, having only resources is not sufficient for effective teaching. A teacher may have proper training, skills, capability, and knowledge of technological integration but still, they may lack belief in their capability to execute it in an effective manner. Mishra & Koehler (2007) emphasized that for effective teaching with technology, educators must have a complex integrated knowledge of technology, pedagogy, and content. Yet, merely knowledge of

technological integration cannot guarantee effective teaching as it requires various other factors like knowledge of pedagogical practices, required teaching learning skills, and self-efficacy. Self-efficacy is the belief in one's specific capability. Sherman & Howard (2012) claimed that the self-efficacy of teachers may play a significant role to implement technological integration in their teaching-learning activity as cited by Sharma (2017).

1.4 Theoretical background of Self-efficacy

A person must have some special characteristics to do work effectively and to complete it successfully. There are two ways when we decide to do a job, either we can or cannot. The belief in one's ability to do work is called self-efficacy Albert Bandura (1977). Albert Bandura a psychologist in his Social Cognitive theory defined the word self-efficacy as "Self-efficacy refers to the belief of a person on his/her ability to perform a specific task." In other words, it shows how much belief has someone in his/her ability to achieve a particular assignment. The word "Self-efficacy" has significantly gained popularity in the field of psychology and other related fields after the publication of Albert Bandura's article "Self-efficacy: Towards a Unifying Theory of Behaviour Change" (1977). The word "Self-efficacy" is frequently used in other fields of study like sociology, medicine, nursing, etc. Studies show that when a person has high self-efficacy, he/she even decides to complete the challenging work as it will be successfully achieved while a person having low self-efficacy decide to leave challenging work in fear of failure. The theory of Self-efficacy has a significant role in psychological adjustments, psychological problems, physical health, and professional training programs.

It is important to know the meaning of other technical words related to self-efficacy to better understand self-efficacy. Self-efficacy is not the ability or skill but the belief in ability or skill (Bandura, 1997). It means how much one has belief in his/her ability to perform the given task. In other words, the meaning of skill or ability is different from the meaning of self-efficacy as it describes how much belief someone has in his/her skill or ability. It might be that someone has the skill or ability to complete a specific task but may not have much belief to execute it successfully. In other words, self-efficacy does not mean that knowing what to do is the same as one's belief about what one is capable of doing or learning. In short, "perceived self-efficacy is concerned not with the number of skills you have, but with what you believe you can do with what you have under a variety of circumstances." (Bandura, 1997) Also, self-efficacy is not the same as other self-related concepts like self-esteem. Falling into the same category, sometimes people get confused with the difference between self-efficacy and self-esteem. Self-esteem is an evaluation of self-worth (Bandura, 1997). Researchers like Neil (2005), Smith and Mackie (2007) described self-esteem as general feelings of self-worth or self-value. While self-efficacy is the belief in one's capacity to execute a specific task successfully.

Describing the role of self-efficacy with respect to human functioning, Bandura (1997) explained that human motivation level, emotions, and actions depend on the belief of his/her ability rather than only the ability or skill they have. Because of this, one's actions can be easily predicted who has belief in his/her ability or who has only ability but not the belief to do the work. The understanding of self-efficacy helps to decide one's belief about his/her skill or ability rather than what skill or ability they possess. This helps to understand the persons' behavior having similar skills or abilities but

differences in their beliefs to perform the similar activity. For example, sometimes people having a higher level of skills do not tend to do work because of a low level of belief in their ability and gets failure while people having a high level of belief in his/her ability or skill keep prepared to do the challenging work and get success. But it does not mean that without requisite skill or ability, only self-efficacy helps him to get success. (Pajares, 2002).

The construct of self-efficacy explains that people generally tend to attempt only the work that they have the belief to accomplish the task and will not attempt those tasks they believe they will not get success in. And obviously, when people think about impossible tasks they do not tend to involve in those works. Although, people having a strong level of self-efficacy belief they can perform even challenging tasks. They get interested in the difficult task to be mastered while people having a weak sense of self-efficacy keep avoiding challenging tasks (Bandura, 1994).

Self-efficacy does not predict the behavior of a person. It is related to “I can” not “I will”. It should be noted that “I can do” or “I will do” are not the same ones. “I Can” is a “judgment of capability” while “I will” is a “statement of intention” (Bandura, 2005). Self-efficacy is not the intention to perform or accomplish a specific goal. Intentions refer to what I will probably do; several research studies have found that intentions are influenced by different numbers of factors, but it is not limited to only self-efficacy (Maddux, 1999a.). Self-efficacy is not the motivation or ambition or want for control. It may be that someone has ability in a particular domain but not self-efficacy in that particular field. Self-efficacy is not the outcome expectancy as outcome expectancy is someone's belief that a particular behavior may lead to a particular outcome in a

particular situation. Self-efficacy is the belief that one can execute the behavior that produces the result. It is not the personality traits. It is a belief in one's ability to synchronize his/her skill and abilities to achieve the desired target in a specific field and situation (Maddux, 1999a).

1.5 Role of self-efficacy in human life

Self-efficacy can play a significant role in enhancing human success and welfare in numerous ways. It influences the choices and actions of people. People incline to complete those tasks in which they feel capable and assured and escape those in which they lack beliefs. They lack interest in those works in which they believe that their actions will not have desired outcomes (Pajares, 2002). For example, students weak in biology may not be interested in the medical field.

Self-efficacy helps decide people how much effort will be needed on a particular action, how they will face challenges and how they stand to achieve the goals, and how spirited they will be in unexpected conditions. People having a higher level of self-efficacy will have higher energies, determination, and flexibility. People with a higher level of personal competence attempt to take on the bigger assignment rather than people having fear of failure because of a low sense of self-efficacy. Such people welcome challenging tasks to be mastered. They have higher fundamental interest and bottomless engrossment in such types of challenging tasks, they fix the challenging objectives and stay with strong commitment, and keep working on those tasks. They increase and withstand their hard work to face the adverse consequences. People having a high sense of self-efficacy recover quickly after facing obstacles. They accept failures and do not

blame others. They evaluate their efforts and point setbacks to insufficient efforts and requisite skills and knowledge (Pajares, 2002).

People's thought-form and emotional conditions are also influenced by self-efficacy. A higher sense of self-efficacy supports to form of feelings of calmness in approaching relatively difficult targets. On the other hand, people having weak self-efficacy may consider easier work as a tougher one and will try to be avoided it. Such types of considerations lead to nervousness, hopelessness, and stress and it reaches to negative way. As a result, self-efficacy can strongly impact the level of achievement that one eventually accomplishes. This role of self-efficacy also creates the types of self-fulfilling insight in which one achieves what one has confidence in one can complete. The stubbornness connected to a high sense of self-efficacy is expected to lead to enlarged performance. It increases his/her spirit while having a low sense of self-efficacy leads to failure and decreases his/her morale (Pajares, 2002).

Self-efficacy helps people to develop thoughts about the creation of new things not limited to just describing existing knowledge. Researches confirm that people having a high sense of self-efficacy differ in terms of their thinking about the creation of new knowledge from people having the feeling of inefficacious. Efficacious people not only think about the future but also build their future.

Many factors are affecting the mediational role that judgments of self-efficacy play in human behaviour. There may not be fair incentives or maybe performance limitations; because of that, even having a high level of sense of self-efficacy and highly skilled people may not get motivated to do the task. In such type of scenario, people may choose not to perform according to their beliefs and skills because they are not getting

proper attention and required resources, or they are getting a feeling of being ignored or they notice social constraints in their intended track or ending. In such types of situations, self-efficacy will not be successful to predict performance. A person may think that he/she can perform the specific task but do nothing as they feel obstructed by the actual or potential threats.

The role of self-efficacy has gained a substantial place in research. Several pieces of the research described the importance of self-efficacy in one's success. In general, people can recognize aims they want to achieve, stuffs they want to get, and what they would like to attain. But there is a big difference between plans and converting them into action. Researchers like Bandura and others advocated that an individual's self-efficacy plays a significant role to minimize the difference between plan and action, and how aims, jobs, and tasks are approached. Having a robust sense of self-efficacy helps to solve challenging glitches as tasks to be mastered while people having low-level self-efficacy try to escape challenging problems. Strong self-efficacy helps people to develop a deeper interest in such challenging activities in which they participate while weak self-efficacy leads to feeling that difficult problems and situations are not easy to handle. A robust sense of self-efficacy builds strong commitment to their matters, people having low weak self-efficacy don't see positive things and try to blame others. Life is full of ups and downs but people having low self-efficacy gets frustrated and gets lose confidence when they fail to achieve their target while people having strong self-efficacy recover quickly from setbacks and failures. There are primarily four sources of self-efficacy, they are Mastery experience, vicarious experience, verbal persuasion, and somatic and emotional states (Bandura, 1997; Pajares, 2002).

1.6 Sources of Self-efficacy

1.6.1 Mastery experience: We all have this type of experience. It happens when we do work and get success; means we have mastered something new. Mastery experience plays a significant role in developing self-efficacy because people are generally interested do those similar work in which they get success in the past (Bandura, 1994). On the contrary, self-efficacy gets decreased when people get in failure in similar work. When a person is given a particular task to complete then he/she recalls his/her previous experience and with that experience, they try to achieve the desired goals. It is understandable too that people who have previous experience get work done easily because of his/her mastery of previous work. For example, when an individual learned how to drive a bike then with this experience he/she can easily learn how to drive a car. Froman & Owen, (1989, 1990); Gross, Rocissano & Roncoli, (1989) found in their study that those women who knows-how to take care of children prior to becoming mothers feel more assured in taking care of their babies as cited by Hayden (2019). Such women have more self-efficacy in taking care of a child and so their baby gets better care. On the contrary, those parents who are limited in their own lives and do not have prior experience in taking care of a baby have a low sense of self-efficacy.

The basic objectives of the programs like a workshop, training programs, internships, and teaching practices are to develop the mastery experience of the learners. These programs have a major role as with the help of these programs one increases his/her expertise and gets further success. For example, training colleges provide training programs like an internship, workshops, and other related programs to increase the professional development of the teachers. People teachers during training programs go

to school and practice how to teach students and develop their mastery experience so that when they join the school they teach in a better way. Mastery experience plays a significant role in developing self-efficacy as people generally like similar works which they have successfully done previously (Bandura, 1994). On the other hand, self-efficacy lowers when people do not get success in a similar previous task. To develop the mastery experience trainers must consider that trainees should not be given always an easy task. To develop a better sense of self-efficacy, trainees must be given difficult tasks gradually (Bandura, 1994). If trainees continue to get an easy task to attempt then it is little chance to develop a quality sense of mastery experiences. It is better to attempt the difficult tasks too and overcome obstacles to get success so that a strong sense of mastery experience can be developed (Bandura, 1994).

1.6.2 Vicarious experience: People do not always interpret the results of their actions but also form their self-efficacy through observing others getting success or failures in their perform tasks. Vicarious experience is not a stronger source than mastery experience but sometimes people have limited prior understanding of a task or are not sure about their abilities then this source of self-efficacy becomes into consideration for them. This experience plays a vital role in developing self-efficacy as it helps the learners to observe requisite approaches and practices which are beneficial to reach the expected results (Wise & Trunnell, 2001). Especially, the role of modeling is significant in this perspective as it helps to develop self-efficacy when the person has no previous experience with the work to be done. It can also raise the self-efficacy of a person having experience and a good sense of self-efficacy if models teach them in a proper way (Pajares, 2002). People can raise their self-efficacy by watching others doing things similar to them or a person who is similar to them. This can be understood with

this sentence if someone similar to me can do it then why I cannot. Vicarious experience plays a vital role when observers see similarities in some attributes. For example, if a cricketer watching other players better than him playing cricket then he can also improve their self-efficacy but not watching the football player because football is different from cricket. Similarly, when people see someone similar to him getting failed in a particular task then it lowers the vicarious experience. The influence of vicarious experience can be better judged when a person sees a model is how much similar to him. The higher the model similar to him the higher the vicarious experience will develop. This source of self-efficacy can also be described as when a person joins a gym to improve his/her fitness then he/she observes other people who have a good fitness level and get influenced. He/she starts to behave like him, and he/she chooses a diet like him.

Workshop or training programs are not only the sources of developing mastery experiences but also play a significant role in developing vicarious experiences. Observing others in workshops, training programs, a class, or during role-play can also offer observational experiences which eventually improve self-efficacy, particularly when a person performs similar work to him.

Vicarious experience is the central part of a learning program where a relationship builds between the coach or trainers and students or clients. In training colleges where teachers expressing their teaching skills, teaching methodology and trainee teachers observe it sensibly and practice it to develop the vicarious experience. Like this, many things people learn from their parents, teachers and take it into a daily lifestyle. In a

family, a child learns how to eat, how to wash clothes, brush, etc. from their family members like parents, siblings, etc. and copy it into his/her practice.

1.6.3 Verbal or Social persuasion: Verbal or social persuasion is the third and important source of self-efficacy which influences individuals' self-efficacy. People develop their self-efficacy through others' verbal or social persuasion too. People get motivated to achieve a target when someone encourages them that a particular target is not impossible for them which ultimately helps the development of self-efficacy. Social persuaders can play a significant role in developing people's sense of self-efficacy. Coaches of a team always use these techniques to motivate their trainees. They continue to motivate their players before and after the matches. They always encourage their players using sentences like 'we are going to win the match', 'opposite team is not as prepared as our team', 'our team is more fit and balanced than the opposite team', etc. (Hayden, 2019). If their team does not perform well or as expected then they change the focus on the next match, prepare them for the next match, evaluate their performance, discuss them and move further rather blame and discourage their players (Brown, Malouff & Schutte, 2005). This type of team recovers quickly from its setbacks and focuses on the next match to perform better. Contrary to this, when people are discouraged like 'you cannot do', or 'you do not have expertise or skill' then they get failed and leave easily to do any further challenging.

But it does not mean that verbal or social persuader can encourage someone to do those works or tasks in which they do not have basic skills and knowledge. A good persuader identifies the person's ability and skills easily and makes a contribution to their increased sense of self-efficacy. Also, the persuader must take care into consideration

that the task should not be impossible. Because if a task is impossible to achieve then it will be the reason for lowering self-efficacy as it creates negative thinking which will lead to failure. In fact, it is easier to wane the self-efficacy of a person with negative evaluations than to make stronger such beliefs through positive persuasions (Pajares, 2002).

1.6.4 Somatic and Emotional states: Somatic and emotional states like anxiety, pressure, and excitement inform about self-efficacy. When people think about a task to complete then they can judge their level of self-efficacy. Robust emotional responses to a task offer indications about the projected success or failure of the result. When people face adverse condition and worries about their abilities, those emotional responses can themselves lesser self-efficacy insights and activate added pressure and nervousness that confirm the insufficient performance they worry (Pajares, 2002). Pressure situations create emotional arousal which leads to a negative effect on persons facing challenging tasks (Bandura & Adams, 1977). When a person feels that he/she is being watched by someone then they feel pressure and uncomfortable. For example, if a person is exercising in the gym and suddenly he/she feels that someone is watching him or exercising then he/she may get uncomfortable. These are negative psychological and emotional states which can lessen the sense of self-efficacy which leads to affects the continuous training session. In this type of situation, professional trainers can play a significant role in boosting their self-efficacy using appropriate techniques and positive ways (Jackson, 2010). Above mention, examples confirm that somatic and emotional states affect people's decision-making. When emotional states improve then their emotional stress gets decreased.

Self-efficacy of teachers is also affected by the physiological and emotional states of teachers. If the teachers are assured and passionate about their duty, they will make students perform well in their course of action. Conversely, if teachers are depressed and stressed about their activities, it is sure that they will not be able to perform their duties optimally. Teachers should not have depressing thoughts or anxiety, otherwise even if well-educated or trained, they will not be effective in their profession (Shahzad & Naureen, 2017).

To be effective and successful in his/her professional commitments one needs to have self-efficacy. Different professions required their strategies and techniques to be outstanding in their respective field. A country's developments depend on numerous things and teacher is one of them. Self-efficacy helps teachers to achieve their professional commitments. A self-efficacious teacher productively facilitates things. Therefore, it is imperative to assess and evaluate the teachers to know their sense of self-efficacy.

1.7 Self-efficacy of teachers

After the publication of Albert Bandura's article "Self-efficacy: Towards a Unifying Theory of Behaviour Change" (1977). The word "Self-efficacy" is frequently used in other fields of study like sociology, teacher education, medicine, nursing, etc. Researchers studied self-efficacy and showed abundant attention to teacher self-efficacy and its relationship with different variables like students' academic achievement, motivation, etc. (Zee & Koomen, 2016). The focus of these studies mainly remains concentrated on Bandura's theory of self-efficacy (Berg & Smith, 2016). Self-efficacy of teachers has been defined by various researchers. "Teacher self-efficacy is

the teachers' belief in their capability to come out with the desired outcome of students" (Bandura, 1997; Tschannen-Moran, Hoy & Hoy, 1998). In other words, self-efficacy of teachers has been defined by (Christophersen et al., 2016) as, "teacher self-efficacy refers to the belief of teachers' on their teaching capability for carrying out effective teaching in a classroom." This belief makes a significant impact on students as it supports motivating even those learners who are facing some educational difficulties (Armor, et. al., 1976, Friedman & Kass, 2002).

The study of the self-efficacy of teachers is very important as it affects behaviours like motivation, patience, and flexibility of teachers. It also impacts teachers' practice and approaches toward their learners (Erdem & Demirel, 2007). Different researchers Armor et. al, (1976); Ashton & Webb, (1986); Moore & Esselman, (1992); Ross, (1992) confirmed that there has been a noteworthy positive relationship between self-efficacy of teachers and students' achievement (Swarnalatha, 2019; Durowoju & Onuka, 2015; Shahzad & Naureen, 2017). A teacher having a higher level of self-efficacy understands his/her students' differences and plays a vital role in students' outcomes. Motivating students in a manner that helps students get interested in their respective course of work is teachers' one of the important characteristics. Studies proved that better self-efficacious teachers motivate students well so that they can achieve their goals (Midgley, Feldlaufer, & Eccles, 1989; Akeah, 2017). Self-efficacy of teachers has been directly or indirectly influencing the motivation and achievement of students (Dusek, 1985; Parsons, Kaczala, & Meece, 1982). Various studies confirmed the effect of self-efficacy of teachers on the academic achievement of students and concluded that self-efficacy plays a major role in effective teaching (Fox, 2014; Tschannen-Moran et. al, 2001).

Effective management of class is one of the important challenging tasks for teachers. Teachers having a robust sense of self-efficacy manage class effectively and keep maintain their objectives. There has been a positive correlation between teacher self-efficacy and their behaviour in the classroom. Teachers' efforts which they invest in teaching are hugely affected by their self-efficacy. An efficacious teacher seeks opportunities to invest his/her skill and abilities so that students can be benefitted optimally. They are more central to their classroom objectives. They plan their activities and execute them properly as it is always a challenge to convert the plan into action. They plan, set goals, and accomplish them in a time-bound manner. Teachers having a robust level of self-efficacy is more intended to expose their abilities and skill. Self-efficacy teachers affect planning and organizing as it helps teachers to exhibit their skills and abilities in planning and organizing (Allinder, 1994).

A good classroom atmosphere has a good amount of ideas and innovations which makes the subject more interesting and challenging. Innovations in education boost students and their teachers to go to a new level of knowledge. Self-efficacy of teachers has a great role in creating new ideas and innovations. Teachers with a robust sense of self-efficacy are more interested to come up with new ideas and experiments. They apply appropriate methodology to keep students alive in the experiments so that students can have new and up-to-date knowledge (Guskey, 1988; Stein & Wang, 1988).

Teachers' persistency and resiliency when things do not work according to plan and in the face of failures are hugely affected by teachers' self-efficacy. Success and failures are part of life but people having weak self-efficacy get frustrated while people having a strong sense of self-efficacy quickly recover themselves from setbacks. Teachers

having a strong sense of self-efficacy be positive about their students' mistakes. They encourage them to come out from the errors done rather discourages them (Ashton & Webb, 1986). They make students stay strong against their struggles (Gibson & Dembo, 1984).

1.8 Integration of technology in Social Studies at secondary level

It is the normative responsibility of the social studies for creating and broadening the base for basic human values like freedom, reliance and respect for diversity etc. The primary aim of teaching social studies should be investment of moral and mental energy in a child which can facilitate them in a position where they can think independently and treat the social powers which threaten these values. The teaching of social studies can accomplish this by imparting social values to the child by promoting their thinking abilities so that they can take decision independently (NCERT, 2006).

By nature, man is a social being. He seeks social adjustment and engagement with his surrounding environment in which he lives. He is responsible towards the desired obligation of the society, its institutions, their functioning, and development. For this one needs to be aware of the society, should have knowledge about society. Education is the one of the most powerful instruments for adjustment and better living for human being, it helps to understand the modern society, and therefore it helps in the task of social development. Social studies defined as a study of the men, society and their interrelationship, may serve this purpose in an efficient manner. Social studies is concerned with human beings and their relation to society, and a social studies curriculum should address the human experience. It is related with the past, connected to the present and looks further to the future. This is an integration of various branches of the knowledge- history, geography, economics, and political science. At the school

level subject of social studies is taught in integrated approach not as a disciplinary form like higher education level which differs it from social science. Social studies refers to the study of integrated form of human, society and their interrelationship so, it is imperative to understand the contents of social studies at the secondary level and its relationship among different contents areas of social studies. History is not only about past stories but also it enlightens the knowledge how world evolved during different phases of time. Students learn about different civilizations, different revolutions, and movements, which have changed the course of life in the past. How some civilizations disappeared and how some civilizations developed further. This provides information to know how the world and various societies progressed. It gives an opportunity to students to correlate past phenomena with present situations. It helps students to think about present and future. At secondary level, themes of history should consist of Events and Processes, Economies and Livelihoods, Culture, Identity and Society (NCERT, 2006). Study of geography enables students to learn about different local and global natural resources, economic, political situations. It helps students to be aware about different locations, their cultures, life-styles. It fills the gap between nature and human relationship. It enables students to explore regional diversity. It study the interrelationship of natural occurrences with different sociological perspectives. Topics of geography at secondary level consists of different locations, climate, draining, Wildlife, Resources, etc. There is a significant relationship between economics and social studies. In this area of discipline, Production, Demand, and supply, Inflation, Populations, Agricultural activities, etc. are taught to students. It enables students to understand the relationship between social studies and economics so that they can know the relationship between demand and supply, challenges of populations, cost of labour

etc. The objectives of contents of economics is to make aware students about different activities which are essential for livelihood. With the development of technology and its integration in education, social studies given opportunities to researcher to work in this field.

Integration of ICT in social science education will replace the paradigm of lecture method to multimedia approach to the teaching learning process. OER related to social studies, video documentary of various real life SST (Geography, History, Political science and Economics) social media are dominating the learning environment. A new kind of disparity is found among the population of social science teachers with respect to having skill of technological skill and earned skill one.

Social studies are taught from elementary level to higher secondary level as an integrated part of the school curriculum. The aim of teaching social studies is not only to enable learners to adapt as per the prevailing situation but also to upgrade their way of living as a lively member of the society in which they live. At school level social studies comprises of History, Geography, Political science and Economics. These subjects are closely related with the society and inter related with each other too. The objective of teaching social studies is to create an analytical mind among students, where they can closely observe the social activities and developing understanding how they are interrelated with each other. Social studies provides such a platform where they can know the various issues like, poverty, war and peace, different culture, different perspective etc. It helps students to develop analytical thinking. With the help of effective integration of educational technology, teachers can make learning more effective as it provides multimedia approach. Students should be exposed with

emerging technological innovations so that they can be less dependent on traditional way of learning from books only. Teachers can use videos and picture in a class room for better understanding of the social issues. They should be encouraged to participate in such discussion which are related with them. In this way they will have better understanding of the realities.

As we live in a pluralistic society and students are part of this. Social studies focuses on integration of diverse stream. Teachers need to be highly sensitive in schools towards integration of all the groups. Adopting new innovations should be taken into consideration that it should not be barrier to others. Emergence of technological breakthrough has benefited in a several way. It is the teachers who can use these things to transact the curriculum in a better way.

Teaching of social studies needs to be locally contextualized by its teachers. Students get connected when they feel that they are being taught using their own surrounding examples. Themes of social studies have adequate scope to integrate technology to transact the curriculum. With the help of multimedia approach teachers can make things interesting for students, for example teachers can show videos, pictures using internet, laptop etc.

1.9 Research Gap

The researcher reviewed substantial amount of related studies carried out in India and abroad. Most of the studies were from abroad. Many investigators carried out related studies in different contexts with different variables. Most of the studies were found in general nature (Schmidt et al. (2009); Archambault & Crippen (2009), Graham et al. (2009) etc. rather subject specific. However, a few researchers have studied TPCK

specific to Mathematics Handal et al. (2013), Science Graham et al. (2009), Recently, Akman & Guvnen (2015) studied pre service social science teachers' TPCK. For effective teaching there are various characteristics required like content knowledge, communication skill, understanding of subject matter and Self efficacy. Self efficacy of the teacher is the belief toward performing tasks of teaching- has been the key variable for effective teaching. Review of related literature led to the investigator of present study to find out the various research gaps as most of the previous studies related to TPCK were in general and not specific to social studies teachers, population of the studies were mostly pre service teachers, most of the studies were carried out in abroad and the language of the population were also mostly English. The researcher did not find any previous studies which was carried out to investigate the in service secondary school social studies teachers' TPCK and Self efficacy with respect to Type of schools and Locality of schools. The extensive review of the previous studies found enough evidence of research gap regarding Technological Pedagogical Content Knowledge and Self efficacy of secondary school social studies teachers with respect to types of the school and locality of the school. With above discussion, the researcher decided to study the Technological Pedagogical Content Knowledge and Self efficacy of secondary school social studies teachers.

1.10 Need and significance of the study

In the last few years, digital and instructional technologies have turned out to be a significant part of our lives. It affected our communication in general and teaching in particular. Applications of digital technologies in our day-to-day lives become so broad since these technologies facilitate individuals with various outcomes and prospects

(Sahin, 2011). To be a successful teacher in their career they need to know and understand technology, pedagogy, and content knowledge. With the integration of Pedagogy and Content to Information and Communication Technologies (ICT), educators can strengthen their professional abilities, and make the learning process effective by using contemporary approaches consistent with the new technological breakthrough. Studies suggest that when teachers mix technology into teaching activities, their students become more fascinated in the subject (Schrum et al., 2007; Sweeder & Bednar, 2001). Also, the integration of technology may help student performance (Margerum – Leys & Marx, 2002). NCFTE (2009) highlighted that “teacher education needs to orient and prepare the educator to distinguish between critically useful, developmentally appropriate, and the detrimental use of Information and Communication Technology”. Justice Verma report (2012) expressed the concern that methodology should not be treated as a separate part from content but integrated with it. Earlier, the content knowledge was given more importance and did not show appropriate light on the application of the pedagogical theories (Shulman, 1986). Pedagogical integration with content knowledge was theoretically argued by Shulman (1986), which is known as Pedagogical Content Knowledge (PCK) framework. With the advent of ICT incorporation in education, a special kind of knowledge has emerged. Because knowledge of the contents, pedagogy, and technology in isolated way is not sufficient for active teaching but the amalgamation of all these knowledge domains together and their knowledge in an organised mode is vital. Grounded on Shulman's (1986) PCK, Mishra & Koehler (2006) emphasized the integration of technological knowledge and given an extended framework of Technological Pedagogical Content Knowledge (TPCK) to take technology into account in the teaching-learning process.

Performing the task of teaching in the presence of technology or absence of technology requires a number of characteristics of the teachers which are good communication skills, listening skills, sound knowledge of the subject matter, self-efficacy, etc. Self-efficacy of the teacher is the belief toward performing tasks of teaching- has been the key variable for effective teaching. Different researchers Armor et. al, (1976); Ashton & Webb, (1986); Moore & Esselman, (1992); Ross, (1992) confirmed that there has been a significant positive correlation between Self efficacy of teachers & students' achievement (Swarnalatha, 2019; Durowoju & Onuka, 2015; Shahzad & Naureen, 2017). Studies proved that better self-efficacious teachers motivate students well so that they can achieve their goals (Midgley, Feldlaufer, & Eccles, 1989; Akeah, 2017). Self-efficacy of teachers has been directly or indirectly influencing the motivation and achievement of students (Dusek, 1985; Parsons, Kaczala, & Meece, 1982). Various studies confirmed the influence of self-efficacy of teacher on the academic achievement of students and concluded that self-efficacy plays a major part in effective teaching (Fox, 2014; Tschannen-Moran et. al, 2001). Self-efficacy of teachers has a great role in creating new ideas and innovations. Teachers with a robust sense of self-efficacy are more interested to come up with new thoughts and experiments. (Guskey, 1988; Stein & Wang, 1988). Technology integration by the teacher is halfway done needs strong belief to do so, the role of self-efficacy has gained considerable attention in research on one's motivation and learning. In education, the self-efficacy of teachers has proved to affect students' choices of activities, effort invested, interest, and achievement. Self-efficacy is an important theoretical framework that can be used to understand one's beliefs with respect to their capabilities to perform specific tasks or activities (Bandura, 1986).

Social knowledge of the students is very important for any nation to be sustainably developed. Position paper of National Focus Group on Teaching of Social Sciences (2006) has emphasized the teaching of social studies. The presence of ICT at school with the learner and their parents and society is quite inseparable. Hence, in the teaching of social studies, it is imperative to align it accordingly. At the school level, social studies are one of the important subjects of the school curriculum. For effective teaching of social studies, teachers should be innovative to adopt technological and pedagogical development into their teaching-learning practices. Social studies teachers should be able to carry the technological advances for social transformation incorporating into their teaching-learning activities. They need to be open to adopting new pedagogical approaches and suitable technology to deliver the social studies contents. Technology enables teachers to rethink and refresh pedagogical practices. As social studies are engaged with human beings, a social studies curriculum should address the human practice, it is related to the past, connected to the present, and looks further to the future so, social studies teachers should maximize the potential of technologies to enhance and renovate the teaching activities. The present generation of social studies teachers in education can play a pivotal role to yield quality social studies teaching and can realise its teaching at the school level effectively. The teaching of social studies can produce the next generation of citizens with a high value of social knowledge. Substantive schemes regarding ICT in schools are found implemented in the Mithilanchal region and its school located there. Implementation of such schemes dominantly depends on these characteristics of TPCK and Self-efficacy besides some other characteristics. Therefore, the knowledge of TPCK and Self-efficacy in existing social studies teachers must be studied so that their in-service teacher training program

can be arranged and strengthened accordingly. This knowledge can be used for diagnosis, evaluation, and enrichment programs.

As the quality of teaching social studies depends on its social studies teachers, therefore, investigator wanted to study the TPCK and self-efficacy of secondary school social studies teachers with respect to the type of school and locality of the school. Many researchers tried to study self-efficacy and TPCK in different contexts but till now researcher did not find any study in which self-efficacy and TPCK of secondary school social studies teachers studied. With the help of this study, the researcher will be able to know the TPCK and self-efficacy of secondary school social studies teachers. Further this study will help respective stakeholders and policy makers so that they can make appropriated policy on this subject matter. In the view of above discussion researcher decided to study the Technological Pedagogical Content Knowledge and Self-efficacy of Secondary school social studies teachers.

1.11 Statement of the Problem

TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE AND SELF-EFFICACY OF SECONDARY SCHOOL SOCIAL STUDIES TEACHERS: A STUDY

1.12 Objectives of the study

1. To study the Technological Pedagogical Content Knowledge of Secondary school social studies teachers.
2. To study the influence of Type of school on Total Technological Pedagogical Content Knowledge of Secondary school social studies teachers.

3. To study the influence of Locality of school on Total Technological Pedagogical Content Knowledge of Secondary school social studies teachers.
4. To study the influence of interaction between Type of school and Locality of school on Total Technological Pedagogical Content Knowledge of Secondary school social studies teachers.
5. To study the influence of Type of school, Locality of school and their interaction on
 - Technological Knowledge
 - Pedagogical Knowledge
 - Content Knowledge
 - Pedagogical Content Knowledge
 - Technological Content Knowledge
 - Technological Pedagogical Knowledge
 - Technological Pedagogical Content Knowledge of Secondary school social studies teachers.
6. To study the Self-efficacy of Secondary school social studies teachers.
7. To study the influence of Type of school on Self-efficacy of Secondary school social studies teachers.
8. To study the influence of Locality of school on Self-efficacy of Secondary school social studies teachers.
9. To study the influence of interaction between Type of school and Locality of school on Self-efficacy of Secondary school social studies teachers.

10. To study the influence of Type of school, Locality of school and their interaction on

- Efficacy to influence decision making
- Instructional self-efficacy
- Disciplinary self-efficacy
- Efficacy to parental involvement
- Efficacy to enlist community involvement
- Efficacy to create positive school climate

11. To study the relationship between Self-efficacy and Total Technological Pedagogical Content Knowledge and its domain- (1) Technological Knowledge, (2) Pedagogical Knowledge, (3) Content Knowledge, (4) Pedagogical Content Knowledge, (5) Technological Content Knowledge, (6) Technological Pedagogical Knowledge and (7) Technological Pedagogical Content Knowledge of Secondary school social studies teachers.

1.13 Concomitant objectives

1. To develop the Secondary School Social Studies Teachers' TPCCK Scale
2. To develop the Self-efficacy of teachers Scale

1.14 Hypotheses of the study

The following hypotheses were formulated and tested at .05 level of confidence.

H₀1(a). There is no significant influence of Type of school on Total Technological Pedagogical Content Knowledge of Secondary school social studies teachers.

H₀1(b). There is no significant influence of Locality of school on Total Technological Pedagogical Content Knowledge of Secondary school social studies teachers.

H₀1(c). There is no significant influence of interaction between Type of school and Locality of school on Total Technological Pedagogical Content Knowledge of Secondary school social studies teachers.

H₀2(a). There is no significant influence of Type of school on Technological Knowledge of Secondary school social studies teachers.

H₀2(b). There is no significant influence of Locality of school on Technological Knowledge of Secondary school social studies teachers.

H₀2(c). There is no significant influence of interaction between Type of school and Locality of school on Technological Knowledge of Secondary school social studies teachers.

H₀3(a). There is no significant influence of Type of school on Pedagogical Knowledge of Secondary school social studies teachers.

H₀3(b). There is no significant influence of Locality of school on Pedagogical Knowledge of Secondary school social studies teachers.

H₀3(c). There is no significant influence of interaction between Type of school and Locality of school on Pedagogical Knowledge of Secondary school social studies teachers.

H₀4(a). There is no significant influence of Type of school on Content Knowledge of Secondary school social studies teachers.

H₀4(b). There is no significant influence of Locality of school on Content Knowledge of Secondary school social studies teachers.

H₀4(c). There is no significant influence of interaction between Type of school and Locality of school on Content Knowledge of Secondary school social studies teachers.

H₀5(a). There is no significant influence of Type of school on Pedagogical Content Knowledge of Secondary school social studies teachers.

H₀5(b). There is no significant influence of Locality of school on Pedagogical Content Knowledge of Secondary school social studies teachers.

H₀5(c). There is no significant influence of interaction between Type of school and Locality of school on Pedagogical Content Knowledge of Secondary school social studies teachers.

H₀6(a). There is no significant influence of Type of school on Technological Content Knowledge of Secondary school social studies teachers.

H₀6(b). There is no significant influence of Locality of school on Technological Content Knowledge of Secondary school social studies teachers.

H₀6(c). There is no significant influence of interaction between Type of school and Locality of school on Technological Content Knowledge of Secondary school social studies teachers.

H₀7(a). There is no significant influence of Type of school on Technological Pedagogical Knowledge of Secondary school social studies teachers.

H₀7(b). There is no significant influence of Locality of school on Technological Pedagogical Knowledge of Secondary school social studies teachers.

H₀7(c). There is no significant influence of interaction between Type of school and Locality of school on Technological Pedagogical Knowledge of Secondary school social studies teachers.

H₀8(a). There is no significant influence of Type of school on Technological Pedagogical Content Knowledge of Secondary school social studies teachers.

H₀8(b). There is no significant influence of Locality of school on Technological Pedagogical Content Knowledge of Secondary school social studies teachers.

H₀8(c). There is no significant influence of interaction between Type of school and Locality of school on Technological Pedagogical Content Knowledge of Secondary school social studies teachers.

H₀9(a). There is no significant influence of Type of school on Self-efficacy of Secondary school social studies teachers.

H₀9(b). There is no significant influence of Locality of school on Self-efficacy of Secondary school social studies teachers.

H₀9(c). There is no significant influence of interaction between Type of school and Locality of school on Self-efficacy of Secondary school social studies teachers.

H₀10(a). There is no significant influence of Type of school on efficacy to influence decision making of Secondary school social studies teachers.

H₀10(b).There is no significant influence of Locality of school on efficacy to influence decision making of Secondary school social studies teachers.

H₀10(c).There is no significant influence of interaction between Type of school and Locality of school on efficacy to influence decision making of Secondary school social studies teachers.

H₀11(a).There is no significant influence of Type of school on instructional self-efficacy of Secondary school social studies teachers.

H₀11(b).There is no significant influence of Locality of school on instructional self-efficacy of Secondary school social studies teachers.

H₀11(c).There is no significant influence of interaction between Type of school and Locality of school on instructional self-efficacy of Secondary school social studies teachers.

H₀12(a).There is no significant influence of Type of school on disciplinary self-efficacy of Secondary school social studies teachers.

H₀12(b).There is no significant influence of Locality of school on disciplinary self-efficacy of Secondary school social studies teachers.

H₀12(c).There is no significant influence of interaction between Type of school and Locality of school on disciplinary self-efficacy of Secondary school social studies teachers.

H₀13(a).There is no significant influence of Type of school on efficacy to parental involvement of Secondary school social studies teachers.

H₀13(b). There is no significant influence of Locality of school on efficacy to parental involvement of Secondary school social studies teachers.

H₀13(c). There is no significant influence of interaction between Type of school and Locality of school on efficacy to parental involvement of Secondary school social studies teachers.

H₀14(a). There is no significant influence of Type of school on efficacy to enlist community involvement of Secondary school social studies teachers.

H₀14(b). There is no significant influence of Locality of school on efficacy to enlist community involvement of Secondary school social studies teachers.

H₀14(c). There is no significant influence of interaction between Type of school and Locality of school on efficacy to enlist community involvement of Secondary school social studies teachers.

H₀15(a). There is no significant influence of Type of school on efficacy to create positive school climate of Secondary school social studies teachers.

H₀15(b). There is no significant influence of Locality of school on efficacy to create positive school climate of Secondary school social studies teachers.

H₀15(c). There is no significant influence of interaction between Type of school and Locality of school on efficacy to create positive school climate of Secondary school social studies teachers.

H₀16. There is no significant correlation between self-efficacy and Total Technological Pedagogical Content Knowledge and its domains 1) Technological Knowledge, (2) Pedagogical Knowledge, (3) Content Knowledge, (4) Pedagogical

Content Knowledge, (5) Technological Content Knowledge, (6) Technological Pedagogical Knowledge and (7) Technological Pedagogical Content Knowledge of Secondary school social studies teachers.

1.15 Operational Definitions of the variables

Locality: It refers to Secondary schools running in urban and rural areas.

Secondary School Social Studies Teachers: It refers to those teachers who are teaching social studies in Bihar Government Secondary Schools and CBSE affiliated private secondary schools.

Self-efficacy: It refers to Teachers' belief in his/her ability to accomplish task of teaching.

TPCK: It refers to perceived integrated knowledge of technology with pedagogy and social studies contents.

Types of School: It refers to Bihar Government and CBSE affiliated private managed schools.

1.16 Delimitations of the study

The present study was delimited to:

- I. Secondary school social studies teachers of Darbhanga district of Bihar only.
- II. Bihar government schools and CBSE affiliated private schools only.
- III. Regular mode of education only.
- IV. Self-efficacy delimited to task of teaching

1.17 Organisation of the chapters

The present study has been organized into the following five chapters-

- i. Introduction: The first chapter of the study starts by introducing the topic of the study. It includes theoretical framework of the variables, need and significance of the study, statement of the problem, objectives of the study, hypotheses of the study etc.
- ii. Review of the related literature: This chapter includes a review of related literature. It includes a review of TPCCK and Self-efficacy from India and abroad too.
- iii. Methodology of study: This chapter describes the methodology adopted for this study, population, sample, sampling techniques, process of tools construction and process of data analysis etc.
- iv. Analysis and interpretation of the data: In this chapter data is analysed using different statistical techniques.

Findings, Conclusions, Educational implications and Suggestions: This is the last chapter of the study which discuss about findings, conclusions, educational implications of the study and suggestions for further research.

Chapter-2

Review of the Related Literature

Chapter II

Review of the Related Literature

2.1 Introduction

With the identification of the research problem, the researcher starts to review the related literature. A review of related literature is one of the essential steps of the research process. A literature review is the systematic process of searching, finding, reading, and making a summary of previous research work relevant to the research problem being investigated. The review of related literature includes books, journals, scholarly articles, abstracts, dissertations, recorded work done by researchers, experts, scholars, and other sources relevant to the specific research problem. With the emergence of technology and the internet, the process to reach the required information became easy and user-friendly. Researchers can get the thesis and dissertations from various repositories. There are many online platforms which are providing useful content to investigators.

According to John. W. Creswell (2013), “A literature review is a written summary of journal articles, books, and other documents that describes the past and current state of information on the topic of the research study.” Literature reviews present a strong background for further research. It provides a base to locate facts related to the research problem. It helps a researcher to avoid duplication of work.

As previous studies give much relevant information like how, why, and when the study was conducted, what were the objectives of the research, what were the hypotheses, what methodology was adopted, and what were the significant findings of the studies. It helps the researcher to relate its research problem with previous studies and it helps

to identify the gap within previous studies. According to C.V. Good (1959) “The review of related writing may give controlling theory suggestive strategies for examination and exhaustive information for an interpretive reason.”

A review of previous studies helps to remove the repetition of what has been already done and provides the base to formulate hypotheses for further investigation. A review of the previous studies allows investigators to familiarize him/herself with the present knowledge in the subject in which he/she is investigating the problem.

Several researches have been conducted on Technological Pedagogical Content Knowledge (TPCK) and Self-Efficacy abroad with respect to different variables but in India, only a few pieces of studies have been conducted on Technological Pedagogical Content Knowledge and Self-Efficacy. In this chapter, the researcher reviewed the studies related to Technological Pedagogical Content Knowledge and Self-efficacy.

2.2 Studies related to Technological Pedagogical Content Knowledge (TPCK)

Ozudogru and Ozudogru (2019) studied Mathematics teachers’ TPCK and the effect of demographic variables. The purpose of the study was to construct and validate “Technological pedagogical and content knowledge scale” which can be administered to explore mathematics teachers’ knowledge levels of different domains of TPACK. Additionally, the objective of the present study was also to study the TPACK levels of mathematics teachers with respect to different demographic variables like gender, the experience of teaching, and level of school which includes primary and secondary mathematics. The research methodology of the study was based on a descriptive survey technique. a total of 202 mathematics teachers from middle and high schools were the

sample of the study. Out of 202 teachers, 88 were female and the remaining 114 were male. To collect the data with respect to teachers' self-assessment of their 7 domains of the TPACK framework, the researcher developed a scale namely, the Teachers' TPACK scale. Exploratory & Confirmatory factor analysis were executed to found the construct validity of the scale. To extract the underlying factors of the TPACK tool, a multivariate analysis method was used. For data analysis, MANOVA was applied. The outcome of exploratory and confirmatory factor analysis found as a valid and reliable scale. Further, a finding of the study showed that male teachers have better TPACK than female teachers, study finds there was no significant effect on respondents' TPACK based on teaching experience and level of school.

Mercado, et al. (2019) explored the technological integration of prospective science teachers in teaching science using Technological Pedagogical and Content Knowledge (TPCK). This study aimed to explore the significance of the TPACK Framework for integrating technology in teaching science. The study was based on the descriptive survey design. The participants of the study were taken from the second-year and third-year pupil science teachers of a teacher education institute. A total of 28 prospective science teachers were part of the sample of the study. The researcher developed the TPACK questionnaire covering the significance of TPCK as a basis for integrating technology. The questionnaire was composed of three parts. The data were analyzed to reach the finding. The finding indicates that the participants of the study sensed that the TPACK framework assisted them to understand the content of the subject easily; Pedagogy allowed them experiential learning experiences and technology to strengthen teachers' ability to teach the subject with technology easily. Respondents agreed that with the help of technology they feel motivated for learning. Findings regarding

instructional materials, respondents agreed that their learning broadens due to this. The study suggests developing the software application so that science teaching can be improved.

Beri and Sharma (2019) studied Teacher Educators' Technological Pedagogical and Content Knowledge. The objective of the study was to know the teacher educators' technological pedagogical and content knowledge competency with respect to their gender, locality, stream, and types of colleges. The adopted methodology of the study was a descriptive survey type. The sample of the study comprised of teacher educators who were admitted in different teacher education institutes in the state of Punjab (India). A total of 200 participants were selected through a simple random sampling technique. To gather the research data researcher developed an instrument consisting of five points Likert scale. SPSS program was used to analyze the data. The findings of the study discovered that there was a high level of technological pedagogical and content knowledge competencies among teacher educators in Punjab region. Furthermore, the finding of the study with respect to gender, locality of college, stream, and type of colleges showed that there were significant differences in technological pedagogical and content knowledge competencies among teacher educators in Punjab region.

Thizarkyaw (2019) recently studied the TPCK of teacher educators in training colleges. This study directed to check the practice of TPCK of teacher educators of three different teacher education colleges with respect to different variables. The descriptive survey technique was used to conduct the study. The sample of the study comprised of all the teacher educators from three teacher education colleges. The

questionnaire which was developed by Sahin (2011), was adapted to collect the quantitative data from respondents. Different statistical techniques like ANOVA, t-test were performed to check the significance of differences among variables. The finding of the study suggested that there were no significant differences in the practice of TPCK with respect to education colleges, educators' experience, and gender. However, there were significant differences in technological knowledge found with reference to their experience and degree. Furthermore, with respect to their ranks, there were significant differences in the practice of content and technological knowledge.

Bala and TAO (2018) examined the Techno-Pedagogical Competence and anxiety towards the use of instructional aids in teaching. The methodology implemented to conduct the study was a descriptive survey. A total of 100 senior secondary school teachers, each 50 from Government and Private schools were selected for the study. A stratified sampling technique was used by the researchers to select the sample. Researchers adopted the instruments 'Teachers Techno-pedagogical Competence scale, developed by Rajashekar and Sathiyaraj (2013), and the Scale for Anxiety towards the use of Instructional Aids in teaching developed by Rajashekar and Sathiyaraj (2013). Different statistical analysis like, percentage, average, t-test, SD, and linear regression was performed to get the results. The finding of the research revealed that six teachers had a low level of techno-pedagogical competency, 43 teachers had a moderate level of techno-pedagogical competence and the remaining teachers had a high level of techno-pedagogical competence. The findings in terms of Anxiety towards the use of Instructional Aids in teaching, there was not a single teacher who had a high level of anxiety towards the use of instructional aids while 27 teachers had a moderate level of anxiety and the remaining 73 teachers had a low level of anxiety towards the use of

instructional aids in teaching. With respect to Techno-pedagogical competence and anxiety towards the use of instructional aids in teaching, there were no significant mean differences between male and female senior secondary school teachers.

Macrides and Angeli (2018) investigated Technological Pedagogical and Content Knowledge through music focusing on affect. This study aimed to know the lack of TPCK theoretical framework for the technology integration in music teaching-learning practices and discover within the TPACK framework and the importance of affect in instructional design. For the activities of music composition and listening, the researcher developed guidelines for the integration of technology in learning. Based on set principles data were analyzed on the theme of TPCK framework. Data were analyzed to reach the results through the subject matter of music focusing on the affective domain. The relationship among emotions, musical content, and technology were also found. The findings of the study indicates that there were significant differences between experimental and control groups in which experimental groups score was better than control group. Also, study provided suggestion for further study to get more results of various other aspects of music education. This study has practical suggestions in the field of music education because it provides guidelines to design music lessons using technology integration.

Bas and Senturk (2018) evaluated the perception of Turkish in-service teachers' Technological Pedagogical and Content Knowledge. The purpose of the study was to investigate the Technological Pedagogical and Content Knowledge level of the in-service teachers with respect to certain variables. The methodology employed in the study was a descriptive survey method. A total of 200 in-service teachers were part of

the sample of the study. A cluster sampling technique was used to select the sample. To collect the data for the study, the instrument developed by Sahin (2011) based on the theme of TPACK Framework, namely Technological Pedagogical Content Knowledge Survey was used. Different statistical techniques like t-test, ANOVA analysis were used to reach the results of the study. The finding of the study indicates that with respect to gender, occupational experience, level of education, teaching level, etc. there were significant differences in TPACK perceptions among the in-service teachers. Furthermore, findings suggest that in-service teachers had an average level of TPACK perceptions. Results also provide suggestions to improve the TPACK perception of in-service teachers in order to integrate ICTs into instructional practices effectively.

Aqib, et al. (2018) studied Pre-service teachers' Technological Pedagogical and Content Knowledge in three-dimensional material based on gender differences. To study all the domains of TPCK in depth, the researcher conducted the study qualitatively. The sample of the study comprised of Mathematics College students. They were selected from two colleges. To collect the data of the research task-based interview was used as an instrument. The data analysis in this study went to data reduction, data presentation, and conclusion phases. The triangulation method was used to be authentic in the data analysis of the study. The finding suggested that there was same level of Content knowledge and Pedagogical knowledge among male and female prospective teachers, but there were significant differences in Technological knowledge between them. The implication of this result reflects other technology-related domains. Though, it can be reduced by the appropriate technological training session.

Prakash and Hooda (2018) studied the Government and private schools teachers' Techno-pedagogical competency. The purpose of the research was to study the government & private schools teachers' technological pedagogical competency comparatively. The population of the study comprised of all the government & private teachers of higher secondary schools working in the state of Haryana. A total of 200 teachers working in the higher secondary school participated in the study. A simple random sampling technique was employed to select the sample. To collect the data for the study, the instrument Teacher's Techno-pedagogical Competency Scale developed by Rajashekhar and Sathiraj (2013) was used. Different statistical techniques like mean, standard deviation, and t-ratio were also used. The statistical tool, t-ratio was applied to find the significant differences in techno-pedagogical competency between government and private school teachers. The finding of the data analysis indicates that private teachers had a better techno-pedagogical competency than the techno-pedagogical competency of the government school teachers. The reason behind this may be the resources and facilities being provided to the private school teachers. There were significant mean differences in techno-pedagogical competency between male and female teachers where male teachers' techno-pedagogical competency was better than that of female teachers. The mean value of techno-pedagogical competency of rural teachers was less than the mean value of techno-pedagogical competency of urban teachers. It can be said that the reason behind the greater techno-pedagogical competency was the more facilities being provided.

Sharma and Sharma (2018) examined the "effectiveness of an ICT Programme on TPCK, Teacher self-efficacy & Teaching effectiveness of pre-service teacher educators". In the study, the researchers developed an ICT Programme and discussed it

with subject experts regarding its effectiveness. The method of the study was experimental. Quasi-experimental design was used to carry the study, two groups were created one was an experimental group and another was a control group. Both groups consisted of equal numbers each 45 pre-service teacher educators. The subjects of the experimental group were taught with ICT enabled Instructional Program while the participants of the control group were taught with the traditional method. The dependent variables involved in the investigation were, TPACK, Teacher Self-efficacy, and Teaching effectiveness, and the independent variables consisted of the ICT-Enabled Instructional Programme which was manipulated by the researcher to check its effects on pre-service teacher educators' "Technological Pedagogical and Content Knowledge", Teacher Self-efficacy and Teaching effectiveness. A pre-test & post-test were conducted by the researcher. To check the pre-service teacher educator's TPACK, Teacher self-efficacy and teaching effectiveness researcher developed the respective instruments. To analyze the data, different statistical techniques like Average, Standard Deviation, t-test, etc. were employed in the study. The finding of the study revealed that there was a significant role of an ICT-enabled instructional program on pre-service teacher educators' TPACK, self-efficacy, and Teaching effectiveness.

Mupita, et al. (2018) reviewed the different literature related to "Technological pedagogical and content knowledge". The goal of the study was to review the applicability of TPCK and its theoretical perspectives. In this study ten peer-reviewed published from 2015 to 2018 journal article were reviewed. The journals of the study included were reviewed from reliable sources like Elsevier, IEEE, and Sage publications. The articles were mainly related to Educational technology, Computer, and Educational journal, Computer Assisted Learning, etc. The article both empirical

and theoretical based published in the journal was intentionally downloaded for review. Selected articles were categorized accordingly. All the required data were inserted into the spreadsheet to reach the results. The finding of the study presents different perspectives on “Technological Pedagogical and Content Knowledge”. Analysis of review suggests teachers' perception that different domains of TPACK should not be in isolation. It suggests that to achieve the educational objectives there should be more technological engagement for the teachers. To develop the TPACK in teachers, they should be provided technology-supported lessons. Furthermore, it indicates that teachers should prepare themselves for innovations so that they can use them in their classrooms.

Cetin and Erdogan (2018) developed the “technological pedagogical content knowledge (TPCK) efficiency scale for mathematics teacher candidates”. This study aimed to construct a valid and reliable measurement tool that can be applied to examine mathematics teacher candidates’ “technological pedagogical content knowledge” efficiency level. A total of 453 primary and secondary school pre-service mathematics teachers were the sample of the study. For the data analysis, SPSS and AMOS programs were employed. Based on TPACK Framework items of the instrument were formulated. Confirmatory Factor Analysis was applied to pre-determined factors. Correlational analysis of the items in the scale was from .33 to .86. The internal consistency Cronbach alpha of the overall tool was found 0.98, and for the TPACK dimensions, it was found between 0.81 and 0.97. These results suggest that the tool has a high level of reliability. Finally, the instrument was developed and it has a total of 79 items in a five-level Likert type. The final TPACK efficiency scale is a valid and

reliable tool that can be employed to study the self-efficiency of mathematics teacher candidates.

Altun and Akyildiz (2017) explored the “Technological pedagogical and content knowledge” of pupil teachers with respect to some variables- gender, subject specialization, and having Internet connectivity and personal computer. It was hypothesized that there is a significant role of some variables in developing TPACK for pupil teachers. The methodology of the study was descriptive survey type and the nature of data was based on the quantitative approach. The sample of the study was pupil teacher who is pursuing their courses with specialization in elementary teaching, science teaching, social studies teaching, mathematics, and Turkish teaching at a teacher education institute. The total sample consisted of 609 last semester pupil teachers and it was selected by random sampling technique. For the data collection, a Turkish version of the “Technological pedagogical and content knowledge scale” was used, this instrument was firstly constructed by Schmidt et al (2009) & it was adapted by Bahcekapil, (2011) in a Turkish context. The gathered data were analyzed by the SPSS 19.0 version with the help of statistical tools like t-test, ANOVA, variance analysis, etc. The study finds that pupil teachers have a good TPACK Level. Furthermore, it was found that with respect to variables like gender, course attended, use of the internet and personal computer there exist some correlations and significant differences. It was suggested that more training opportunities should be provided to be an effective teacher.

Yalley (2017) investigated the senior secondary school social studies teachers’ “Technological Pedagogical and Content Knowledge” in Ghana. This study was aimed

to explore the TPACK of Social studies teachers working in senior secondary schools. The methodology of the study was a descriptive survey. All the 136 social studies teachers working in all the 19 secondary high schools in the Kumasi Metropolis of Ghana were the population & sample of the study. This type of sampling technique is called the census technique where the sample is equal to the population. For the data collection, the main instrument originally constructed by Schmidt et al. (2009b) was adapted and modified by the researcher along with an observation checklist. With the help of two instruments, the triangulation method was used to check the accuracy of the findings. The findings of the investigation suggested that social studies teachers had a significant level of technical knowledge, technological pedagogical knowledge, technological content knowledge, and technological pedagogical and content knowledge too. Furthermore, to get the necessary technological pedagogical content competencies, social studies teachers need to be encouraged to learn the use of technological resources like publications, technology journals, and educational blogs. Online journals, online magazines, etc. Also, the further suggestion of the study is that in the teacher education program focus should be given to technological integration.

Heitink, et al (2017) study tried to understand what teachers think about the selection of pedagogical choices during the use of ICT in practice. In the study, the researcher discussed the reasoning of teachers about pedagogy eliciting their TPK. Through video cases, the data of the study were gathered. The teachers were requested to participate in the study openly. Respondents of the study were requested to shoot a short video ranging from 10 to 15 minutes and requested to share about their use of Information and Communication Technology (ICT) and their reason to use ICT in their specific practice. A total of 29 primary teachers in which 10 male and the remaining 19 female

teachers joined in the study recording their videos. Based on the instrument to assess teaching acts developed by Van de Grift et al., 2011, the observation instrument was used to identify teachers' pedagogical strategies for the use of ICT. After the collection of the data through observation techniques, Summative content analysis was conducted to analyse the gathered data. The finding of the study shows that to promote activation of learning teachers used Information and Communication Technology in their pedagogical practices. While finding related to reason behind using ICT in practice, teachers reasoned it for adapting according to students' needs but hardly, it was observed in the practice. The few teachers who always used Information and Communication Technology to facilitate pedagogical practices showed fostering learning and behavior supporting adaptive teaching. For effective teaching with Information and Communication Technology, the study suggests that teachers must know how Information and Communication Technology can support particular pedagogical strategies. Furthermore, the findings of the study provided suggestions to work on teachers' development of Technological Pedagogical Knowledge (TPK).

Yildiz (2017) studied “pre-service mathematics teachers' critical thinking skills & factors affecting Techno-pedagogical competencies”. The study aimed to know whether critical thinking and techno-pedagogical competencies indicate significant differences with respect to certain variables & whether there is a significant correlation between techno-pedagogical competencies & critical thinking of prospective elementary mathematics teachers. The descriptive survey method was adopted in this study. A total of 552 prospective elementary mathematics teachers were the participant in the study. The purposive sampling technique was used to select the participants. To collect the data for the study two instruments Critical Thinking Scale and TPACK Self-

efficacy Scale were used. The critical Thinking Scale was developed by Ozdemir (2005) and TPACK Self-Efficacy Scale was constructed by Kabakci Yurdakul, et al. (2012). SPSS 21.0 version was performed to analyse the data of the study. Different statistical techniques like correlation, t-test, ANOVA were used in the analysis process. The finding of the study shows that there was an average level of Critical thinking and Techno-pedagogical competency among participants. Whereas, there was a significant correlation between the techno-pedagogical competencies and critical thinking.

Bekiroglu and Karabuz (2017) examined the “technological pedagogical and content knowledge and technology integration of pre-service teachers”. This study pointed to explore the technological integration skill during their practices and TPCK of prospective physics teachers. The methodology of the study was based on a case study. The sample of the investigation consisted of ten senior prospective physics teachers, in which seven of them were female. The data were collected through the method of interviews, observations, and lesson plans. The analysis of the data indicates that prospective physics teachers were able to integrate technology successfully into their practices more than in their lesson plans. They can perform as an expert while using Computer-Based Learning technology in teaching-learning practices. The finding also suggested that teachers may be able to use technology effectively in their practices, but also it should be conveyed to teachers that just mere use of technology cannot guarantee quality learning outcomes. The level of TPACK among pre-service physics teachers was high. Furthermore, the analysis of data found that prospective teachers had a good amount of knowledge regarding content, technology, and pedagogy. The study suggested for teacher education programs introduce various educational technologies.

To develop TPCK among teachers, they should be encouraged to use technological tools.

Navarro (2017) studied the outcome-based approach, technology integration in teaching physics, and its effectiveness in education. Furthermore, the study tried to describe the teachers' demographic profile with respect to age, sex, computer literacy, teaching experience, educational qualification; technological integration in teaching-learning activity; to know the students' performances using pre and post-test design; and differences between pre and post-tests of respondents. It was an experimental study and the quasi-experimental design was adopted. Two groups were formed one was experimental and the other was a control group. The experimental group was given treatment. The pre and post-test were conducted on both groups. With the help of the purposive sampling technique, eight instructors at the tertiary level and 367 enrolled students were selected for the study. In the study, a total of seven instruments were used to collect the research data, out of them five instruments were developed by the researcher while the remaining two were adapted. To analyze the data different statistical tools like, percentage, weighted mean, SD, t-test for independent sample, and Analysis of Co-variance were applied. The finding of the analysis suggests that there was significant effect of technology integration intervention in improving the students' test scores. Furthermore, the study gave suggestions to develop such technology-integrated outcome-based courses to better the learning outcome of the students.

Adam (2017) developed a framework to connect Technology, Pedagogy, and Culture. The study describes that without a full understanding of particular social cultures a teacher cannot be effective to integrate technology and pedagogy into practices. To

investigate how teacher educators use digital technologies in their pedagogical process, the researcher adopted an ethnographic method. A total of eleven teacher educators who were working at Maldivian University were part of the study. The researcher uses, focus groups, interviews, observations, and the hanging out approach to collect the data. The findings revealed that particular cultures, early learning experiences, and practicing institutes influenced the Pedagogical and Technological practices of teacher educators. With the findings of the study, to understand teachers' pedagogical and technological habitus in different contexts, the researcher has given a framework namely Pedagogical and Technological Cultures Habitus. This framework can be used to design various professional development programs in various contexts. Also, it added an outer layer to an existing TPACK framework to represent teachers' backgrounds and habitus.

Harris, et al (2017) reviewed various published papers related to TPCK/TPACK. The purpose of this study was to determine the direction of future research in TPACK and development with the review of previous work on Technological Pedagogical and Content Knowledge (TPACK). The study suggested many directions in which Technological Pedagogical and Content Knowledge research and development efforts start. The study discussed the previous construction of instruments and measurement, validation, and reliability.

Kiray (2016) developed a Technological Pedagogical and Content Knowledge Self-efficacy scale for pre-service science teachers. The instrument is based on Mishra and Koehler's (2006) TPACK framework. This scale has seven dimensions and a number of 55 items. A total of 467 second-year students of the science department from four universities in Turkey were selected for the sample of the study. The reliability and

validity of the scale were calculated by pre-service science teachers' gathered data. The reliability of the tool was calculated by Chronbach's alpha reliability coefficient and it was found as high as 0.969 and the validity of the instrument was maintained in two ways that are content validity and construct validity. The analysis of data found that this instrument has the necessary properties required to identify pre-service teachers' TPACK self-efficacy perceptions.

Ozdemir (2016) Examined pre-service elementary school and pre-school teachers' Technological Pedagogical Education Competencies. The present study aimed to measure the TPACK of pre-service elementary school and preschool teachers. The study was conducted through the descriptive survey method. All the 995 junior and senior pre-service teachers in the academic year 2014-15 studying in Bulent Ecevit, Ghazi, and Mugla University were the populations of the study. To gather the data for the study, the instrument Technological pedagogical education competency scale developed by Yurdakul et al., (2012) was used. The scale had four sub-heading which are design, practice, ethics, and specialization to determine the TPACK competencies. Statistical tools like t-test and one-way variance analysis (ANOVA) were used. The finding of the study indicates that the TPACK mean of junior & senior pre-service teachers were high. In the sub-domain of the TPACK competency, their mean were also high. Pre-service elementary school and pre-school teachers' TPACK competency were found high also. There were significant variances in TPACK competency among pre-service elementary school and pre-school teachers with junior pre-service preschool teachers. The reason may be because of technology and material development courses given to pre-service teachers.

Gomez (2016) conducted a qualitative research on middle school. In the present study, the researcher explored the TPACK in the Practice of middle school social studies teachers in a one-to-one laptop environment. The objective of the study was to explore the middle-grade Social Studies classrooms in which, what effective teaching with technology looks like in actuality. The other objective of the study was to know when teachers make the decision regarding their curriculum then how they integrated technology knowledge, content knowledge, and pedagogical knowledge. The study was conducted on three Social Studies teachers who were working in a school and was teaching 6th, 7th, and 8th class students. This study was based on a multiple case study method. Data were collected through different techniques like observation, focus groups, interviews, and artifacts. Also, with the help of a descriptive analysis of data, it was studied how teachers think about teaching with technology, what is their beliefs about teaching and how they use the TPACK framework in practice. The finding of the study indicates that the development of TPACK emerged uniquely in each teacher, and strengthen them in teaching. Findings also suggest that there is a need to improve the TPACK framework as it found many limitations in the framework. This study has many educational implications for policy makers, and teacher educators. Furthermore, in order to get the benefit from the TPACK Framework optimally in teaching, the TPACK framework should be taken into consideration.

Qasem and Viswanathappa (2016) studied to develop teachers' TPACK through a blended learning approach. This study aimed to check the levels of ICT Knowledge of Science teachers in secondary school through a blended learning approach. The methodology of the current study was an experimental method. In this study, the design was quasi-experimental. In this study two groups were created one was experimental

and another was the control group. At the start of the study, a pre-test was conducted on both groups. The teachers of the experimental group had been trained in a blended approach environment. The teachers of the control group were trained in the traditional learning environment. A total of sixty science preservice teachers participated in this study as a sample with each group having 30 teachers. To know the teachers' ICT Knowledge, a Knowledge scale grounded on "Technological Pedagogical and Content Knowledge (TPACK)" which was constructed by Koehler and Mishra (2006) was used by the researcher. Only four dimensions of the TPACK Scale and 35 items which were, directly and indirectly, related to technology were added to the scale. Items were based on a five-point Likert scale starting from 'not aware of the components to high knowledge about the components. After the collection of the questionnaires, data were analysed with the help of SPSS 17.0 version software. To check the significant differences between experimental and control groups t-test was applied. The finding of the study suggested that the Framework of TPACK has significantly provided a valuable instrument to assess teachers' knowledge in the area of Information and Communication Technology integration. Also, the knowledge of teachers regarding ICT was more than average in the experimental & control group and the t-test provided the result that there is a significant variance in Teachers' Information and Communication Technology between the two groups.

Harvey and Caro (2016) experimented with the "building TPACK in pre-service teachers through explicit course design". The study used the "Technological pedagogical and content knowledge (TPACK) framework" to develop and assess these knowledge domains within the integration of technology courses for pupil teachers. To measure the technology integration of pupil teachers, this study plays a significant role

in the application of TPACK as a metric. Respondent of the study were two groups of students enrolled in an undergraduate teaching certification program. It was experimental research in which one experimental group was taught “technological pedagogical and content knowledg (TPACK) framework” while the other control group was not. Pre-test & post-test of the TPACK assessment were conducted at starting and the ending time of the course. The finding of the study indicated that the uses of the TPACK framework are playing a significant role in developing these skills in pupil teachers.

Mai and Hamzah (2016) studied the Perceptions of “technological pedagogical and content knowledge (TPACK)” of primary school science teachers in Malaysia. In the present study, the researchers studied the perceptions of primary science teachers’ towards (TPACK) seeing teachers’ perceptions of the affordances of the use of technology in teaching activities. The descriptive survey method was employed in the study and the type of the data was qualitative. The respondents of the study was 133 primary school science teachers in Malaysia. The sample consists of 66 male teachers while the remaining 67 were female teachers. To collect the data for the study, the tool which was constructed by Schmidt et al. (2009) used. This tool has 47 items of the TPACK domain based on the 5-point Likert scale. Different descriptive & inferential statistical tools were employed to analyze the collected data. The finding suggested that in term of pedagogical knowledge primary science teachers perceives better self-confidence. Additionally, no significant differences were found in terms of gender of science teachers’ perceptions of “technological pedagogical content knowledge (TPACK)” although, there were significant perceptions differences of pedagogical

knowledge, content knowledge, and pedagogical content knowledge with respect to their age.

Vila, et al. (2015) studied primary teachers' "Technological Pedagogical Content Knowledge". The objective of the investigation was to analyze the needed level of TPACK among primary education teachers. The study was based on the non-experimental quantitative method and for this 224 pre-school teachers and primary education teachers working in the province of Alacante (Spain) were part of the sample. The finding of the study was that teachers had not sufficient technological knowledge to integrate it into teaching while they have sufficient knowledge of content and pedagogy knowledge. There were significant differences in the level of TPACK based on gender, and years of experience. Finding suggests that keeping with the TPACK model, which appears as a reference framework to be taken into account where its connection with the teaching-learning activities in the classroom.

Angeli and Ioannou (2015) developed the "Technological Pedagogical and Content Knowledge (TPACK) for Secondary education computer science teachers". To teach secondary education computer science teachers how to integrate technology in the teaching-learning practices the framework of "Technological pedagogical content knowledge (TPACK)", developed by Koehler & Mishra (2006), and the approach of technology mapping was adopted by the researcher. The researcher developed a fifteen-hour professional development program for teachers. In this period teachers came to know about the educational affordance of various computer devices and how to apply them to make learners more understanding of computer science subjects. After the completion of the fifteen-hour program, teachers got to know important information

regarding the use of ICT. Teachers came to know how to incorporate technology, content, and pedagogy in the teaching-learning process and in order to design learning activities properly for learners' levels. The paper shows a good example of TPACK in practice by expressing teachers' actual activities. It was experimental research and the participation in the teacher professional development program and their evaluation of the program demonstrated teachers' actual instructional artifacts.

Varol (2015) studied the “Predictive power of preservice physical education teachers' attitudes towards educational technologies for their TPCK”. The objective of the study was to explore the preservice physical teachers' effect on the attitudes toward using technology in teaching TPCK. A correlational research model was employed in this study. A total of 529 prospective physical education teachers were the sample of the study. To collect the data for the study, two instruments were used (1) the TPCK Scale and (2) the Technology attitude scale. To analyze the data, descriptive and inferential statistical techniques like correlations and regression analysis were used. The findings of the study advocated that the reason for the high-level effects on TPCK was because of attitudes towards educational technologies, and the sub-dimensions of the attitude scale for educational technologies described thirty-one percent of the total variance in TPCK. Additionally, analysis of the data found that prospective physical teachers had high level of attitude towards educational technologies and TPCK.

Baris (2015) studied the “TPCK and educational use of web technologies by European teachers”. In the present study, the researcher studied “self-efficacy and attitudes of European teachers with TPCK & the Educational use of web technologies”. The purpose of the study was to measure the teachers' attitudes towards self-efficacy in

TPCK & web-based education. The sample of the study was teachers working in elementary and secondary education schools in different European countries. A total of 117 teachers were contacted, out of them, a total of 33 teachers involved in the study, of which 15 teachers were male and the remaining 18 teachers were female. To measure the teachers' self-efficacy in terms of web pedagogical content knowledge, the survey 'TPCK-W Survey' constructed by Lee, et. al. (2009) was used. Data were collected online using the google survey link which was sent to respondents with online links. The collected data were analyzed using SPSS 17.0 version. Descriptive statistical techniques like, mean, SD, and percentage were applied. To compare the quantitative data Kruskal-Wallis test and Mann-Whitney U-test were applied. The findings of the study showed that European Teachers' "Technological Pedagogical and Content Knowledge and educational use of Web technologies self-efficacy" were high and their attitudes were positive. Also, there were no significant effects of gender, age, and experience on TPCK-W and attitudes. Furthermore, based on teachers' web communication, pedagogical use of the web, and web content, respondents' general web attitudes changed positively.

Sezer (2015) examined teachers' Techno-pedagogical competencies with respect to certain variables. The goal of the current study was to explore the technological pedagogical and content knowledge (TPACK) competencies level of teachers in terms of gender, and branch, and to attend in-service training programs. This study was based on the descriptive survey method. The population of the study was all the teachers working in secondary schools in various provinces in Turkey. A total of 216 teachers in which 98 male teachers and 74 female teachers of secondary schools were participated in the study through the Snowball sampling technique. To know the

teachers' awareness of TPACK competencies the instrument Technological pedagogical content knowledge scale adapted by Ozturk & Horzum (2011) was used. It was constructed by Schmidt et al. (2009a). The scale had seven dimensions. The online method was performed to collect the data for the study. Data were analysed using the SPSS 13.0 version. To test the data normality hypothesis, the Shapiro-Wilks Normality test was used. Since the data were not normally distributed, the Mann-Whitney U and Kruskal Wallis tests were performed to analyze the data. The analysis of the data found that there was a high level of awareness regarding Technopedagogical knowledge competencies among the participants of the sample. With respect to the branch and attend in-service training programs of teachers, there were significant statistical variances in the awareness level of their technological pedagogical and content knowledge competencies.

Bhatia and Chugh (2015) studied technological integration in teaching-learning. The study starts by considering that teachers are not using technology in their curriculum appropriately. This paper aimed to develop an instrument to measure the Perception of Technological Pedagogical and Content Knowledge (TPCK). The study was a survey in nature and the purposive sampling technique was used to collect the sample of the study. A total of 78 primary teachers consisted in the sample of this study. Adding a few numbers of items regarding Information and Communication Technology which can contribute to pupil performances and based on the theme of Koehler and Mishra's (2009) TPCK framework a questionnaire was prepared. The questionnaire had eight sub-domain including seven of the TPACK framework and Information and Communication Technology (ICT) contributing to pupils' performance. The items of the questionnaire were close-ended. The data were analyzed using SPSS 20.0 version.

The findings of the study revealed that the developed instrument is valid and reliable and it can be used in further studies.

Aquino (2015) studied “Biological Science Preservice teachers’ technological pedagogical and content knowledge (TPACK) self-efficacy”. The required data were collected using the descriptive survey method. The respondents of the study were selected from the college of teacher education. A total of 37 Biological science preservice teachers were selected for the study. To collect the data researcher adapted the instrument ‘Technological Pedagogical Content Knowledge scale’ constructed by Schmidt, Baran, Thompson, Koehler, Mishra, and Shin (2009). To substantiate the findings of the study, observation and interview techniques were also conducted. Different statistical techniques like weighted mean, percentage, ranking, and t-test were used. The study revealed that the participants had good TPACK Self-Efficacy. Further, their self-efficacies were slightly affected by their gender, and electronic devices with internet connectivity. The study suggests further work regarding instructional packages to better the TPACK of participants.

Akman and Guven (2015) developed “an instrument to measure the TPACK level and self-efficacy perception of the prospective teachers and social sciences teachers”. The methodology of the study was a descriptive survey in nature. A total of 285 social studies prospective teachers from four universities in Turkey were the sample of the study. To develop the tool an item pool was formed after reviewing the related studies. The scale was formed in the type of 5-point Likert type. After analysis of items, finally, 55 items were part of this study. This instrument had seven domains of TPACK. Reliability and validity of the instrument were made for the gathered data. Analysis of

data suggested that the instrument was valid and reliable to use in further studies. This instrument was specially developed for social studies teachers and prospective teachers from the area of social studies.

Karaca (2015) investigated technological pedagogical content knowledge of preservice teachers with respect to gender, type of high school, possession of various technologies, etc. A survey technique was employed to conduct the study. The sample of the study was selected by using a convenience sampling technique. A total of 142 prospective teachers participated in the study. Data were collected using a questionnaire from respondents. To analyze the collected data, different descriptive statistical techniques like percentiles, mean, and frequencies as well as inferential statistics like t-test, and ANOVA were performed. The findings of the study suggested that preservice teachers have middle level of technological pedagogical content knowledge (TPCK). There was a significant variance in TPCK level among preservice teachers with reference to their gender and, female preservice teachers' TPCK level was higher than male preservice teachers. Furthermore, there was no significant variance in TPCK with reference to their type of high schools.

Kazu and Erten (2014) examined “Technological Pedagogical Content Knowledge Self-Efficacies of Teachers”. The study aimed to know teachers’ opinions on TPACK, their self-efficacy, and whether these views altered with respect to certain variables. The methodology adopted in the study was the scanning method. A total of 280 primary teachers participated in the study and they were selected through a random sampling technique. To collect the data, the instrument “Technological Pedagogical Content Knowledge Scale” adapted to Turkish language by Ozturk and Horzum (2011) which

was originally constructed by Schmidt et al. (2009) was used by the researchers. To analyze the data, different statistical techniques like average, standard deviation, etc. were used. The findings of the study revealed that teachers' self-efficacies to TPACK and its sub-domains TK, CK, PK, PCK, TCK, and TPK were high levels. Furthermore, the study revealed that there was no significant differences in Self-efficacy perceptions on TK, CK, PCK, TCK, and Technological Pedagogical Content Knowledge with respect to their gender, while there were significant differences in self-efficacy perceptions on PK & TPK with respect to their gender. Female teachers' self-efficacies were better than male teachers in the sub-dimensions.

Cacho (2014) assessed the TPCK of Pre-service teachers. The purpose of the study was to explore the TPCK level of pupil teachers and its relation to the Technological Pedagogical and Content Knowledge modelling of teacher educators. The methodology adopted in the study was a descriptive survey type. The participants of the study were pupil teachers who were enrolled in the Bachelor of Elementary Education. The sample of the study was selected through the simple random sampling technique. To collect the data for the study researcher developed the instrument based on a review of related instruments. Researcher developed two self-reporting tools to measure the pupil teachers perceived level of Technological Pedagogical and Content Knowledge and it's all the domains and to measure the teacher educators' TPCK Modelling. The items of the questionnaire were based on a five-point Likert type. The researcher conducted the pilot study. The finding of the study suggests that pre-service teachers' perception level regarding technological pedagogical and content knowledge was high. Another finding indicates that pre-service teachers need to be trained appropriately so that they can improve their technological knowledge, to balance with content knowledge and

pedagogical knowledge. Furthermore, the finding of the study regarding perception towards teacher educators TPCK Modeling was also high. The respondent said that their teacher use the TPCK in the teaching activity. There was positive and significant correlations between pre-service teachers' TPCK Level and TPCK modelling of teacher educators.

Tajudin and Kadir (2014) Studied “technological pedagogical content knowledge (TPCK)” and the teaching practice of Mathematic pupil teachers. This investigation aimed to identify the level of TPCK of mathematics pupil teachers at University Pendidikan Sultan Idris (UPSI) & to discover their teaching activities throughout practical training at school. The methodology of this research was a mixed-method that is quantitative and qualitative. In the first phase data were collected through questionnaires from one hundred fifty-six pupil teachers of under graduate specialising in mathematics education and science education. The tool was applied to measure the level of content knowledge, pedagogy and technology, and TPACK of mathematics. Data were analysed with descriptive statistics. In the second phase, data were collected using interview, and 4 pupil teachers were interviewed to assess the level of TPCK integration in the teaching practice of teachers' trainees. The finding showed the level of TPCK among teacher trainees was average. The level of TPCK between mathematics teacher trainees and science teacher trainees was almost the same but based on gender-male and female there was a significant variance. In terms of using technology, all the respondents were frequent in using Microsoft PowerPoint presentations as well as a scientific calculator. This study suggests that there is a requirement for technological integration in education and teachers should be given exposure to using technology.

Jang and Tsai (2013) explored the TPACK of Taiwanese teachers by employing a new contextualized TPACK model. The purpose of the study was to investigate TPACK of secondary school science teachers by employing a new contextualized TPACK model. The relationship between in-service teachers' TPACK and other aspects were also investigated. For this, a data collection questionnaire was posted to secondary school teachers randomly selected across various parts of Taiwan, and also return envelopes were attached so that they can return the complete questionnaire to the researcher. Different statistical techniques like mean, t-test ANOVA were conducted appropriately. The results discovered that secondary school science teachers' TPACK was statistically significant in relation to gender and teaching experience. Male teachers were found better technological knowledge than female teachers. The study showed that gender and teaching experience were significant prominent aspects for their TPACK.

Zelkowski, et al. (2013) constructed and validated a reliable “Technological Pedagogical and Content Knowledge” (TPACK) tool for secondary school mathematics pre-service teachers. This study was aimed to develop and validate a reliable content-specific survey for the pre-service secondary mathematics teachers. To maximize the diversity in the sample, data were collected from the various mathematics teacher education institutes across the United States. The sampling technique was a mix of purposive and stratified. An aggregate of 315 pre-service teachers responded to the survey from 15 teacher education institutes across the United States. Exploratory and confirmatory factor analysis (CFA) were performed to give strength and validity to the research method and results. The finding of the study indicated that TK, PK, technological pedagogical and content knowledge construct are valid and reliable, while, for preservice mathematics teachers Techno-pedagogical knowledge,

pedagogical content knowledge, and technological content knowledge continue to be difficult and self-report.

Hosseini and Kamal (2013) surveyed preservice and in-service teachers' perceptions of TPCK. The study directed to determine the pre and in-service teachers' knowledge of technology integration through the TPACK Framework. The descriptive survey method was employed to conduct the study. The sample of the study consisted of 275 pupil teachers enrolled in a university. A stratified sampling technique was used to select the sample of the study. To collect the data three instruments were used that are (1) Computer Attitude Questionnaire, (2) Demographic Questionnaire, and (3) TPCK Questionnaire. The instrument which was based on the TPCK Framework given by Mishra and Koehler (2006) for technology integration into teaching developed by Schmidt et al. 2009 was used. To check the variances among different groups on a combination of dependent variables, the MANOVA analysis was conducted. Further to check the significance of MANOVA results the Pillai's trace was calculated. To check the relationship between computer attitude and TPCK, Pearson product-moment correlation was applied. The finding of the respondents' TPCK indicates that Technopedagogical knowledge was the lowest and Pedagogy knowledge was the highest among respondents. Additionally, MANOVA results revealed that there was no significant correlation between the age and gender with TPCK and its all dimensions whereas, there was a significant relationship between the respondents' teaching experiences and field of study with their TPCK. Furthermore, there was no significant relationship between respondents' attitudes towards using technology and TPCK.

Akkoc (2013) studied the integration of the TPACK framework into teacher education. In this study, for the preservice mathematics teacher education program, it was explored how the TPACK framework can be applied to design and deliver a course in mathematics teaching. To design the course using TPACK framework, the content dimension was brought into play. The design of the course went through different phases like, to specify the objectives of the course, developing and arranging the content of the course, Postulating teaching and learning situations, and Evaluation of the course objectives. To develop and design the course using TPACK framework, on one side this method was aimed to develop specific mathematical concepts based on TPACK and the other side of the approach was to develop general TPACK which can be developed for any content. The important characteristic of the program was that participants actively engaged in hands-on activities.

Nordin, et al. (2013) studied a case of secondary school Pupil Teachers' TPACK Mastery Level. The study aimed to investigate pupil teachers' perceptions of their Technological pedagogical and content knowledge Mastery level and to check the variances of TPACK Perceptions before and after field experiences. The approach of the study was mixed with qualitative and quantitative methods. A survey method was used to collect the data and additionally, three pupil teachers were interviewed for the study. The interview was conducted before and after the field experience. Pupil teachers were also observed by the researcher during the field experience. To measure the perceived level of TPACK level. The researcher adapted the instrument in the context of New Zealand which was earlier adapted by Archmbault & Crippen (2009) and originally developed by Schmidt et al. (2009). The final version of the Instrument had 36 items. The respondent of the study was from Graduate Diploma in Teaching and

Learning of New Zealand University. The sample of the study consisted of 107 secondary school pre-service teachers. The findings of the data analysis suggested that pre-service teachers were lowest in Technology knowledge and were highest in Content Knowledge at both before and after field experience. Finding suggests there were significant changes in TPACK sub-domains knowledge at pre and post-test results. Interviews and Observations suggested changes in knowledge of TPACK.

Bilici, et al. (2013) constructed a comprehensive instrument “Technological Pedagogical Content Knowledge Self-Efficacy Scale for Pre-service science teachers”. The methodology of this study was descriptive survey in nature. A total of 808 senior pupil science teachers from seventeen teacher education colleges were selected as a sample for the study. To decide the factorial structure of the tool, Exploratory Factor Analysis was performed and to approve the structure model attained from Exploratory Factor Analysis, Confirmatory Factory Analysis was applied. To check the internal consistency reliability of the subscale, Cronbach’s alpha coefficient test was conducted and it was found that the item of instrument had high reliability and was valid with different samples. Findings indicated that the tool was reliable and valid to study the prospective science teachers’ self-efficacy towards Technological Pedagogical and Content Knowledge (TPACK).

Chai, et al. (2013) studied the literature related to Technological Pedagogical and Content Knowledge that investigated Information and Communication technology integration from the framework of TPACK. Articles were searched and found from reliable sources. In this review study, a total of 74 articles were reviewed, the spreadsheet was used for coding and analysis. The parameter of coding was based on

some previous studies like Wu and Tsai (2009) and Tsai and Wen (2005). Four main categories, Basic data, Research methods, Content analysis, and Discussion were taken into consideration to select the articles. The finding of this review study revealed that TPACK term is an interesting area of research. For the period from which articles were reviewed showed that various sophisticated research method was employed to reach the conclusion. They produced helpful results to enhance the capability of teachers for ICT integration into teaching practices. The review of the previous literature showed various gaps in TPACK framework which need to be minimized. Furthermore, the study suggested more development and research in the area of Technological Pedagogical and Content Knowledge (TPACK). The study suggested to create technological environment based on TPACK so that technological integration strengthens further.

Altun (2012) examines the classroom teachers' "technological pedagogical and content knowledge with respect to different variables". The main objective of the study was to know the classroom teachers' TPACK with respect to gender, teaching experience, teaching level, usage of internet and computers, use of technology lab, and software related to education. It was hypothesized that there will be a difference among teachers' "technological pedagogical and content knowledge" based on their demographic profiles. The methodology of the research was based on the general deductive method. To collect the data researcher used a Turkish version of "technological pedagogical and content knowledge" which was earlier adapted by Bahcekapili, 2011. The sample of the study was 322 primary school teachers who were selected using a random sampling technique. Analysis of data was done by the application of SPSS Version 15 software. Different statistical techniques like t-test, ANOVA were used to analyse the data. The result revealed that with respect to different variables- gender, having the computer and

use of the internet, and the use of educational software there are meaningful correlations and significant variances of TPACK and its sub-domain among teachers. The study suggested that to get optimum pedagogical benefits of ICT in primary schools' teachers should be provided with more practical uninterrupted professional development opportunities.

Bulut (2012) studied the perceptions of mathematics pupil teachers about “technological pedagogical and content knowledge” (TPACK) regarding geometry. The objective of the study was to investigate the perceptions of “technological pedagogical and content knowledge” of pre-service mathematics teachers for geometry. Additionally, this study aimed to inspect the relationship among the different components of “Technological pedagogical and content knowledge”. Furthermore, pre-service mathematics teachers' different dimensions of “technological pedagogical and content knowledge” were studied with respect to possible gender and year of enrolment. The methodology of the current study was the descriptive survey method. The sample of the study consists of 780 pupil mathematics teachers who were pursuing teacher training courses at seven public universities in central Anatolia. To collect the data researcher developed the Perceived Technological Pedagogical and Content knowledge Scale regarding geometry. The findings of the investigation showed that perceptions of “Technological pedagogical and content knowledge” of pre-service teachers are more than the average level. Moreover, to check the relationship among different dimensions of “Technological pedagogical and content knowledge”, a correlational analysis was performed. Findings of the correlational analysis suggested that there was significant positive correlation exists among the different dimensions of the “technological pedagogical and content knowledge” framework. Also, as per MANOVA findings,

there are significant differences in three components that are, technology knowledge, technological pedagogical knowledge, and TPCK among male and female pupil mathematical teachers in favour of male candidates.

Tondeur, et al. (2012) Studied “TPACK in teacher education: in search of the new curriculum”. This study aimed to know the method of Teacher education institutes how they prepare pupil teachers for integrating with ICT in their classroom exercise. The methodology of the study was based on multiple case studies. It was conducted to explore how the Teacher education institutes with their existing curriculum develop “technological pedagogical content knowledge”. Data were collected from the head of the department and the ICT coordinators of the three teacher education institutes. The first finding suggested that the three teacher education institutes are moving from ICT as a stand-alone subject towards embedding ICT in the curriculum, the second finding indicates that to develop pre-service teachers’ TPACK three approaches were adopted, and each approach representing different ways of understanding the place of ICT in the curriculum.

Agyei and Voogt (2012) studied “Pre-service mathematics teachers’ development of technological pedagogical and content knowledge” through collaborative design. In this study, the classroom practices of experimental teachers and their learning with TPACK were examined in terms of the collaborative design of technology-enhanced teaching learning materials impacts. The methodology of the study was centred on the case study. The study focused on pupil teachers’ perception of how design teams played a key role in their development of TPACK & how pre-service teachers develop their TPCK. The sample of the study were four pre-service mathematics teachers and their

125 peer students in the final year of a teacher education program. Data of the study was collected through interview technique from experimental teachers to evaluate teachers' TPCK, the questionnaire originally constructed by Schmidt, et. al (2009) was adapted for the study. Findings of the study suggested that to enhance the pre-service teachers' TPCK, more systematic training should be provided and they should be engaged in technology-enhanced design activities. Additionally, the study indicates that TPCK framework can play a vital role in integrating technology in teaching activities.

Sahin (2011) developed a scale to measure the pre-service teachers' technological pedagogical and content knowledge. A total of 348 prospective teachers participated in this study. The present instrument has seven dimensions of Technological Pedagogical and Content Knowledge (TPACK) & it has 47 five-point Likert type items. The validity and reliability were checked properly and it was found that the instrument was valid and reliable. To determine the validity power of the tool, an Exploratory Factor Analysis was conducted. And to establish the reliability of the tool, Chronbach's alpha coefficient was used. The test-retest reliability was also conducted with a total of 76 prospective teachers twice with a gap of three weeks. Analysis of data found that this instrument was valid and reliable to determine the prospective teachers' Technological Pedagogical and Content Knowledge levels.

Abbitt (2011) investigated the "relationship between Self-Efficacy Beliefs about Technology Integration and TPACK of Pre-service teachers". The exploratory methodology was used in the study. The design of the current investigation was single-group pre and post-test. In the study, data were collected from respondents at the starting and completion of the course focusing on technology integration. To know the

correlation between Self-Efficacy-Technology Integration and Technological Pedagogical and Content Knowledge, the researcher conducted the correlational analysis using pre and post-test data. The sample of the study comprised of 45 prospective teachers enrolled in a teacher education institute. The data of the study were collected using two established research instruments. The finding of the study suggested the varying nature of the correlation between self-efficacy beliefs and knowledge.

Erdogan and Sahin (2010) studied the relationship between “Technological Pedagogical and Content Knowledge (TPACK) of mathematics teachers and their achievement levels”. The study explored the mathematics teachers’ candidates’ “Technological Pedagogical and Content Knowledge” with reference to their gender and departmental affiliations. The objective of the study was also to know that can TPACK be used as a predictor of academic achievement. Participants of the study were those mathematics teachers’ candidates from teacher education institutes who have attended the majority of their classes in technology, pedagogy, and content domains. A total of 137 preservice teachers were part of the study as a sample. 38 preservice mathematics teachers out of the total were from the Department of Secondary Mathematics teacher where only one section was running while the remaining 99 respondents were from the Department of Elementary Math Teacher Education. 80 participants were females while 57 participants were male candidates. To gather the data for the study, the instrument “Technological Pedagogical and Content Knowledge (TPACK) Scale” originally constructed by Sahin (2009) was used. The scale had seven domains and 47 items based on the 5-point Likert type. To know the significant difference in TPACK Knowledge based on their gender and departmental affiliation an

independent t-test was used. Also, an analysis was done to check the relationship between achievement scores and the “Technological Pedagogical and content knowledge” (TPACK) construct. To analyse the data SPSS 15.0 version was performed. The finding of the study suggests that there are significant variances in TPACK Domain knowledge between elementary-level preservice teachers and secondary-level preservice teachers. Based on gender, there was a significant difference in TPACK domain knowledge between teachers in which male teachers TPACK knowledge was better than female teachers. The result also shows that TPACK can also be used as a predictor of achievement level.

Chai, et al. (2010) Studied facilitating Teachers’ development of TPACK. The aims of the study were to investigate the effect of an Information & Communication Technology program designed to enhance preservice teachers’ TPACK and to know how technology knowledge, pedagogical knowledge, and content knowledge contribute to prospective teachers’ TPACK. Based on the TPACK Framework, a course ICT for meaningful learning was developed to prepare pre-service teachers for technology integration. This course had two each 12 hours sessions. The sample of the study consists of 889 pupil educators of the Postgraduate Diploma in Education program. A questionnaire that was originally constructed by Schmidt, Baran, Thompson, Mishra, Koehler, and Shin (2009) was adapted by the researcher to collect the data. Pre and post-test were conducted to collect the data. The finding of the study suggests significant positive effects of the Information and Communication Technology course. Furthermore, the statistical tool, regression analysis was used to check the predictor of TK, PK, and CK on TPACK. Results show that TK, PK, and CK are all significant predictors of TPACK with PK having the major impact.

Shin, et al. (2009) studied how through a course experience, “technological pedagogical content knowledge (TPACK) can be changed”. Based on the hypothesis that there will be a more integrative understanding of technology and its relationship with content and teaching. To check how teachers understand the relationship among content, technology, and pedagogy a single group pre and post-test design was used. A pre-test survey was experimented during the starting week of the course and a post-test survey was administered to the students during the last week of the course. A combination of educational technology courses, both regular and online was conducted. A total of twenty-three graduate students participated in the test. The finding of the study shows that participants gained better acquaintances of TPACK.

Kocoglu (2009) explored the TPACK of pupil teachers in language learning. The purpose of the investigation was to explore how “Technological Pedagogical and Content Knowledge develops in pre-service English-as-a-Foreign Language teachers joined in the mandatory Computer-assisted Language learning (CALL) course”. Also, how “pre-service English-as-a-Foreign Language teachers” relate their knowledge of language teaching, technology knowledge (TK), and Pedagogical content knowledge (PCK) was examined. To conduct the study researcher developed a course within the context of an undergraduate program. The objective of the course was to acquaint prospective teachers with a variety of educational technology and to know how to employ it in the teaching-learning process not only in teaching English but also in their classrooms when they become teachers. A total of twenty-seven preservice English-as-a-Foreign teachers were part of the study. The methodology of the study was grounded in nature. Data were collected from the participants through open-ended interview questions. To analyze the data it was first categorized and then based on Koehler and

Mishra's (2006) TPACK Framework results were found. The findings of the study suggested that there were significant roles of computer-assisted language learning programs in preservice teachers' development of TPACK and it was helpful in practicing their TPACK. Additionally, Pre-service teachers were able to recall their educators modeled the use of computer technology in class and it motivated preservice teachers to incorporate technology into the teaching-learning activities more meaningfully.

2.3 Studies related to Self-efficacy

Padma and Jayanthi (2020) conducted a study to know the self-efficacy of prospective teachers. The objective of this investigation was to check the differences of self-efficacy with reference to their gender, educational qualification, rural & urban locality, income group, married and unmarried, medium of instruction and disciplines of arts and science. The study was conducted through survey. To collect the data from respondents, researchers developed a tool. Stratified sampling technique was considered to reach the sample of the study. Different statistical techniques like Average, Standard deviation, t-test and F-test was applied to analyse the collected data. Findings of the study suggested that there were no significant differences of self-efficacy among pre-service teachers with respect to their gender, educational qualification, rural and urban locality, income group and disciplines of arts and science. While, based on their marital status, there was significant variance of self-efficacy. Pre-service teachers who were married had lower self-efficacy than the pre-service teachers

who were unmarried. Overall, the level of self-efficacy was high among the pre-service teachers.

Zhou et al. (2020) examined secondary school teachers' self-efficacy in teaching computer science. This study described the construction and application of a tool that measures high school teachers' self-efficacy in teaching computer science. Researchers organized a nine-week professional development program for teachers. After successfully completing the program teachers' responses were recorded in computer science teaching self-efficacy instrument. The confirmatory factor analysis was used to validate the self-efficacy instrument, which can be applied by other researchers in computer science education environment. The finding of the study also confirmed that there was significant increase in teachers' self-efficacy after the professional development program in the CK & PCK dimensions of teaching computer science.

Wilde and Hsu (2019) studied the influence of general self-efficacy on the interpretation of vicarious experience information within online workshop. The objective of the study was to analyse the effect of vicarious experience on the self-efficacy of online learning. A total of 136 participants were the part of sample in which 50% were male and 50% were female. It was a between-groups experimental design study. A pre & post-test were conducted to gather the data for the study. Data were collected through Pre-workshop questionnaire and Vicarious experience information (VEI) questionnaire. The analysis of the data revealed that having low general self-efficacy to find VEI less beneficial for their self-efficacy to complete a set task with compare to having high general self-efficacy.

Swarnalatha (2019) studied “Influence of Teacher Self-efficacy on academic achievement of high school students”. The purpose of this study was to check the impact of self-efficacy on academic achievement of secondary school students. It was an ex-post facto research design. A total of 236 secondary school teachers and their 2842 students of secondary school were participated in the study as a sample. To collect the data from respondents, researcher used a “Teacher’s sense of efficacy scale” which developed by Woolfolk and Hoy. Different statistical techniques like frequency, mean, SD, two sample t-test etc were used to analyse the collected data. The finding of the study discovered that there was significant impact of teacher self-efficacy & personal efficacy on academic achievement of secondary school students.

Peker, et al. (2018) investigated teacher self-efficacy of math teachers. The purpose of this study was to investigate the teacher self-efficacy of math teachers with reference to some specific variables like gender, seniority, the stream they graduated from and the grade of school they were teaching. In the study, researchers used the survey and causal comparative research method. A total of 158 math teachers were the participants of the study. “Teacher Sense of Efficacy Scale” were used to gather the data from participants. The causal-comparative research method was applied to compare the scores of specific variables like gender, seniority etc. To analyse the data of the study, initially researchers used descriptive statistical techniques to know the level of self-efficacy belief with respect to defined variables. To check the differences between groups, for independent samples, a t-test was performed while to get the differences between dependent samples, one-way ANOVA was applied. The study suggested following findings, overall math teachers had quite efficient level of self-efficacy but in the self-efficacy sub-factor for student engagement it was slightly efficient. There

were also some significant statistical differences of self-efficacy with respect to gender. Furthermore, there were also significant differences of self-efficacy between math teachers with respect to their level of seniority. On the other hand, there were no significant variances of self-efficacy among math teachers with respect to grade of school they were teaching and the stream they graduated from.

Muomezie (2018) conducted a study on teachers' efficacy in teaching physical education. The goal of this study was to know the teachers' efficacy of physical education teachers and to provide valuable solutions of the problem. Researchers raised four research question to find out the aim of the study. The descriptive survey method was adopted by the researcher to get the answers of the research questions. A total of hundred and four teaches from fifty-two primary schools were consisted of the sample for the study. Multistage sampling technique was applied to get the sample of the study. In the first stage of sampling, schools were selected randomly, and in the second stage, purposive sampling technique was taken into consideration to select the teachers. Questionnaire was used to collect the data from respondents but only eighty-six copies of the questionnaire out of hundred and four were returned. The finding revealed that teachers had very low self-efficacy in teaching some physical education content area.

Talluri (2018) investigated secondary school students' self-efficacy with respect to their sex and type of school management. With the help of stratified random sampling technique, a total of 576 secondary school students were selected as sample of the study. To achieve the objectives of the study, data were collected using tool of Self-efficacy Scale developed by Dr Arun Kumar Singh and Dr Shruti Narain. Different statistical techniques like Mean, SD and t-test was used to analyse the collected data. The study

found that there were no significant differences on self-efficacy with respect to their gender. Study also, did not find any differences on self-efficacy in relation to government and private secondary school students.

Kavita and Dahiya (2018) conducted an experimental study to find out the self-efficacy of pupil teachers with reference to multimedia and academic stream. The objective of this study was to know the effect of multimedia package on self-efficacy of pre-service teachers with respect to their stream. It was an experimental study having design of pre-test post-test quasi experimental. A sample of 60 pupil teachers from a college of education were randomly selected for the study. An experimental group and a control group each of 30 prospective teachers were formed. Experimental group was taught through multimedia while teachers of control group were taught conventional method of teaching. To gather the data from respondent investigators used standardized tool Self-efficacy Scale (SES-MGBR) which was developed by Mathur and Bhatnagar (2012). Pre-test and post test data were compared after experiment. Collected data were analysed using different appropriate statistical techniques like ANOVA and t-test. Findings of the experiment revealed that prospective teachers of experimental group who were taught using multimedia instructional method had significantly higher score of self-efficacies than that of prospective teachers of control group who were taught using traditional method of teaching. Experiment did not find any significant differences of self-efficacy among prospective teachers of experimental group with respect to their academic streams like science stream, arts stream and commerce stream. With above findings, the researchers concluded that prospective teachers' self-efficacy can be enhanced through multimedia instructional packages.

Lacks and Watson (2018) examined the relation of School Climate with Teacher Self-Efficacy. This was a quantitative study and the design of the study was correlational. All the licenced teachers working in two middle schools were the sample of the study. The census sampling technique was used to select the sample. To collect the data from respondents, two instruments were used in the study. School Climate Index (SCI) which was developed by Moran and Dipaola (2006) and “Teacher Sense of Efficacy Scale” which was developed by Moran and Hoy (2001). To check the relationship between school climate and teacher self-efficacy and beliefs, the data analysis was performed using spreadsheet. The findings of the study disclosed that there was no significant association between teachers’ sense of self-efficacy and school climate, there was no significant correlation between collegial leadership and teacher self-efficacy, no significant correlation was found between teacher professionalism and teacher sense of efficacy, there was low level of correlation between teacher perceived academic press and teacher self-efficacy, and there was significant positive correlation between community engagement and teacher sense of self-efficacy.

Sen (2017) studied secondary school teachers’ self-efficacy with respect to certain variables. The survey method was adopted in the study by investigator. The sample of the study was selected through multi-stage sampling technique. A total of 1048 secondary school teachers were participated in this study as sample. To collect the data researcher used three standardized instruments and developed a Teachers’ self-efficacy scale. Researcher personally collected the data for the study by administering four research instruments. SPSS was performed to analyse the collected data. The findings of the study suggested that there was significance variance in self-efficacy of male and

female secondary teachers and male teachers were more self-efficacious than female teachers.

Menon and Sobha (2017) conducted a study on teacher efficacy of secondary school teachers. The purpose of the study was to know the teacher efficacy of secondary school teachers. The normative survey methodology was adopted to achieve the objectives of the study. With the help of stratified sampling techniques, a sample of 350 secondary school teachers were selected. To gather the data for the study, a teacher efficacy scale was developed by the investigators. Appropriate statistical techniques were used to analyse the collected data. The findings of the study revealed that secondary school teachers had average level of teacher efficacy and there were significant differences of teacher efficacy among secondary school teachers with respect to teaching experience and type of school management although, there were no significant differences of teacher efficacy among teachers with respect to their gender, locale and subject of specialization.

Kumar, et al. (2017) conducted an empirical study on self-efficacy among higher secondary school teachers. This study aimed to measure government higher secondary school teachers' self-efficacy with respect to gender, their qualification, teaching subject and teaching experience. The descriptive survey method was used to conduct the study. A sample of 300 government higher secondary school teachers were the part of the study. Out of these there were 146 male teachers and 154 female teachers. To select the sample from population, multistage probability sampling technique was used. To collect the data for the study, investigators adopted self-efficacy scale developed by Arun Kumar Singh and Dr Shruti Narain. The scale consisted 20 Likert type items. The

gathered data were analysed using different statistical techniques like Mean, Standard Deviation and C.R. The study found that there were significant variances of self-efficacy with reference to gender among higher secondary school teachers. Furthermore, the finding suggested that there were no significant differences of self-efficacy among higher secondary school teachers with respect to teaching subject, their qualifications and teaching experiences.

Sharma and Kaur (2017) examined self-efficacy of women teachers. The objective of the study was to know the differences in self-efficacy between school and college women teachers. To conduct the study, descriptive survey method was adopted. The sample of the study comprised of 500 married women teachers working in school and colleges. Multistage random sampling technique was considered to select the sample of the study. Data were collected from the respondent using Teacher self-efficacy scale. The findings of the study revealed that there were no significant differences of self-efficacy between school and colleges women teachers and furthermore, majority of the school and college women teachers have average level of teaching efficacy.

Shahzad and Naureen (2017) studied the “impact of teacher self-efficacy on high school students’ academic achievement”. To find out the impact of teacher self-efficacy on students’ academic achievement, researchers adopted an exploratory quantitative research design. The sample of the study was chosen considering systematic random sampling technique. A total of 60 teacher participants and 100 students from 10 secondary school were randomly selected as a sample of the study. To collect the data from respondents, researchers used the instrument, Teacher Self-efficacy Scale constructed by Tschannen-Moran and Hoy (2001). To analyse the collected data from

respondents, researchers used SPSS version 20 by applying product moment correlation and multiple regression analysis. The findings suggested that there was positive correlation between teacher self-efficacy and students' academic achievement. It has concluded that teachers having high sense of self-efficacy can be the force of improved students' academic achievement.

Akeah (2017) studied "Turkish prospective history teachers' self-efficacy and motivation". The purpose of this study was to find the self-efficacy and motivation of prospective history teachers in relation to the teaching profession in general and the history teaching profession particularly. The descriptive survey method was adopted by the investigator. It was a mixed-method research design involving of both quantitative and qualitative approaches. The sample of the study was selected from two teacher training colleges. A sample of 40 prospective teachers were chosen for the study using purposive sampling technique. A self-efficacy questionnaire was used to collect the quantitative data and, to collect the qualitative data researcher interviewed the respondents. The finding revealed that most of prospective history teachers had high level of self-efficacy in general teaching and the history teaching. Finding also indicated that prospective history teachers had high level of self-efficacy and motivation with respect to teaching of history than self-efficacy and motivation for teaching of general subject. Furthermore, finding also indicated a certain extent of correlation between self-efficacy and motivation.

Yusof and Mariani (2017) checked the level of teacher's self-efficacy with respect to gender, teaching experience and teacher training. The objective of the investigation was to check the level of primary school self-efficacy with respect to different variables. A

total of 122 male and 321 female teachers of 443 primary teachers were selected by stratified sampling technique. A Teacher self-efficacy questionnaire consist of 35 items was used to gather data. Data was analysed using SPSS package. Study found that teachers had moderate level of self-efficacy. The findings also confirmed that there was no significant variances in self-efficacy with respect to their gender and teacher training. While there was significant variance of teacher self-efficacy with reference to their teaching experience.

Hatlevik (2016) Examined the “relationship between teachers’ self-efficacy, their digital competence, strategies to evaluate information, and use of ICT at school”. Study suggested that in good teaching practice, the role of self-efficacy is very important. The goal of the investigation was to investigate the correlation between teachers’ self-efficacy, ICT, their way to assess information, their digital competence, and their practice of ICT in school. A sample of 332 teachers were part of the survey. Data was collected through a self-reported questionnaire in which multiple questions were asked about digital competence. Structural equation modelling was performed to test the hypotheses of the study. The findings confirmed the hypothesized model. The relationships between the factors were found to be positive significantly. Finally, the factors in the model described 41% of the teachers’ digital competence, 49% of their self-efficacy, and 36% of their use of Information and Communication Technology at school.

Sehgal (2015) examined the correlation between teacher self-efficacy and teacher effectiveness. This study aimed to know the factors which make a teacher more effective and what is the role of self-efficacy to make their teaching effective. The

survey methodology was adopted in the study. A total of 575 teachers and 6020 students from 25 English medium private schools were the sample of the study. To collect the data from respondents, the researcher used three existing instruments, namely the “Students’ evaluation of Teaching Effectiveness Rating Scale” developed by Tolan and De Ayala (2005), ‘Big-five’ 50-item Personality scale which was available online publicly, the Teacher Self-efficacy Scale which was constructed by Tschannen-Moran and Woolfolk-Hoy (2001), Principal Leadership Scale developed by Wylie and Hodgen (2010), and Teacher Collaboration Scale developed by Goddard, Goddard & Tschannen-Moran(2007). To analyze the data, the Hierarchical Linear Regression technique was used. The finding of the analysis revealed that there was a positive correlation between teacher self-efficacy and teacher effectiveness. The study finds that collaboration and principal leadership has a significant role to develop teacher self-efficacy, and highly self-efficacious teachers are more effective in terms of teaching.

McC Campbell (2015) examined the self-efficacy for teaching Mathematics of Pre-service teachers. This study was aimed to better understand the relationship of prospective teachers’ self-efficacy beliefs for teaching mathematics. Using the convenience sampling technique, a total of 184 undergraduate students participated in the study. To collect the data seven instruments were used. Regression analysis was conducted to analyse the data. The findings revealed that for teaching math, self-efficacy for doing mathematics and teaching mathematics content knowledge and beliefs about teaching mathematics were the significant predictors of self-efficacy. Mathematical content knowledge was not found significant predictor for teaching. There were significant variances between self-efficacy for teaching and self-efficacy for doing mathematics.

Durowoju and Onuka (2015) conducted an experiment to “examine the effect of teacher self-efficacy enhancement and location of school on academic achievement of students”. Sample of the study was selected using multi-stage random sampling technique. A sum of sixty schools, 30 each from urban and rural were randomly selected to get the one teacher from each school. Two instruments those are Teacher self-efficacy enhancement scale and Economics Achievement Test were used to collect the data from the respondents. Both instruments had 0.79 and 0.74 reliability respectively. To enhance the teachers’ self-efficacy, a treatment package that is teacher self-efficacy enhancement package was developed and used. The findings revealed, there was significant effect of teacher self-efficacy enhancement on students’ academic achievement in economics. The location of school had also significant effect on students’ achievement in economics. The study suggested teachers and corresponding stakeholders to use the self-efficacy enhancement programs so that they can be more efficacious in carrying out their teaching activities. Teachers can play vital role to improve the academic performance of students if they (teachers) develop high level of self-efficacy among themselves irrespective of their school location.

Sharma (2015) examined self-efficacy and achievement motivation of pre-service teachers with respect to their attitude towards teaching. The purpose of this study was to explore the relationship between pupil teachers’ self-efficacy, achievement motivation and their attitude towards teaching. The normative survey method was adopted by the researcher. A sample of 290 prospective teachers from B. Ed colleges were the part of the study. Random sampling technique was used to select the sample of the study. For the collection of data from respondents, researcher used three standardized instrument, General self-efficacy scale adapted version by Singh, revised

version of Achievement motivation scale by Deo and Mohan and, Teacher attitude scale by Goyal. Data were analysed using different descriptive and inferential statistical techniques like, Mean, SD, Correlation and t-test. The findings revealed that there was no significant positive correlation between self-efficacy and attitude towards teaching of pre-service teachers. Study also indicated that there was no significant negative correlation between achievement motivation and attitude towards teaching of pupil teachers. Further, study found significant variances in their self-efficacy with reference to their gender.

Gholami (2015) studied relationship of teacher self-efficacy and teacher burnout. This study was aimed to study the self-efficacy and its relationship with teachers' burnout of Iranian teachers of English. The sample of the study contained of ten EFL Educators from a University. In which, there were three female teachers and seven male teachers. Two instruments of Burnout and Self-efficacy were used to collect the data from respondents. Maslach Burnout Inventory (MBI) was developed by (Maslach, Jackson and Leiter, 1996) and, the second instrument was adopted version of Teacher Efficacy (Woolfolk & Hoy, 1990) scale was used. To find out the relationship between teacher self-efficacy and teacher burnout, correlational analysis was performed. The finding of the study indicated that there was negative relationship between teacher self-efficacy and teacher burnout.

Batdi (2014) studied self-efficacy beliefs of German teacher trainers. The study intended to know the self-efficacy of German teacher trainers. To conduct the study, the descriptive survey method was considered by the researcher. The sample for the study were selected from German teacher trainers who had worked in seven regions of

Turkey during the academic year of 2012-2013. A total of 52 German teacher trainers were randomly selected for the study. To collect the data for the study, researcher used instrument The Teacher Interpersonal Self-efficacy Scale developed by Brouwers and Tomic (2002) and it was translated into Turkish language. The study found that male teachers having more experienced had high level of self-efficacy.

Attri (2014) examined the self-efficacy of pre-service teachers with respect to their gender and academic achievement. The descriptive survey method was adopted in this study. To achieve the objective of the study, multistage sampling technique was used to select the participant. In the first stage, researcher selected eight private teachers training college using purposive sampling technique. In the second stage, random sampling technique was used. To collect the data from participants, investigator used adapted version of Swarzer's General Self-efficacy Scale. To analyse the data of the study, two-way ANOVA and t-test statistical technique were used. Finding of the study revealed that, there was dissimilarity between male and female teachers' self-efficacy and, male prospective teachers were having higher level of self-efficacy than that of female prospective teachers. In addition to, having high academic achievement prospective teachers had significantly better self-efficacy than that of low academic achievement prospective teachers.

Achurra and Villardon (2013) studied the Teacher' Self-efficacy and student learning. This study was aimed to know the teachers' beliefs in relation to university students learning outcome. A total of 71 teachers from two universities, and a total of 2195 students from same two universities were participated in the study as sample. The data from teachers were gathered through a computer application. Data were collected

at the start of the course. The data from students were collected at the conclusion of the course. The instrument “College Teaching Self-Efficacy Scale which was developed by Prieto (2003), and “Students’ self-perceived learning scale” developed by the researcher for the study was used to collect the data. Descriptive and correlational analysis were performed to analyse the data. The finding of the study revealed that teachers from both universities had high level of self-efficacy, and teachers’ self-efficacy beliefs were moderately significant related to students’ learning outcome except in the Planning and Assessment dimension.

Tanriseven (2012) examined prospective teachers’ and primary school teachers’ sense of self-efficacy. The purpose of this study was to explore the prospective teachers’ and primary teachers’ self-efficacy with respect to teaching. To conduct the study, the descriptive survey method was adopted by the investigator. To collect the data from respondents, an adapted version into Turkish of “Teacher’s sense of efficacy scale” (TSES), developed by Tschannen-Moran and Woolfolk Hoy (2001) was used by the researcher. A total of 195 primary school teachers from 15 primary schools and, 140 prospective teachers of a training college were sample of the study. Different appropriate statistical techniques like mean, SD etc were considered to analyse the collected data. Findings indicated that working teachers had higher level of self-efficacy than that of prospective teachers. Working teachers were more efficacious in student engagement, classroom management and instructional strategies than prospective teachers. Study also found that there was no significant difference of self-efficacy among teachers and prospective teachers in terms of their gender. This finding was in the line of researchers like Gencturk ve Memis, 2010; Kan, 2007; Kaner, 2010;

Sahin-Taskin & Haclomeroglu, 2010; Taschannen-Moran & Woolfold Hoy, 2007; Yilmaz & Cokluk-Bokeoglu, 2008.

Punia and Kaushik (2012) compared the teachers' perceived self-efficacy of India and Bhutan. The study was aimed to compare the teachers' perceived self-efficacy of India and Bhutan with respect to certain variables. The descriptive survey method was adopted by the researchers to complete the study and the approach of the research was an ex-post facto. For collection of the data researchers used the inventory developed by Kumar and Mutha which had a total of 69 items. The selection of the sample of the study was done through purposing and random in nature because of the suitability of the study. A total of 1024 teachers from India and Bhutan were selected that is 445 from India and 579 from Bhutan. There were 78 college teachers and 497 school teachers consisting of 240 females and 339 males of Bhutan while from India 194 college teachers and 235 school teachers consisting of 351 female and 93 males from both private and government institutions were the portion of the study. For the analysis of the collected data, researchers used descriptive and inferential statistical techniques. Different statistical techniques were mainly mean, standard deviation, ANOVA, t-test and F-test. To compare the variables F-test was applied while correlational analysis was applied to know the relationship. The findings indicated that there was significant difference of self-efficacy between teachers with respect to Indian teachers and Bhutani Teachers and, teachers of Bhutan had high efficacy level than that of Indian teachers' self-efficacy. The study also found that there were significant differences of self-efficacy between government and private teachers with respect to school and colleges in both the countries. Another finding suggested that there was no significant difference

of perceived self-efficacy between the rural and urban teachers working in both the countries.

Mojavezi and Tamiz (2012) conducted a study to know the effect of teacher self-efficacy on students' motivation and achievement. The core objective of the study was to know the impact of teacher self-efficacy on students' motivation and achievement. For this purpose, researchers chose two group of participants consisting of 80 senior secondary schools' teachers and their 150 senior secondary school students. To collect the data from participants' researchers used two different tools, one was Teacher self-efficacy questionnaire, developed by Tschannen-Moran and Hoy (2001) and another was Students' Motivation questionnaire, partially adopted and partially developed by the researchers. Confirmatory factor analysis was conducted on the students' motivation questionnaire. After analysing of the data, study found that there was important correlation between teacher self-efficacy and students' motivation.

Tai, et al. (2012) examined the impact of teacher self-efficacy on the student learning outcome. Researchers developed a teaching and learning model based on previous review of related literatures. To achieve the objectives of the study, researchers formulated five hypotheses. The survey method was used by the researchers. A total of 372 questionnaires were distributed to high school students which were randomly selected for the study. Analysis of data were started with Structural Equation Modelling to verify the theoretical model. Reliability and validity of the tool were verified and after that hypotheses of study were tested. Furthermore, a confirmatory analysis factory analysis was conducted. The analysis of the data was performed using different statistical techniques like Statistical software packages SPSS, version 13.0 and

LISREL, version 8.70. The findings indicated that there were robust relationship of teacher self-efficacy and the teacher teaching process with learning satisfaction.

Kumar and Papaiah (2012) conducted a study on self-efficacy of high school teachers with reference to different variables. A total of 30 high school teachers working in government high schools and three private un-aided high schools were selected as the sample of the study. Data of the study was collected using “The Ohio State Teacher Efficacy Scale (OSTES)” constructed by Tschannen-Moran and Woolfolk Hoy (2001). To find out the significant differences between government and private school teachers’ self-efficacy, ‘t’-test was applied. The finding of the study revealed that there was significant variance of self-efficacy between government high schools and private high schools teachers.

Gurol and Akti (2010) steered a study to find the relationship between prospective teachers’ self-efficacy and their internet self-efficacy. The descriptive survey method was used by the researchers. A sample of 248 prospective teachers consisting of 116 female and 132 male teachers were the part of study. “The Ohio State Teacher Efficacy Scale (OSTES)”, developed by Tschannen-Moran and Woolforlk Hoy and, The Internet Self-efficacy instrument (adapted) were used for the collection of data from participants. Different statistical techniques like Pearson product-moment correlation and regression analysis was performed to analyse the collected data. The result of the Pearson Product-moment correlation indicated a significant correlation between prospective teachers’ self-efficacy and their internet self-efficacy.

Abbitt and Klett (2007) studied “Identifying influences on attitude and self-efficacy beliefs towards technology integration among pre-service educators”. Tools were used

for the pre and post-tests to measure perceived comfort towards computer technology, perceived usefulness of “computer technology, and self-efficacy beliefs toward integrating technology into teaching”. The undergraduate students who joined teacher preparation programs were part of the sample. This study examined the effects on self-efficacy beliefs toward technology incorporation among prospective teachers. This study found possible effects on self-efficacy belief. The average score of all of the factors indicated a change from the commencement of the course as compared to the completion of the course. The score of perceived usefulness and comfort with computer technology as well as the score of self-efficacy with technology integration were higher after the course. The result suggested that some factors will have a higher direct influence on self-efficacy belief than others.

Wang, et al. (2004) studied “increasing pupil teachers’ self-efficacy for technology integration”. The purpose of this study was to examine how vicarious learning and goal setting influence pupil teachers’ self-efficacy for integration of technology into classroom setup. The methodology of the study was experimental & pre and post-test survey was conducted to get the data from the respondents. A total of 280 pupil teachers were the part of the study. A total of four groups were formed as three experimental and a control group. Data were analysed using appropriate statistical techniques. The findings confirmed that there was significant effects of vicarious experience and goal setting on participants self-efficacy beliefs for technology integration. In fact, there was more significant effects found when both vicarious and goal settings were present in compare to when there was only one factor. The findings suggested teacher educators that the application of vicarious learning and goal setting may play significant role to

develop the self-efficacy of pre-service teachers with respect to effective technology integration.

Byrd (2002) studied the “Impact of Teacher Efficacy on the Academic Achievement of third grade students in South Carolina”. The objective of the study was to check whether teacher efficacy influences the academic achievement of students with respect to different variables. Sample were selected in multi-stage. Firstly, a total of eight districts were selected randomly and after that nine elementary school were selected using stratified sampling technique. The sample of the study was one hundred fifty six third grade teachers and 3945 students of third grade. The collected data were analysed employing the SPSS Version 10, using the statistical techniques of t-test, ANOVA etc. The finding suggested there was no significant variances of self-efficacy of teachers between urban schools and rural school teachers.

Silver, et al. (2001) conducted a study on strategies self-efficacy instrument for use with community college students. In this study self-efficacy and self-regulation theories were used to examine scores from an instrument. The sample of the study were 550 social science students and the average age of the participants were 24.72 years. To collect the data from respondents an instrument was adapted as per the need of the study. Analysis of the data was performed applying MANOVA and Descriptive DFA statistical techniques. The findings indicated that academic achievement of students in community college was correlated to self-efficacy and there was positive correlation between self-efficacy and academic achievement.

Ashton, et al. (1983) conducted a study on “Teachers’ sense of efficacy”. It was an exploratory research design. Analysis of data suggested that there was significant

relationship among teacher sense of efficacy and student teacher interaction, and student performance. Study found that teachers having high sense of teaching efficacy will have students' high academic performance, there are more concentrate on academic instruction, observe on-task behaviour of their students, and create student friendly classroom culture. Students of teachers having low sense of efficacy had lower academic achievement scores than that of students of teachers with high sense of efficacy attitudes.

Raphael and Mtebe (n.d.) Studied “pre-service teachers’ self-efficacy beliefs towards educational technologies integration in the classroom”. Based on some hypothesized factors that could influence pupil teachers’ self-efficacy beliefs retrieved from previous studies mainly performance expectancy, perceived ease of use, social influence and support, researcher collected the data from respondents. To gather the data from sample researchers adapted previous instruments accordingly. A total of 411 samples were given the questionnaires but only 386 respondents returned it. To analyse the data, SPSS version 20 was performed. The study found that out of four hypothesized factors, Support factor was strongest predictor. Performance expectancy had also significant effect on pre-service teachers’ self-efficacy belief to integrate the educational technologies. The study also found that there were negative significant effect of perceived ease of use and social influence on pre-service teachers’ self-efficacy beliefs in educational technology integration.

2.4 Summary of the above review of the related literatures

With above extensive review of related literatures, it was found that Technological Pedagogical Content Knowledge (TPCK) and Self-efficacy of teachers had been

studied by various researchers with different variables and in different conditions. The variable of TPCK has been explored by previous investigators with respect to different variables. Investigators carried most of the studies employing descriptive survey method. A few investigators Macrides & Angeli (2018); Sharma & Sharma (2018); Navarro (2017); Abbitt (2011); Chai, et al. (2010) conducted studies using Experimental method. Researchers investigated TPCK with variables like, gender, locality, teaching experience, different disciplines.

With regard to studies related to Self-efficacy, investigators had also conducted most of the studies employing descriptive survey method. In-contrast to TPCK with respect to pre-service teachers, self-efficacy studies consisted of mostly in-service teachers as sample of the study. In-service teachers were not from same level of school, some of them were from primary school, middle school, secondary school and senior secondary school. Some studies conducted on specifically to teacher self-efficacy while some studies focused on general self-efficacy.

Above review of related studies on the variables TPCK and Self-efficacy helps to reach important characteristics which comprise of knowledge of various theories, different variables, different adopted, adapted and developed instruments and various research design. This process assisted the investigator to formulate the hypotheses for validating the data which were found in the present study. However, above review of related studies and its analysis did not give any particular trends in general rather it gave mixed type of results. The reason behind this might be different research design and respondents. Hence, overview of above review of literatures can be summarises that there were no consistencies in the findings of the previous studies. Investigator found

various gaps which can be filled by further researches. Researcher did not find any studies which conducted on secondary school social studies teachers with respect to TPCK and self-efficacy. Having extensive review of related literatures and understanding of the findings of previous studies, it helped investigator to formulate hypotheses for the present study.

Chapter-3

Methodology of the study

Chapter III

Methodology of the Study

3.1 Design of the study

To achieve the objectives of the study, researcher makes a plan for selecting subjects, selection of appropriate research tools, collection of data, analysis of data etc. which refers to the research design of the study. The results and conclusions of the study depends on design of the study. To get the good results and to reach the conclusion, an appropriate planned procedure needs to be carried out (Zaidi, 2015). According to Kerlinger (1986), “Research design is the plan, structure and strategy of investigation conceived as to obtain answers to research problems.” A sound design provides right answers to the research questions. It also provides basis whether the findings of the study can be generalized to a larger population or not. It is important for researcher to select the appropriate research design as per the need of the study. Taking these observation into account, investigator found the most appropriate research design for the present study as follows.

3.2 Research method

To conduct the present study, the researcher decided to use ‘survey method’, which is part of descriptive type of research. According to Best et al. (2017), “Descriptive research which uses quantitative methods to describe *what is*, describing, recording, analysing, and interpreting conditions that exist. It involves some type of comparison or contrast and attempts to discover relationship between existing non-manipulated

variables. Some form of statistical analysis is used to describe the results of the study". In the current study, the main purpose was to study the Technological Pedagogical Content Knowledge and Self-efficacy of secondary school social studies teachers with reference to their type of schools and locality of the school, and existing characteristic of the participants in terms of Technological Pedagogical Content Knowledge and Self-efficacy were not manipulated by the investigator. Hence, the investigator considered survey technique under descriptive quantitative research method as most appropriate for the present study.

3.3 Variables of the study

In the current study, the following variables were considered as independent variables:

- (i) Type of the schools
- (ii) Locality of the schools

Type of the schools were refer to Government and Private Schools and Locality of the schools were considered schools functioning in Urban and Rural areas.

In addition to above mentioned variables, Technological Pedagogical Content Knowledge (TPCK) and Self-efficacy were taken as dependent variables of the current study.

3.4 Population of the study

All the Social studies teachers who were teaching social studies in secondary schools in Darbhanga District of Bihar were taken as the population of the study.

3.5 Sample of the study

To conduct the study some portion of the population were selected as sample with following details:

3.5.1 Sample Size

One hundred forty nine Social Studies Teachers of 50 Secondary Schools were the part of sample. The determination of 50 secondary schools were based on “Determining sample size for research activities” suggested by Krejcie and Morgan (1970). Furthermore, the assumption of availability of at least four Social Studies Teachers in each school was based on as per social studies subjects comprises of History, Geography, Political Science and Economics and as per the provisions of regulatory bodies (BSEB, CBSE).

3.5.2 Sampling technique

Selection of sample of the study was based on stratified random sampling technique, which are as follows:

Stage I

At this stage, after getting the list of Government and Private secondary schools in Darbhanga District of Bihar, Schools were divided as per the stratum of type of school (Government and Private), further schools were divided as per the stratum of locality (Urban and Rural).

Stage II

At this second stage, schools were selected using Proportional stratified random sampling technique (Johnson & Christensen, 2014) from different strata like Government and Private, Urban and Rural. A total of 50 secondary schools were

selected, out of which 37 schools were from Government Schools including 7 schools from urban locality and 30 schools were from rural locality. While a total of 13 schools were from Private managed schools including 7 schools from urban locality and remaining 6 schools were from rural area.

Stage III

At the final stage of sampling, all the Secondary school social studies teachers of proportional stratified randomly selected schools were taken as sample of the study. Since there was non-availability of subject wise list of social studies teachers prior to sampling, therefore, schools were selected first then their all social studies teachers were taken for the sample of the study. In this process, a total of 165 social studies teachers from 50 secondary schools of Government and Private schools were identified. A total of 149 teachers' responses were considered for the study as remaining 16 teachers either not participated in the study or their responses to the scale were incomplete. The description of the sample is mentioned in the following table:

Table 3.1

Description of the sample

Types of School	Urban			Rural			Total	
	No. of Schools	Actual No. of SST teachers	No. of SST Teachers participated in survey	No. of Schools	Actual No. of SST teachers	No. of SST Teachers participated in survey	No. of Schools	No. of SST Teachers participated in survey
Government	7	30	27	30	87	81	37	108

Private	7	23	21	6	25	20	13	41
Total	14	53	48	36	112	101	50	149

3.6 Tools of the study

Following two tools were used for the Data collection.

I. Secondary School Social Studies Teachers' Technological Pedagogical Content Knowledge (TPCK) Scale

II. Self-efficacy of teachers Scale

Both tools were developed and standardized by the researcher himself. The details of the tool development are as follows.

3.7 Development and Standardization of Secondary School Social Studies Teachers' TPCK Scale

The development process of the Secondary School Social Studies Teachers' TPCK Scale commenced with initial planning of developing draft copy of the scale. In the light of the objectives of the study, investigator discussed it with research supervisor, research scholars, teachers having sound expertise of educational technology, social studies teachers of secondary and higher secondary schools, college teachers, teacher educators of different colleges etc. for their suggestions regarding development of the scale in the theoretical background of TPCK. They provided key suggestions about prospective items of different dimensions.

3.7.1 Review of literature related to Measurement of Secondary School Social Studies Teachers' TPCK Scale

Prior to formulation of items of the scale, a wide-ranging literatures were reviewed. The sources of review of related literature were mainly through online platforms. It was combination of online research repository like Shodhganga, Online journals, books etc. Review of related literature regarding development of the scale started from Mishra & Koehler (2006) framework of TPCK. This study further attracted to review Shulman's (1987) Pedagogical Content Knowledge (PCK) which was the base for Mishra & Koehler (2006) for developing the framework of TPCK. The literature review suggested that several researchers had developed and administered TPCK scales in different perspectives. The studies were carried out mostly in foreign countries except a limited number of studies carried out in India. A variety of studies Schmidt et al. (2009), Archambault & Crippen (2009), Graham et al. (2009), Kuskaya-Mumucu & Kocak-Usluel (2010), MaKinster, Boone & Trautmann (2010), Landry (2010), Sahin (2011), Akman & Guven (2015), Owusu (2014), Kiray (2016), Sharma (2017) have administered TPCK scale using different reporting technique but most of the scale were administered using self-reporting technique. Some of them were developed and some of them were adapted by the investigators. Most of the studies were in general for measuring TPCK as these were not directed to specific subject matter. Researchers commonly adapted Schmidt et al. (2009) TPCK scale for further studies. Another commonly used instrument which was developed by Sahin (2011) can be adapted to different subjects. Although above mentioned instruments have played significant role for the measurement of TPCK level of teachers but these instruments were not completely able to expose the real pictures of TPCK level with respect to specific subject like, mathematics, social studies, science etc. To overcome these problems researchers, Graham et al. (2009) developed a TPACK confidence scale specific to

science discipline. Kiray (2016) too developed a TPACK scale for pre-service science teachers. Onal (2016) has developed and validated TPACK scale for pre-service mathematics teachers. Handal et al. (2013) also developed an instrument named as TPCK, directed to mathematics. Recently, Akman & Guven (2015) developed a more reliable and valid tool for social science subject.

3.7.2 Rationale for development of Secondary School Social Studies Teachers' TPCK Scale

With the above discussion and consideration of previous instruments, the investigator recognizes the efforts made earlier by different researchers to develop a reliable and valid instrument. However, it was needed to develop the TPCK scale for secondary school social studies teachers to achieve the objectives of the present study as a lot of work remains to be done with respect to measuring social studies teachers' TPCK in the view of NCF (2005), BCF (2008), NCFTE (2009), and Position paper of National Focus Group on Teaching of Social Sciences (2006). For the present study, above-mentioned studies enlightened the investigator to develop a more valid and reliable tool appropriate to the objectives of the study, especially with respect to the local context.

3.7.3 Drafting of Secondary School Social Studies Teachers' TPCK Scale

With an in-depth analysis of previous tools related to it and the theoretical framework of TPCK, the investigator created a pool of items as per the different dimensions of the scale. at first instance, a total of 87 items were formulated for seven knowledge domains of TPCK (Mishra & Koehler, 2006; Landry, 2009; Schmith et al., 2009; Chai et al., 2010; Öztürk & Horzum, 2011; Şahin, 2011; Owusu, 2014; Kiray, 2016; Sharma, 2017). The items of the instruments were formulated by applying Likert (1932) type

scale on a five point scale ranging from “strongly disagree, disagree, not sure, agree, and strongly agree” whose response are assigned as self-perception of TPCK.

Domains of TPCK

- Technological Knowledge
- Pedagogical Knowledge
- Content Knowledge
- Pedagogical Content Knowledge
- Technological Content Knowledge
- Technological Pedagogical Knowledge
- Technological Pedagogical Content Knowledge

Considering objectives of the study, items were framed in the light of NCF (2005), BCF (2008), NCFTE (2009), and Position paper of National Focus Group on Teaching of Social Sciences (2006). Some attribute variables were also included in the TPCK Scale as the demand of the study which are as follows:

- Type of School
- Locality of the School
- Gender
- Educational qualification
- Teaching experience

3.7.4 Draft instructions for respondent

Instructions were specified and respondent were exposed with it before formal response giving. They were requested to response all the items and it was told that there is no

wrong or right choice rather it is only their response on particular items. It was ensured that their responses will be used for the research purpose only and no personal or confidential information will be shared to anywhere. There was no limitation of time to respond the scale still about 20-25 minute were sufficient to respond the scale. (Detail illustration can be seen in appendix I)

3.7.5 Language editing of the Secondary School Social Studies Teachers' TPCK Scale draft

The draft copy of the scale was sent to check the language accuracy, sentence of the items, and ambiguity of the items. For this purpose researcher got Secondary School Social Studies Teachers' TPCK scale draft edited by the two language experts having background of educational research and sound expertise of Hindi language as the language of the tool was chosen to be Hindi as the population of the study was Hindi language dominated group. Amid Covid-19 global pandemic and country wide precautionary steps taken by Ministry of Home Affairs, Government of India, it was difficult to visit the experts physically, therefore, investigator discussed each items with experts telephonically. Also, draft scale was used among some social studies teachers from the population to examine the legibility and comprehensibility. As per the suggestions provided by the language experts and social studies teachers, a total of 18 items were modified and rearranged.

3.7.6 Establishing content validity of Secondary School Social Studies Teachers' TPCK scale draft

Language edited and modified draft copy of the scale was sent to the subject experts to establish the content validity of the tool. The selection of the experts were based on

having sound expertise of the subject matter especially the combination of technology and social studies. Investigator discussed it with experts as per their convenience. They were supplied theoretical background of the variable, objectives of the study, population of the study and, content validity judgement sheet. Experts were requested to rate each items with respect to clarity of the items, relevance of the items and overall sufficiency of the tool. As per the discussion and suggestions provided by the experts, a total of 05 items were rearranged and modified and, a total of 29 items were removed from the draft copy of the tool. A fresh copy of second draft was prepared.

3.7.7 Administration of the Secondary School Social Studies Teachers' TPCK scale second draft and Try-out of the items

The second draft copy of the Secondary School Social Studies Teachers' TPCK Scale was administered for the purpose of item analysis of the scale. It was administered on a total of 178 secondary schools social studies teachers of government and private schools from urban and rural areas similar to the population of the study. The sample for conducting item analysis was taken for validity establishment. The description of the sample is shown below:

Table 3.2

Description of the sample for carrying-out item analysis of Secondary School Social Studies Teachers' TPCK Scale

Types of Schools	Locality of the school	No. of teachers participated
	Urban	42

Government	Rural	91
Private	Urban	24
	Rural	21
Total no. of teachers		178

Collected data from respondents were arranged and it was entered in Microsoft excel for further analysis.

3.7.7.1 Item Analysis

As the item of this TPCCK Scale was based on a five point Likert (1932) scale. So it was not needed to identify the difficulty level of the items (Sharma, 2017; Sen, 2017). Furthermore, the investigator carried on to find out the discriminatory level of each items. For this objective, calculation of t-value for each items was performed. t-value of each items was calculated using Microsoft excel. In order to find out the t-value of each item, two equal groups having highest total scores and lowest total scores were formed. To form the upper and lower criterion group (Edwards, 1957) for each item, 27% (48 teachers) of the highest scorers and 27% (48 teachers) of the lowest scorers were considered for establishing discriminatory power. The remaining middle group of 46% teachers were not considered for further analysis. The t-value was performed to check the significance differences between groups. Therefore, with the help of Microsoft excel, each items of t-value of scores having highest group and scores having lowest group was find-out. Items having significance differences were accepted and, items having not significant were rejected. The table value of “t” or t-critical was 1.98

at df of 94. The calculated t-value higher than 1.98 was significant and should be accepted while, t-value lower than 1.98 was not significant so it should be rejected. Based on the above analysis and having high merits, finally, 58 items were selected and accordingly included in the tool.

3.7.8 Reliability of the tool

After the findings of discriminatory power of each items, the scale was carried into the establishment of reliability of the scale. The entered data in Microsoft excel was exported to SPSS 26 version. Since, the Secondary School Social Studies Teachers' TPCK scale is of Likert type, hence, the reliability of the scale was calculated employing Cronbach's Alpha test using SPSS 26 version and it was found to be 0.95 which shows that Secondary school social studies teachers' TPCK scale is highly reliable. Beside this, Split-half test was also employed using SPSS 26 version to estimate the reliability of the scale and it was found to be 0.87 which confirms that scale is internally reliable to measure the secondary school social studies teachers' TPCK.

Table 3.3

Reliability of the tool

Type of Reliability	Reliability value
Cronbach's Alpha test	0.95
Split-half test	0.87

In addition to this, domain wise reliability was also calculated employing Cronbach's Alpha test and Split half-test:

Table 3.4

Domain wise reliability

Domain	Cronbach's Alpha test	Split-half test
Technological Knowledge (TK)	.85	.78
Pedagogical Knowledge (PK)	.86	.72
Content Knowledge (CK)	.82	.69
Pedagogical Content Knowledge (PCK)	.80	.74
Technological Content Knowledge (TCK)	.85	.84
Technological Pedagogical Knowledge (TPK)	.91	.89
Technological Pedagogical Content Knowledge (TPCK)	.79	.69

3.7.9 Validity of the tool

The Content validity of the Secondary school social studies teachers' TPCK Scale was established through systematic examination of each items of the scale by a total of five respective subject experts. The experts were among from subject of pedagogy of social studies and Information and Communication Technology (ICT). The selection of experts was on the basis of their sound knowledge, experience and expertise in the respective subject matters, belong to different institutions across India. The first language edited draft was sent to experts and after getting their suggestions some of items were reformulated and modified. While 29 items were removed from the first draft of the tool after the analysis of their suggestions. After the modification of first draft, the scale was administered on the respondents. After the administration of the tool, responses were entered in Microsoft Excel to find out the discriminatory power of each items using t-value for the purpose of item analysis. With the help of t-value

calculation of each item, all the items were found to be significant and having high merit, all the items were retained for final draft. The above mentioned process and item analysis confirmed the validity of the tool for further application.

3.7.10 Method of scoring of the responses

Recording of the respondent's total score was performed as

Strongly disagree	Disagree	Not sure	Agree	Strongly agree
1	2	3	4	5

An individual respondent can score a minimum of 58 and a maximum of 290.

Table 3.5

Domain-wise Description of Tool

Domain	S N. of Item
Technological Knowledge	1,2,3,4,5,6,7,8,9,10
Pedagogical Knowledge	11,12,13,14,15,16,17,18,19,20,21,22
Content Knowledge	23,24,25,26,27,28,29,30,31
Pedagogical Content Knowledge	32,33,34,35,36,37,38,39,40
Technological Content Knowledge	41,42,43,44,45
Technological Pedagogical Knowledge	46,47,48,49,50,51
Technological Pedagogical Content Knowledge	52,53,54,55,56,57,58

3.7.11 Norms

Table 3.6

Norms for interpretation of Secondary School Social Studies Teachers' TPCCK Score

Z-Score	Raw Score	Level
Less than -1.8	Less than 189	Very Low TPCCK
-1.8 to -0.6	189 to 211	Low TPCCK
-0.6 to +0.6	211 to 235	Average TPCCK

+0.6 to +1.8	235 to 257	High TPCK
More than +1.8	More than 257	Very High TPCK

II. Self-efficacy of teachers Scale

3.8 Development and Standardization of Self-efficacy of teachers Scale

The process of developing self-efficacy of teachers scale started with planning of the draft copy of scale. After going through with relevant literature review, available research tools, investigator decided to discuss it with research supervisor, experts, researcher scholars, secondary school teachers. In this process, investigator sought the opinion regarding development of the item for the draft copy. The focus of discussion was mainly centered on the construct of self-efficacy of teachers scale and proposed items which can be developed for the scale. Their suggestions oriented investigator for further development process of the scale.

3.8.1 Review of literature related to Measurement of Self-efficacy of teachers Scale

To reach the information regarding self-efficacy of teachers scale, investigator searched the available tools related to self-efficacy of teachers scale through online sources. Search was focused on online research repository like Shodhganga, Online journals, Open sources, Libraries etc. During the review process it was found that many studies used the tool to measure the self-efficacy of teachers with respect to different variables. Many researchers attempted to measure the level of self-efficacy of teachers in the form of long and short form. The first one was found in Rotter's social learning theory (Tschannen-Moran & Hoy, 2001). Shortly after that Guskey (1981), constructed a 30-

item scale. Tschannen-Moran & Hoy (2001) found various instruments which were attempted to measure the self-efficacy of teachers. They reviewed tools constructed by Ashton et al. (1982); Gibson & Dembo (1984); Meijer & Foster (1988); Midgley et al (1989); Riggs & Enochs (1990); Emmer (1990); Coladarci & Breton (1997) and taken these tools as foundation for the development of more reliable and valid tool- “The Ohio State Teacher Efficacy Scale (OSTES)”. Although this is a promising tool to measure the self-efficacy of teachers, still for the purpose of the present study, search for more appropriate tool was continue. Particularly, in Indian context, Sen (2017) and Sharma (2017) has also constructed the Teacher self-efficacy scale and applied it as per their population.

3.8.2 Rationale for development of Self-efficacy of teachers Scale

After going through with the available above mentioned research tools, the investigator recognizes the work done previously to develop the reliable and valid instruments. However, it was needed to develop the self-efficacy of teachers scale for secondary school social studies teachers to achieve the objectives of the present study especially with respect to local context as a lot of work remains to be done for the current the study. For the development of present tool, Albert Bandura’s guide for constructing self-efficacy scales (2006) was taken as theoretical framework for the construction of the scale.

3.8.2.1 Drafting of Self-efficacy of teachers scale

With extensive analysis of previous tools related to it and the theoretical background of Bandura (2006) guide for constructing self-efficacy scale, investigator drafted a pool of items for the scale. Items were formulated as per the need of the study. Although the

items were developed reviewing various existing sources, still most of the items were adapted and reframed as per the objectives of the study from Bandura's (2006) guide for constructing self-efficacy scale. Proper consideration was taken into account to formulate the items as per the target population. Focused was also given to match the items as per the local context. A total of 67 items were formulated for six dimension but after discussion with research supervisor it was decided to drop four items of the scale due to ambiguity and validity of items.

Dimensions of Self-efficacy of Teachers Scale

- Efficacy to influence decision-making,
- Instructional self-efficacy,
- Disciplinary self-efficacy,
- Efficacy to parental involvement,
- Efficacy to enlist community involvement,
- Efficacy to create a positive school climate,

The items of the scale were formulated by using Likert (1932) method of scale on a five point scale ranging from cannot do at all, cannot do, not sure, can do, highly certain can do. Some attribute variable were also included in the Self-efficacy of teachers scale as per the demand of study, which are as follows:

- Type of School
- Locality of the School
- Gender
- Educational qualification

- Teaching experience

3.8.3 Draft instructions for respondent

Instructions were specified and respondents were exposed with it before formal response giving. They were requested to response all the items as there is no wrong or right choice rather it is only their response on particular items. It was informed that their responses will only be used for the research purpose only and no personal or confidential information will be shared to anywhere. There was no limitation of time to respond the scale still about 15-20 minute were sufficient to respond the scale. (Detail illustration can be seen in appendix)

3.8.4 Language editing of the Self-efficacy of teachers scale

Researcher got Self-efficacy of teachers scale edited by two language experts having background of educational research and sound expertise of Hindi language as the language of tool was chosen to be Hindi considering the target population of the study. Amid Covid-19 global pandemic and country wide precautionary steps taken by Ministry of Home Affairs, Government of India, it was avoided to visit the experts physically, therefore, investigator discussed each items with experts telephonically. Also, draft scale was used among secondary school teachers from the population to examine the legibility and comprehensibility. As per the suggestions provided by the language experts and teachers, a total of 07 items were modified and rearranged.

3.8.5 Establishing content validity of Self-efficacy of teachers scale draft

Language edited and modified draft copy of the scale was sent to the subject experts to establish the content validity of the tool. The selection of the experts were based on having sound expertise of the subject matter. A total of seven experts were considered

as experts. Researcher discussed it with experts as per their convenience. They were supplied theoretical background of the variable, objectives of the study, population of the study and, content validity judgment sheet. Respective experts requested to rate each items with respect to clarity of the items, relevance of the items and overall sufficiency of the tool. A total of four experts were able to respond the suggestions sought by the investigator. As per the discussion and suggestions provided by the experts, a total of seventeen items were further removed from the draft copy. The second draft copy of the scale was prepared with 46 items following experts' suggestions and remarks.

3.8.6 Administration of the Self-efficacy of teachers scale second draft and Try-out of the items

The second draft copy the Self-efficacy of teachers scale was administered for the purpose of item analysis of the scale. It was administered on a total of 178 secondary school social studies teachers of government and private schools from urban and rural areas similar to the population of the study.

Table 3.7

Description of the sample for carrying-out item analysis of Self-efficacy of teachers Scale

Types of Schools	Locality of the school	No. of teachers participated
Government	Urban	42
	Rural	91

Private	Urban	24
	Rural	21
Total no. of teachers		178

Collected data from the samples were arranged and entered in Microsoft excel for further analysis.

3.8.6.1 Item analysis

Having the collected and entered data, researcher step up further to perform the item analysis. As the item of this scale was based on a five point Likert scale, so it was not required to identify the difficulty level (Sharma, 2017, Sen, 2017). Furthermore, the investigator proceeded to find out the discriminatory level of each statement. For this purpose, calculation of t-value for each statement was needed. Calculation of t-value for each statement was performed using Microsoft excel sheet. In order to calculate the t-value of each item, two equal groups were formed having highest total scores and lowest total scores. To form the upper and lower criterion group (Edwards, 1957) for each item, 27% (48 teachers) of the highest scorers and 27% (48 teachers) of the lowest scores were considered for establishing discriminating power. The middle group (46%) were left out as it is. The t-value was calculated to check the significance differences between groups if exists. Therefore, with the help of Microsoft excel sheet, each items of t-value of upper and lower group was find out. Items having significant differences were accepted and, items having not significant were rejected. The table value of “t” or t-critical was 1.98 at df of 94. The calculated t-value greater than 1.98 is significant and

should be accepted, and lower than 1.98 is not significant so it should be rejected. Based on above analysis, a total of seven items which were found not significant and having low merit were removed from the final tool.

3.8.7 Reliability of the tool (Self-efficacy of teachers Scale)

After the determination of discriminatory power of the items and further process, the remaining 39 items were taken into consideration for calculating reliability of the scale. Since the Teacher self-efficacy scale is of Likert type hence, the reliability of the scale was calculated employing Cronbach's Alpha test using SPSS 26 version and it was found to be .94 which shows that Teacher Self-efficacy tool is highly reliable. In addition to this, Split-half test was also performed using SPSS 26 version to establish the reliability of the scale and it was found to be .80 which satisfy that scale is internally reliable to measure the self-efficacy of teachers scale.

Table 3.8

Reliability of the tool

Type of Reliability	Reliability value
Cronbach's Alpha test	0.94
Split-half test	0.80

In addition to this, dimension wise reliability was also calculated employing Cronbach's Alpha test and Split half-test.

Table 3.9

Dimension wise reliability

Dimension	Cronbach's Alpha test	Split-half test
Efficacy to influence decision-making	.72	.68

Instructional self-efficacy	.85	.77
Disciplinary self-efficacy	.82	.81
Efficacy to parental involvement	.92	.88
Efficacy to enlist community involvement	.95	.94
Efficacy to create a positive school climate	.83	.70

3.8.8 Validity of the tool

The process of establishing validity of the tool was through-out the development process of the tool. The content validity of the self-efficacy of teachers scale was established through systematic evaluation of items by experts. It was started from discussion with research supervisors, scholars, teachers, educators etc. Preliminary draft was sent to the Hindi language experts. Language edited draft was then sent to respective seven subject experts. They were among from subject education and psychology background. The experts were selected because of their sound knowledge and expertise in the subject matter belong to different institutions across the country. The language edited draft was modified by removing a total of seventeen items as per the analysis of judgment sheet response provided by the experts. After the administration of second draft on respondents, collected data were entered in Microsoft excel sheet to check the discriminatory power of each items using t-value for the purpose of item analysis. For the final draft of self-efficacy of teachers scale, only items having significant value were considered and remaining were rejected. The above item analysis and evaluation was considered as strong confirmation to establish the content validity of the tool.

3.8.9 Method of scoring of the responses

Calculation of the respondent total score was performed as

Cannot do at all	Cannot do	Not sure	Can do	High certain can do
1	2	3	4	5

An individual respondent can score minimum of 39 and maximum of 195.

Table 3.10

Dimension wise Description of Tool (Self-efficacy of Teachers scale)

Dimension	S N. of Item
Efficacy to influence decision-making	1,2,3,4,5,6,
Instructional self-efficacy	7,8,9,10,11,12,13,14,15,16,
Disciplinary self-efficacy	17,18,19,20,21,
Efficacy to parental involvement	22,23,24,25,26,
Efficacy to enlist community involvement	27,28,29,30,31,
Efficacy to create a positive school climate	32,33,34,35,36,37,38,39,

3.8.10 Norms

Table 3.11

Norms for interpretation of Self-efficacy of teachers Scale Score

Z-Score	Self-efficacy of teachers Score	Levels of Self efficacy
Less than -1.8	Less than 133	Very low self-efficacy
-1.8 to -0.6	133 to 148	Low self-efficacy
-0.6 to + 0.6	148 to 163	Average self-efficacy
+0.6 to +1.8	163 to 178	High self-efficacy
More than +1.8	More than 178	Very High self-efficacy

3.9 Administration of the tools and Data collection

Development of the tools led investigator to administer the tools and collection of data from respondents of the study. In this regard, investigator identified schools as per the stratification of the sample. After selection of the respective schools, investigator

personally visited the schools. Mostly, investigator contacted sampled school with the help of some reference. These references include teachers working in that school or other schools, member of teacher association, secretary of secondary school association of Darbhanga District etc. It is important to mention here that without reference, investigator had to face a little more challenges to get the response from the teachers. After reaching the schools, investigator consulted the Head of the school. Introducing about himself and about the purpose of the visit, investigator shared the copy of the tools and sought cooperation for data collection from all the social studies teachers. The head of the school made arrangement with the teachers sometimes in a group or sometimes individually. After initial discussion regarding purpose of the visit and rapport, investigator shared both the tools with the teachers and briefed basic instructions for their response. Investigator oriented teachers with the way of responding the items of the instruments.

3.10 Scoring of the data

After the collection of data from respondents, all the responses were scored as per the method of scoring of the responses.

3.11 Recording and arrangement of the data

The collected data from respondent were recorded and arranged in Microsoft excel in following manner before exporting it to SPSS. Each responded copy of the tool was labeled with respondent no. so that cross check of the recorded data could be done easily.

Format for data arrangement in Microsoft Excel

Respondent No.	Gender	ToS	Locality	E. Qualification	Sub. Teaches	Computer Lab Yes/No	Teaching Exp.	Item Score	Total Score	Domain wise Total Score

3.12 Statistical Techniques

For the present study, investigator employed different appropriate descriptive and inferential statistical techniques to achieve the objectives of the study. To study the level of Technological Pedagogical Content Knowledge and Self-efficacy of secondary school social studies teachers, certain descriptive statistics like, normal tendency, SD, skewness and kurtosis were calculated on scores obtained by the respondents. Further before employing Analysis of variance (ANOVA), its assumptions of normality of data, and homogeneity of variance were computed employing Shapiro-Wilk Test of Normality and Levene's Test of Homogeneity of Variance respectively. To study the influence of type of school, locality of school and its interaction on Technological Pedagogical Content Knowledge and Self-efficacy of secondary school social studies teachers, two way Analysis of Variance (ANOVA) with 2x2 factorial design (Sansanwal, 2020) was employed. In addition to the above statistical techniques, to study the correlation between self-efficacy and Technological Pedagogical Content Knowledge, 'Pearson Product Moment Correlation' was used.

Chapter-4

Analysis and Interpretation of the
data

Chapter IV

Analysis and Interpretation of the data

After data collection and its organization, the next important step is the analysis of collected data. Without analysis of data, it is difficult to reach at any meaningful point. It is necessary to analyse the collected data carefully and scientifically so that it can be interpreted and concluded in a meaningful manner. The purpose of this research was to study the Technological Pedagogical Content Knowledge and Self-efficacy of Secondary school social studies teachers with respect to type of school and locality of school. To achieve the purpose of the study, investigator collected data of Technological Pedagogical Content Knowledge and Self-efficacy of Secondary school social studies teachers.

Moving forward after the data collection, it was arranged systematically, entered and processed in Microsoft Excel 2013 and then it was exported to SPSS 26 for further analysis. As per the objectives and hypothesis of the study, data were analysed using descriptive and inferential statistics. To study the influence of type of school, locality of school and its interaction on dependent variable, two way Analysis of Variance (ANOVA) with 2x2 factorial design was applied (Sansanwal, 2020). Before analysing the data, assumption of normality and assumption of Levene's Test of Homogeneity of Variance was also examined for every instances separately. To examine the normality of the data's distribution, the Shapiro-Wilk Test of Normality was done. Finding of the Shapiro-Wilk test for all the instances found to be significant. It suggested that data were not normal. Value of p in all the instances were less than .05 level of confidence.

However, some research experts observed that as per the ± 3 rule of thumb for kurtosis cut-offs, “The value for asymmetry and kurtosis between -2 to +2 are considered to be acceptable in order to prove the normal univariate distribution (George & Mallery, 2010). Hair et al. (2010) and Bryne (2010) argued that data is considered to be normal if skewness between -2 to +2 and kurtosis between -7 to +7” as cited by University of Cambridge (2018) which is endorsed by Field (2013). In the light of above reference, on perusal of respective table, it is evident that the skewness and kurtosis is well under the said limit. The sample size 149 is sufficiently large too. Therefore, the assumptions of normality was considered as fulfilled. Hence investigator decided to go further to perform ANOVA. Hypotheses of the study was tested at .05 levels of confidence. The sum total of the variable TPCK and its domains were taken into account for analysis. Similarly, it was done with self-efficacy. The entire analyses were done with respect to the Null hypotheses formulated at the beginning.

4.1 Total TPCK of Secondary school social studies teachers

Table 4.1

Frequency distribution of Secondary school social studies teachers with respect to Total TPCK

Class Intervals (Total TPCK Score)	Frequency (No. of Secondary school social studies teachers)	Cumulative Frequency
180-190	2	2
190-200	9	11
200-210	11	22
210-220	52	74
220-230	46	120
230-240	20	140
240-250	7	147
250-260	2	149

Table 4.2

Distribution of Secondary school social studies teachers with respect to Total TPCK level

Levels of Total TPCK Score)	Frequency (No. of Secondary school social studies teachers)	Percentage of Secondary school social studies teachers
Very Low	1	0.68
Low	25	16.77
Average	107	71.81
High	15	10.06
Very High	1	0.68

Table 4.3

Descriptive statistics with respect to Total TPCK of Secondary school social studies teachers

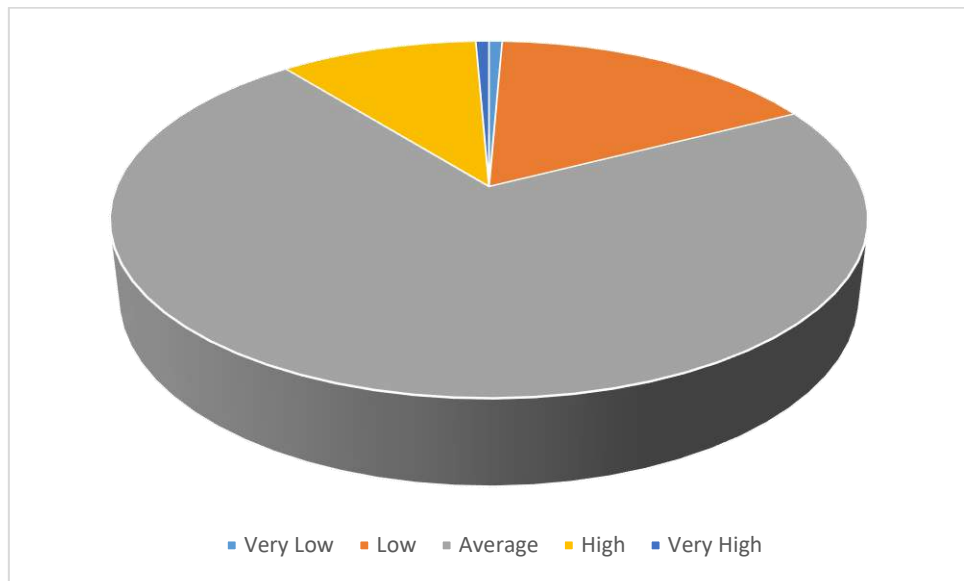
Descriptive statistics	Values
No. of Secondary school social studies teachers (N)	149
Mean	219.69
Median	220.00
Mode	218
Std. Deviation	12.470
Skewness	-.071
Std. Error of Skewness	.199
Kurtosis	.968

Std. Error of Kurtosis	.395
Range	74
Minimum	184
Maximum	258

It is evident from table no. 4.3 that Total TPCK score of Secondary school social studies teachers varied from 184 to 258 displaying a range of 74 in the sample. The mean of Total TPCK was found to be 219.69 which indicates Secondary school social studies teachers have Average level of Total TPCK. Further, table no. 4.2 indicates that 16.77% of Secondary school social studies teachers have Low level of Total TPCK, 10.06 % of Secondary school social studies teachers have High level of Total TPCK, 71.81 % of Secondary school social studies teachers have Average level of Total TPCK, 0.68 % of Secondary school social studies teachers have Very low Total TPCK and same percentage of Secondary school social studies teachers have Very high Total TPCK. Figure 4.1 showing percentage distribution of Secondary school social studies teachers with respect to their Total TPCK.

Figure 4.1

Pie-Chart of Percentage distribution of Secondary school social studies teachers with respect to their Total TPCK



4.2 Influence of Type of school, Locality of school and their interaction on total Technological Pedagogical Content Knowledge of Secondary school social studies teachers.

Table 4.4

Descriptive statistics of Total TPCK

Descriptive Statistics						
Dependent Variable: Total TPCK						
ToS	Locality	Mean	Std. Deviation	N	Skewness	Kurtosis
Government	Urban	219.48	14.208	27		
	Rural	217.57	13.196	81		
	Total	218.05	13.414	108		
Private	Urban	224.81	6.933	21		
	Rural	223.20	9.496	20		
	Total	224.02	8.217	41		
Total	Urban	221.81	11.801	48		
	Rural	218.68	12.709	101		

	Total	219.69	12.470	149	-.071	.968
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4.2.1 Levene's Test of Homogeneity of Variance for total TPCK

Table 4.5

Levene's Test of Homogeneity of Variance

F	df1	df2	P	Remarks
1.372	3	145	.254	NS

Table no. 4.5 shows the value of Homogeneity of Variance where $p=.254 > .05$.

Therefore, assumption of homogeneity of variance was fulfilled.

Table 4.6

Summary of two way ANOVA for Total TPCK of secondary school social studies

teachers with respect to Type of School and Locality of school.

Tests of Between-Subjects Effects					
Dependent Variable: Total TPCK					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1162.743a	3	387.581	2.572	.056
Intercept	5328706.598	1	5328706.598	35357.182	.000
ToS	817.165	1	817.165	5.422	.021
Locality	84.436	1	84.436	.560	.455
ToS * Locality	.629	1	.629	.004	.949
Error	21853.055	145	150.711		
Total	7214390.000	149			
Corrected Total	23015.799	148			

a. R Squared = .051 (Adjusted R Squared = .031)

4.2.2 To study the influence of type of school on total TPCK of secondary school social studies teachers.

On perusal of Table 4.6 it is evident that F-ratio 5.422 for influence of type of school on total TPCK of secondary school social studies teachers with df (1, 145) was found to be significant ($p=0.021<0.05$) leading to the inference that type of school have a significant influence on Total TPCK of secondary school social studies teachers. Therefore, the null hypothesis H_0 (a), “There is no significant influence of type of school on total TPCK of secondary school social studies teachers” was rejected. Further, Table 4.4 shows the mean score of Total TPCK score of Government secondary school social studies teachers is 218.05, which is significantly lower than that of Private secondary school social studies teachers whose mean score of Total TPCK is 224.02. It may therefore be said that Private secondary school social studies teachers were found to have higher Total TPCK as compared to Government secondary school social studies teachers.

4.2.3 To study the influence of locality of school on total TPCK of secondary school social studies teachers

On perusal of the Table 4.6, it is clear that F-ratio 0.560 for influence of locality on Total TPCK of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.455>0.05$) leading to the inference that locality of school does not influence Total TPCK of secondary school social studies teachers. Further, it indicates that the mean score of Total TPCK of secondary school social studies teachers working in rural and urban areas did not differ significantly. So, there was no significance influence of locality of school on Total TPCK. Therefore, the null

hypothesis H₀₁ (b), “There is no significant influence of Locality on total TPCK of secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in urban and rural areas secondary schools were found to have Total TPCK to the same extent.

4.2.4 To study the interaction between Type of school and Locality on Total TPCK of secondary school social studies teachers

From the Table 4.6 it can be seen that the F-ratio= 0.004 for interaction between Type of school and Locality with df (1, 145) was not found to be significant ($p=0.949>0.05$) leading to inference that mean score of Total TPCK of Government and Private schools social studies teachers teaching in school situated in Urban and Rural area did not differ significantly. So there was no significance interaction between type of school and locality of school on Total TPCK of secondary school social studies teachers. Thus, the null hypothesis H₀₁ (c), “There is no significant influence of interaction between type of school and locality of school on total TPCK of Secondary school social studies teachers” was not rejected. It may therefore be said that total TPCK was found to be independent of interaction between type of school and locality. In order to know the trend of influence of interaction between type of school and locality of school on total TPCK of secondary school social studies teachers may be seen in the Figure 4.2

Figure 4.2

Estimated marginal means of total TPCK

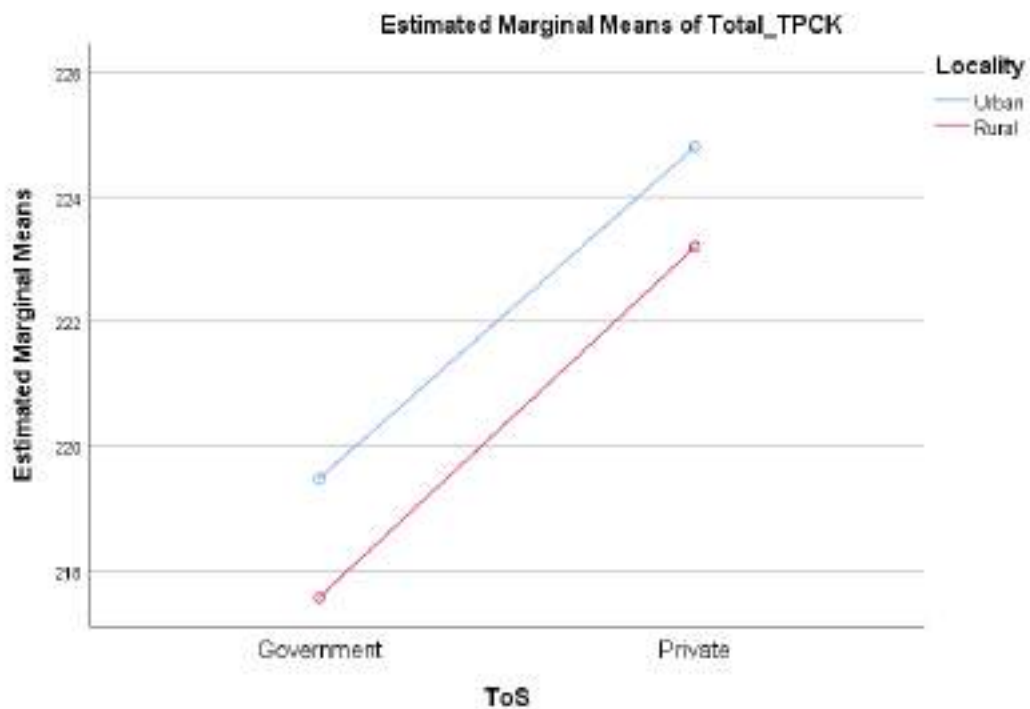


Figure 4.2 showing secondary school social studies teachers teaching in government secondary schools of rural area have lower mean score of Total TPCK in comparison to that of government secondary school social studies teachers teaching in urban area. While there is sharp increase in mean score of Total TPCK of private secondary school social studies teachers situated in urban and rural areas in comparison to government secondary school social studies teachers of urban and rural area. In addition, it is evident from figure 4.2 that secondary school social studies teachers teaching in private secondary schools of rural area have lower mean score of Total TPCK in comparison to that of private secondary school social studies teachers teaching in urban area.

4.3 Influence of Type of school, Locality of school and their interaction on Technological Knowledge (TK) of Secondary school social studies teachers.

Table 4.7

Descriptive statistics of TK

Descriptive Statistics						
Dependent Variable: TK						
ToS	Locality	Mean	Std. Deviation	N	Skewness	Kurtosis
Government	Urban	34.85	4.873	27		
	Rural	34.85	4.907	81		
	Total	34.85	4.876	108		
Private	Urban	39.33	4.993	21		
	Rural	35.60	6.168	20		
	Total	37.51	5.840	41		
Total	Urban	36.81	5.366	48		
	Rural	35.00	5.156	101		
	Total	35.58	5.275	149	-.485	.542

4.3.1 Levene's Test of Homogeneity of Variance for Technological Knowledge (TK)

Table 4.8

Levene's Test of Homogeneity of Variance

F	df1	df2	P	Remarks
.679	3	145	.566	NS

Table no. 4.8 shows the value of Homogeneity of Variance where $p=.566>.05$.

Therefore, assumption of homogeneity of variance was fulfilled.

Table 4.9

Summary of two way ANOVA for Technological Knowledge (TK) of secondary school social studies teachers with respect to Type of school and Locality of school

Tests of Between-Subjects Effects					
Dependent Variable: TK					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	353.105a	3	117.702	4.533	.005
Intercept	142310.350	1	142310.350	5480.604	.000
ToS	186.046	1	186.046	7.165	.008
Locality	94.814	1	94.814	3.651	.058
ToS * Locality	94.814	1	94.814	3.651	.058
Error	3765.096	145	25.966		
Total	192784.000	149			
Corrected Total	4118.201	148			
a. R Squared = .086 (Adjusted R Squared = .067)					

4.3.2 To study the influence of type of school on Technological Knowledge (TK) of secondary school social studies teachers.

Table 4.9 confirms that F ratio 7.165 for influence of type of school Technological Knowledge (TK) of secondary school social studies teachers with df (1, 145) was found to be significant ($p=0.008<0.05$) leading to the inference that type of school have a significant effect on TK of secondary school social studies teachers. Therefore, the null hypothesis H_02 (a), “There is no significant influence of Type of school on Technological Knowledge of Secondary school social studies teachers” was rejected. Further the mean score of TK score of Government secondary school social studies teachers 34.85 which is significantly lower than that of Private secondary school social studies teachers whose mean score of TK 37.51. It may therefore be said that Private

secondary school social studies teachers was found to have higher TK as compared to Government secondary school social studies teachers.

4.3.3 To study the influence of locality of school on Technological Knowledge (TK) of secondary school social studies teachers

On perusal of the Table 4.9, it is clear that F-ratio 3.651 for influence of locality on Technological Knowledge (TK) of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.058>0.05$) leading to the inference that locality of school does not effect on TK of secondary school social studies teachers. Further, it indicates that the mean score of TK of secondary school social studies teachers working in rural and urban areas did not differ significantly. So, there was no significant influence of locality of school on TK. Therefore, the null hypothesis H_{02} (b), “There is no significant influence of Locality of school on Technological Knowledge of Secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in urban and rural area school were found to have TK to the same extent.

4.3.4 To study the interaction between Type of school and Locality on Technological Knowledge (TK) of secondary school social studies teachers

From the Table 4.9, it can be seen that the F-ratio 3.651 for interaction between Type of school and Locality with df (1, 145) was found not to be significant ($p=0.058>0.05$) leading to inference that mean score of TK of Government and Private schools social studies teachers teaching in school situated in Urban and Rural area did not differ significantly. So there was no significance interaction between type of school and locality of school on TK of secondary school social studies teachers. Thus, the null

hypothesis H_02 (c), “There is no significant influence of interaction between Type of school and Locality of school on Technological Knowledge of Secondary school social studies teachers” was not rejected. It may therefore be said that TK was found to be independent of interaction between type of school and locality. In order to know the trend of influence of interaction between type of school and locality of school on TK of secondary school social studies teachers, Figure 4.3 was plotted.

Figure 4.3

Estimated marginal means of TK

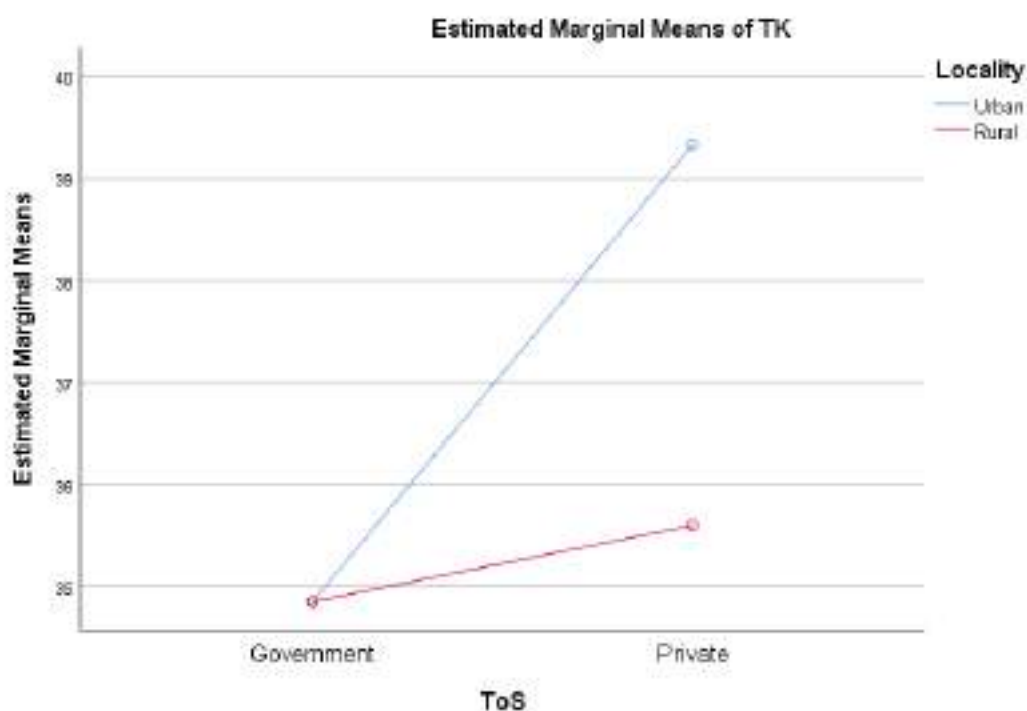


Figure 4.3 showing secondary school social studies teachers teaching in government secondary schools of rural area have same mean score of TK in comparison to that of government secondary school social studies teachers teaching in urban area. While there is sharp increase in mean score of TK of private secondary school social studies teachers situated in urban area in comparison to government secondary school social

studies teachers of urban and rural area. In addition to this, it is evident from figure 4.3 that secondary school social studies teachers teaching in private secondary schools of rural area have lower mean score of TK in comparison to that of private secondary school social studies teachers teaching in urban area.

4.4 Influence of Type of school, Locality of school and their interaction on Pedagogical Knowledge (PK) of Secondary school social studies teachers.

Table 4.10

Descriptive statistics of PK

Descriptive Statistics						
Dependent Variable: PK						
ToS	Locality	Mean	Std. Deviation	N	Skewness	Kurtosis
Government	Urban	46.89	4.200	27		
	Rural	46.12	4.380	81		
	Total	46.31	4.329	108		
Private	Urban	47.05	3.721	21		
	Rural	47.35	4.320	20		
	Total	47.20	3.976	41		
Total	Urban	46.96	3.957	48		
	Rural	46.37	4.374	101		
	Total	46.56	4.240	149	.612	-.063

4.4.1 Levene's Test of Homogeneity of Variance for Pedagogical Knowledge (PK)

Table 4.11

Levene's Test of Homogeneity of Variance

F	df1	df2	P	Remarks
.385	3	145	.764	NS

Table no. 4.11 shows the value of Homogeneity of Variance where $p=.764>.05$.

Therefore, assumption of homogeneity of variance was fulfilled.

Table 4.12

Summary of two way ANOVA for Pedagogical Knowledge (PK) of secondary school social studies teachers with respect to Type of School and Locality of school

Tests of Between-Subjects Effects					
Dependent Variable: PK					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	35.831a	3	11.944	.660	.578
Intercept	238925.670	1	238925.670	13198.128	.000
ToS	13.054	1	13.054	.721	.397
Locality	1.459	1	1.459	.081	.777
ToS * Locality	7.757	1	7.757	.428	.514
Error	2624.934	145	18.103		
Total	325627.000	149			
Corrected Total	2660.765	148			
a. R Squared = .013 (Adjusted R Squared = -.007)					

4.4.2 To study the influence of type of school on Pedagogical Knowledge (PK) of secondary school studies teachers.

On perusal of the Table 4.12, it is clear that F-ratio 0.721 for influence of type of school on PK of secondary school social studies teachers with df (1, 145) was found not to be

significant ($p=0.397>0.05$) leading to the inference that type of school does not influence PK of secondary school social studies teachers. Further, it indicates that the mean score of PK of secondary school social studies teachers working in Government and Private schools did not differ significantly. So, there was no significance influence of type of school on PK. Therefore, the null hypothesis H_{03} (a), “There is no significant influence of Type of school on Pedagogical Knowledge of Secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in government and private schools were found to have PK to the same extent.

4.4.3 To study the influence of locality of school on Pedagogical Knowledge (PK) of secondary school social studies teachers

On perusal of the Table 4.12, it is clear that F-ratio 0.081 for influence of locality on PK of secondary school social studies teachers with df (1, 145) was found not be significant ($p=0.777>0.05$) leading to the inference that locality of school does not influence PK of secondary school social studies teachers. Further, it indicates that the mean score of PK of secondary school social studies teachers working in rural and urban areas did not differ significantly. So, there was no significance influence of locality of school on PK. Therefore, the null hypothesis H_{03} (b), “There is no significant influence of Locality of school on Pedagogical Knowledge of Secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in urban and rural areas school were found to have PK to the same extent.

4.4.4 To study the interaction between Type of school and Locality on Pedagogical Knowledge (PK) of secondary school social studies teachers

From the Table 4.12 it can be seen that the F-ratio 0.428 for interaction between Type of school and Locality with df (1, 145) was not to be significant ($p=0.514>0.05$) leading to inference that mean score of PK of Government and Private schools social studies teachers teaching in school situated in Urban and Rural area did not differ significantly. So there was no significant interaction between type of school and locality of school on PK of secondary school social studies teachers. Thus, the null hypothesis H_03 (c), “There is no significant influence of interaction between Type of school and Locality of school on Pedagogical Knowledge of Secondary school social studies teachers” was not rejected. It may therefore be said that PK was found to be independent of interaction between type of school and locality. In order to know the trend of influence of interaction between type of school and locality of school on PK of secondary school social studies teachers, Figure 4.4 was plotted.

Figure 4.4

Estimated marginal means of PK

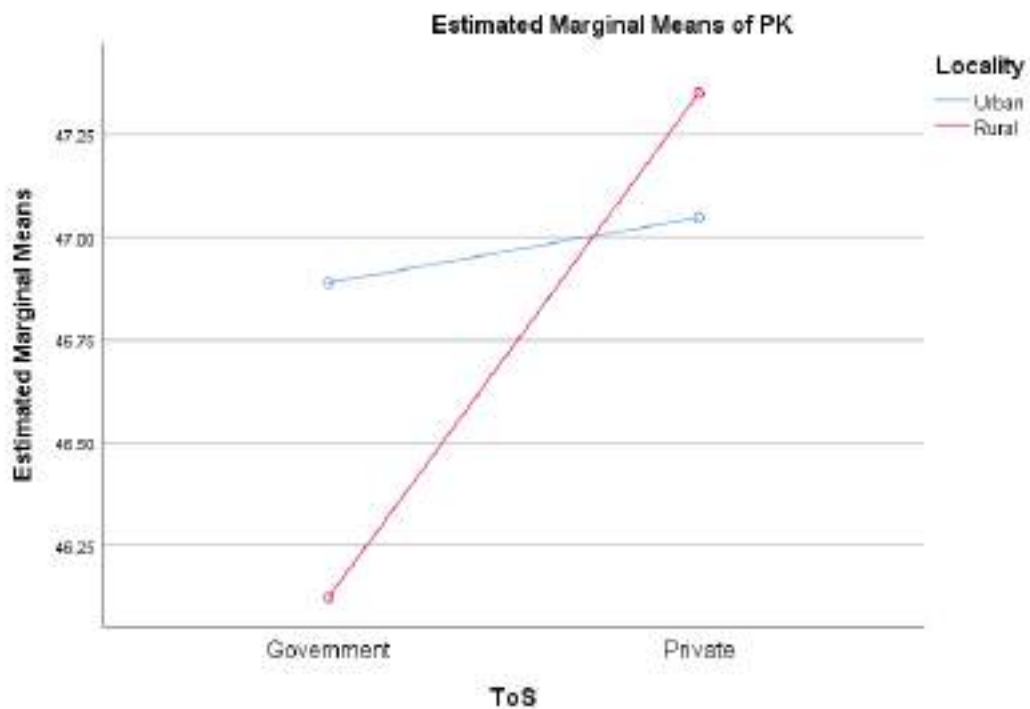


Figure 4.4 showing secondary school social studies teachers teaching in government secondary schools of rural area have lower mean score of PK in comparison to that of government secondary school social studies teachers teaching in urban area. While there is sharp increase in mean score of PK of private secondary school social studies teachers situated in rural areas in relation to government secondary school social studies teachers of rural area. In addition to this, it is evident from figure 4.3 that secondary school social studies teachers teaching in private secondary schools of rural area have higher mean score of PK in comparison to that of private secondary school social studies teachers teaching in urban area.

4.5 Influence of Type of school, Locality of school and their interaction on Content Knowledge (CK) of Secondary school social studies teachers.

Table 4.13

Descriptive statistics of CK

Descriptive Statistics						
Dependent Variable: CK						
ToS	Locality	Mean	Std. Deviation	N	Skewness	Kurtosis
Government	Urban	37.78	3.250	27		
	Rural	36.14	2.760	81		
	Total	36.55	2.962	108		
Private	Urban	35.00	2.966	21		
	Rural	35.80	2.375	20		
	Total	35.39	2.691	41		
Total	Urban	36.56	3.395	48		
	Rural	36.07	2.681	101		
	Total	36.23	2.927	149	.915	1.476

4.5.1 Levene's Test of Homogeneity of Variance for Content Knowledge (CK)

Table 4.14

Levene's Test of Homogeneity of Variance

F	df1	df2	P	Remarks
.351	3	145	.789	NS

Table no. 4.14 shows the value of Homogeneity of Variance where $p=.789>.05$.

Therefore, assumption of homogeneity of variance was fulfilled.

Table 4.15

Summary of two way ANOVA for CK of secondary school social studies teachers with respect to Type of School and Locality of school

Tests of Between-Subjects Effects

Dependent Variable: CK					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	100.869a	3	33.623	4.176	.007
Intercept	142461.014	1	142461.014	17695.158	.000
ToS	65.947	1	65.947	8.191	.005
Locality	4.823	1	4.823	.599	.440
ToS * Locality	40.566	1	40.566	5.039	.026
Error	1167.373	145	8.051		
Total	196828.000	149			
Corrected Total	1268.242	148			
a. R Squared = .080 (Adjusted R Squared = .060)					

4.5.2 To study the influence of type of school on Content Knowledge (CK) of secondary school studies teachers.

On perusal of Table 4.15 it is evident that F-ratio 8.191 for influence of type of school on CK of secondary school social studies teachers with df (1, 145) was found to be significant ($p=0.005<0.05$) leading to the inference that type of school have a significant influence on CK of secondary school social studies teachers. Therefore, the null hypothesis H_04 (a), “There is no significant influence of Type of school on Content Knowledge of Secondary school social studies teachers” was rejected. Further, Table 4.13 shows the mean score of CK score of Government secondary school social studies teachers is 36.55, which is higher than that of Private secondary school social studies teachers whose mean score of CK is 35.39. It may therefore be said that Private secondary school social studies teachers were found to have lower CK as compared to Government secondary school social studies teachers.

4.5.3 To study the influence of locality of school on Content Knowledge (CK) of secondary school social studies teachers

An analysis of Table 4.15 confirms that F ratio 0.599 for influence of locality on CK of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.440>0.05$) leading to the inference that locality of school did not influence CK of secondary school social studies teachers. Therefore, the null hypothesis H_04 (b), “There is no significant influence of Locality of school on Content Knowledge of Secondary school social studies teachers” was not rejected. It may therefore be said that urban secondary school social studies teachers was found to have similar CK as compared to rural secondary school social studies teachers.

4.5.4 To study the interaction between type of school and locality of school on Content Knowledge (CK) of secondary school social studies teachers

It is evident from Table 4.15 that F-ratio 5.039 for interaction between type of school and locality of the school with df (1, 145) was found to be significant ($p=0.026<0.05$) leading to inference that mean score of CK of government and private schools social studies teachers differs with locality of the school. So there was significant interaction between types of school and locality of school on CK of secondary school social studies teachers. Thus, the null hypothesis H_04 (c), “There is no significant influence of interaction between Type of school and Locality of school on Content Knowledge of Secondary school social studies teachers” was rejected. It may therefore be said that CK was found to have significant interaction between type of school and locality of school. In order to know the trend of influence of interaction between type of school

and locality of school on CK of secondary school social studies teachers, Figure 4.5 was plotted.

Figure 4.5

Estimated marginal means of CK

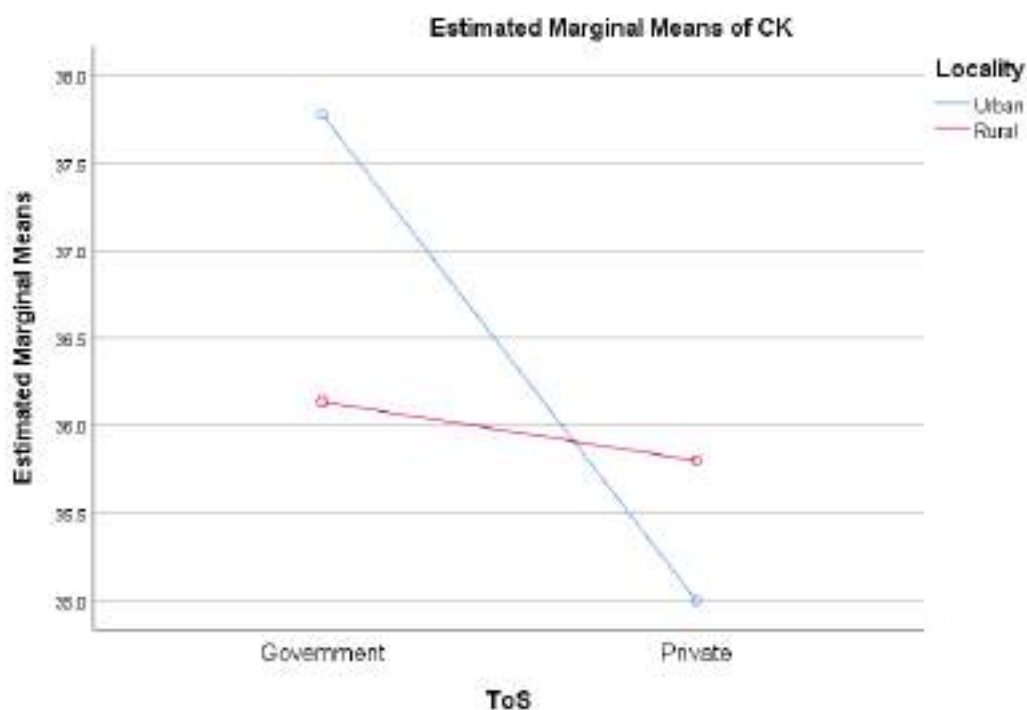


Figure 4.5 showing secondary school social studies teachers teaching in government secondary schools of rural area have lower mean score of CK in comparison to that of government secondary school social studies teachers teaching in urban area. While there is sharp decrease in mean score of CK of private secondary school social studies teachers situated in urban areas in relation to government secondary school social studies teachers of urban area. In addition to this, it is evident from figure 4.5 that secondary school social studies teachers teaching in private secondary schools of rural area have higher mean score of CK in comparison to that of private secondary school social studies teachers teaching in urban area.

4.6 Influence of Type of school, Locality of school and their interaction on Pedagogical Content Knowledge (PCK) of Secondary school social studies teachers.

Table 4.16

Descriptive statistics of PCK

Descriptive Statistics						
Dependent Variable: PCK						
ToS	Locality	Mean	Std. Deviation	N	Skewness	Kurtosis
Government	Urban	35.04	2.993	27		
	Rural	33.68	3.082	81		
	Total	34.02	3.103	108		
Private	Urban	35.00	1.924	21		
	Rural	34.75	1.916	20		
	Total	34.88	1.900	41		
Total	Urban	35.02	2.556	48	.233	.655
	Rural	33.89	2.912	101		
	Total	34.26	2.843	149		

4.6.1 Levene's Test of Homogeneity of Variance for Pedagogical Content Knowledge (PCK)

Table 4.17

Levene's Test of Homogeneity of Variance

F	df1	df2	P	Remarks
2.647	3	145	.051	NS

Table no. 4.17 shows the value of Homogeneity of Variance where $p=.051>.05$.

Therefore, assumption of homogeneity of variance was fulfilled.

Table 4.18

Summary of two way ANOVA for PCK of secondary school social studies teachers with respect to Type of School and Locality of school

Tests of Between-Subjects Effects					
Dependent Variable: PCK					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	59.941a	3	19.980	2.550	.058
Intercept	130425.965	1	130425.965	16642.300	.000
ToS	7.272	1	7.272	.928	.337
Locality	17.590	1	17.590	2.244	.136
ToS * Locality	8.352	1	8.352	1.066	.304
Error	1136.367	145	7.837		
Total	176034.000	149			
Corrected Total	1196.309	148			

a. R Squared = .050 (Adjusted R Squared = .030)

4.6.2 To study the influence of type of school on Pedagogical Content Knowledge (PCK) of secondary school social studies teachers.

On perusal of the TABLE 4.18, it is clear that F-ratio 0.928 for influence of type of school on PCK of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.337>0.05$) leading to the inference that type of school does not influence PCK of secondary school social studies teachers. Further, it indicates that the mean score of PCK of secondary school social studies teachers working in Government and Private schools did not differ significantly. So, there was no

significance influence of type of school on PCK. Therefore, the null hypothesis H₀₅ (a), “There is no significant influence of Type of school on Pedagogical Content Knowledge of Secondary school social studies teachers” was not rejected. It may therefore be said that the social studies teachers working in Government and Private secondary schools were found to have PCK to the same extent.

4.6.3 To study the influence of locality of school on Pedagogical Content Knowledge (PCK) of secondary school social studies teachers

On perusal of the TABLE 4.18, it is clear that F-ratio 2.244 for influence of locality on PCK of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.136>0.05$) leading to the inference that locality of school does not effect on PCK of secondary school social studies teachers. Further, it indicates that the mean score of PCK of secondary school social studies teachers working in rural and urban areas did not differ significantly. So, there was no significance influence of locality of school on PCK. Therefore, the null hypothesis H₀₅ (b), “There is no significant influence of Locality of school on Pedagogical Content Knowledge of Secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in urban and rural areas school were found to have PCK to the same extent.

4.6.4 To study the interaction between Type of school and Locality on Pedagogical Content Knowledge (PCK) of secondary school social studies teachers

From the Table 4.18 it can be seen that the F-ratio 1.066 for interaction between Type of school and Locality with df (1, 145) was found not to be significant ($p=0.304>0.05$) leading to inference that mean score of PCK of Government and Private schools social

studies teachers teaching in school situated in Urban and Rural area did not differ significantly. So there was no significance interaction between type of school and locality of school on PCK of secondary school social studies teachers. Thus, the null hypothesis H_{05} (c), “There is no significant influence of interaction between Type of school and Locality of school on Pedagogical Content Knowledge of Secondary school social studies teachers” was not rejected. It may therefore be said that PCK was found to be independent of interaction between type of school and locality of school. In order to know the trend of influence of interaction between type of school and locality of school on PCK of secondary school social studies teachers, Figure 4.6 was plotted.

Figure 4.6

Estimated marginal means of PCK

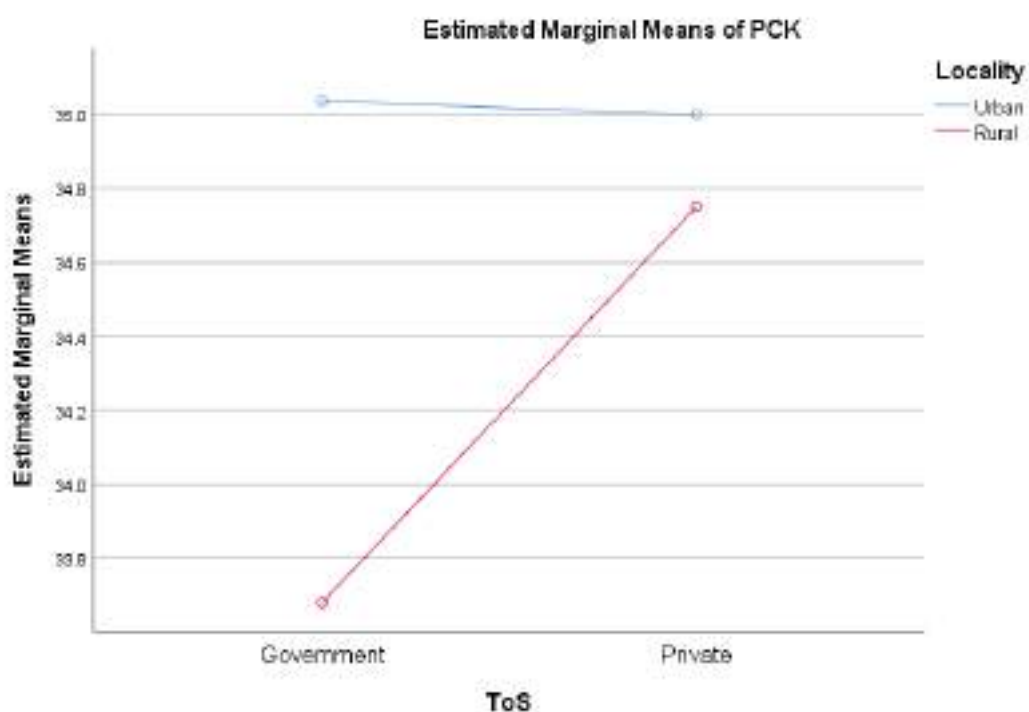


Figure 4.6 showing secondary school social studies teachers teaching in government secondary schools of rural area have lower mean score of PCK in comparison to that of government secondary school social studies teachers teaching in urban area. While there is minor decrease in mean score of PCK of private secondary school social studies teachers situated in urban areas in relation to government secondary school social studies teachers of urban area but there is sharp increase in PCK of private secondary school social studies teachers teaching in rural areas in relation to that of government secondary school social studies teachers in rural area. In addition to this, it is evident from figure 4.6 that secondary school social studies teachers teaching in urban and rural area secondary schools have similar mean score of PCK irrespective of type of school i.e., government and private secondary schools.

4.7 Influence of Type of school, Locality of school and their interaction on Technological Content Knowledge (TCK) of Secondary school social studies teachers.

Table 4.19

Descriptive statistics of TCK

Descriptive Statistics						
Dependent Variable: TCK						
ToS	Locality	Mean	Std. Deviation	N	Skewness	Kurtosis
Government	Urban	16.96	2.738	27		
	Rural	17.86	2.504	81		
	Total	17.64	2.581	108		
Private	Urban	18.52	2.581	21		
	Rural	19.10	1.832	20		

	Total	18.80	2.239	41		
Total	Urban	17.65	2.756	48		
	Rural	18.11	2.429	101		
	Total	17.96	2.539	149	-.605	.473

4.7.1 Levene's Test of Homogeneity of Variance for Technological Content Knowledge (TCK)

Table 4.20

Levene's Test of Homogeneity of Variance

F	df1	df2	P	Remarks
1.664	3	145	.177	NS

Table no. 4.20 shows the value of Homogeneity of Variance where $p=.177>.05$.

Therefore, assumption of homogeneity of variance was fulfilled.

Table 4.21

Summary of two way ANOVA for TCK of secondary school social studies teachers with respect to Type of School and Locality of school

Tests of Between-Subjects Effects					
Dependent Variable: TCK					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	60.251 ^a	3	20.084	3.259	.023
Intercept	35708.028	1	35708.028	5794.765	.000
ToS	53.205	1	53.205	8.634	.004
Locality	14.849	1	14.849	2.410	.123
ToS * Locality	.719	1	.719	.117	.733
Error	893.507	145	6.162		
Total	49014.000	149			
Corrected Total	953.758	148			

a. R Squared = .063 (Adjusted R Squared = .044)

4.7.2 To study the influence of type of school on Technological Content Knowledge (TCK) of secondary school social studies teachers.

An analysis of Table 4.21 confirms that F ratio 8.634 for influence of type of school on TCK of secondary school social studies teachers with df (1, 145) was found to be significant ($p=0.004<0.05$) leading to the inference that type of school have a significant effect on TCK of secondary school social studies teachers. Therefore, the null hypothesis H_{06} (a), “There is no significant influence of Type of school on Technological Content Knowledge of Secondary school social studies teachers” was rejected. Further, Table 4.19 shows the mean score of TCK score of Government secondary school social studies teachers 17.64 which is lower than that of Private secondary school social studies teachers whose mean score of TCK 18.11. It may therefore be said that Private secondary school social studies teachers were found to have higher TCK as compared to Government secondary school social studies teachers.

4.7.3 To study the influence of locality of school on Technological Content Knowledge (TCK) of secondary school social studies teachers

On perusal of the Table 4.21, it is clear that F-ratio 2.410 for influence of locality on TCK of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.123>0.05$) leading to the inference that locality of school does not influence TCK of secondary school social studies teachers. Further, it indicates that the mean score of TCK of secondary school social studies teachers working in rural and urban areas did not differ significantly. So, there was no significance influence of locality of school on TCK. Therefore, the null hypothesis H_{06} (b), “There is no

significant influence of Locality of school on Technological Content Knowledge of Secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in urban and rural areas school were found to have TCK to the same extent.

4.7.4 To study the interaction between type of school and locality on Technological Content Knowledge (TCK) of secondary school social studies teachers

From the Table 4.21 it can be seen that the F-ratio 0.117 for interaction between Type of school and locality with df (1, 145) was found not be significant ($p=0.733>0.05$) leading to the inference that mean score of TCK of Government and Private secondary school social studies teachers did not differ significantly with locality of school. So there was no significance interaction between type of school and locality on TCK of secondary school social studies teachers. Thus, the null hypothesis $H_0(c)$, “There is no significant influence of interaction between Type of school and Locality of school on Technological Content Knowledge of Secondary school social studies teachers” was not rejected. It may therefore be said that TCK was found to be independent of interaction between types of school and locality. In order to know the trend of influence of interaction between type of school and locality of school on TCK of secondary school social studies teachers, Figure 4.7 was plotted.

Figure 4.7

Estimated marginal means of TCK

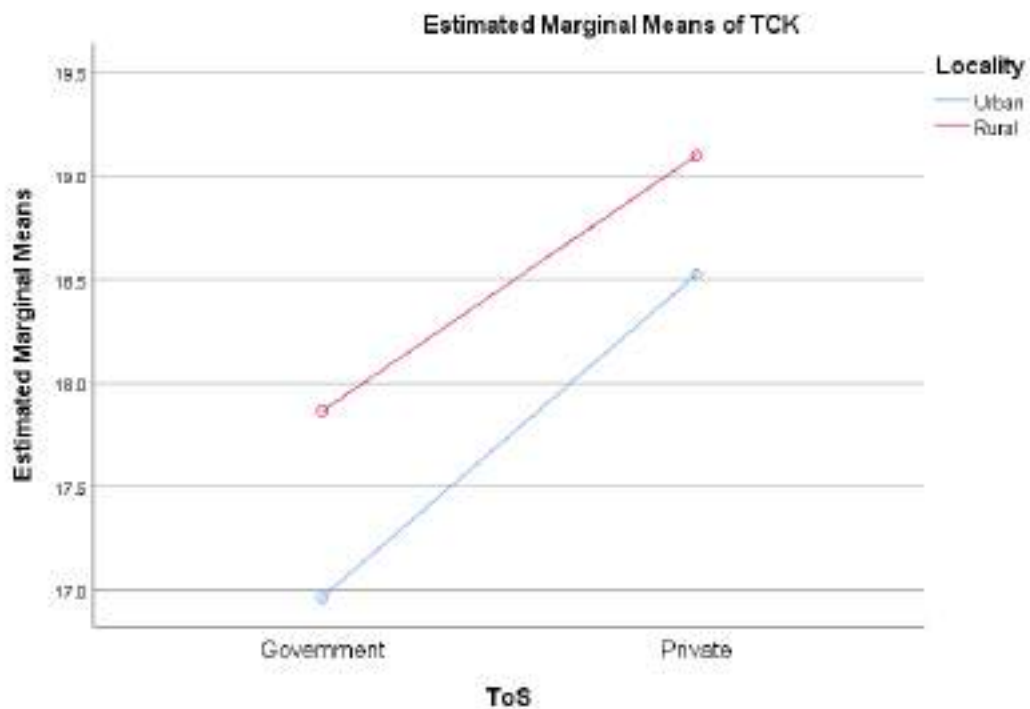


Figure 4.7 showing secondary school social studies teachers teaching in government secondary schools of urban area have lower mean score of TCK in comparison to that of government secondary school social studies teachers teaching in rural area. While there is sharp increase in mean score of TCK of private secondary school social studies teachers situated in urban and rural areas in relation to government secondary school social studies teachers of urban and rural area, but private secondary school social studies teachers teaching in rural area have higher mean score of TCK in comparison to that of private secondary school social studies teachers teaching in urban area.

4.8 Influence of Type of school, Locality of school and their interaction on Technological Pedagogical Knowledge (TPK) of Secondary school social studies teachers.

Table 4.22

Descriptive statistics of TPK

Descriptive Statistics						
Dependent Variable: TPK						
ToS	Locality	Mean	Std. Deviation	N	Skewness	Kurtosis
Government	Urban	21.48	3.512	27		
	Rural	22.57	2.793	81		
	Total	22.30	3.009	108		
Private	Urban	22.95	2.247	21		
	Rural	23.45	1.905	20		
	Total	23.20	2.076	41		
Total	Urban	22.13	3.085	48		
	Rural	22.74	2.656	101		
	Total	22.54	2.806	149	-1.500	3.157

4.8.1 Levene's Test of Homogeneity of Variance for Technological Pedagogical Knowledge (TPK)

Table 4.23

Levene's Test of Homogeneity of Variance

F	df1	df2	P	Remarks
2.673	3	145	.055	NS

Table no. 4.23 shows the value of Homogeneity of Variance where $p=.055 > .05$.

Therefore, assumption of homogeneity of variance was fulfilled.

Table 4.24

Summary of two way ANOVA for TPK of secondary school social studies teachers with respect to Type of School and Locality of school

Tests of Between-Subjects Effects

Dependent Variable: TPK					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	50.447a	3	16.816	2.188	.092
Intercept	55655.941	1	55655.941	7240.887	.000
ToS	37.663	1	37.663	4.900	.028
Locality	17.069	1	17.069	2.221	.138
ToS * Locality	2.358	1	2.358	.307	.580
Error	1114.520	145	7.686		
Total	76889.000	149			
Corrected Total	1164.966	148			
a. R Squared = .043 (Adjusted R Squared = .024)					

4.8.2 To study the influence of type of school on Technological Pedagogical Knowledge (TPK) of secondary school studies teachers.

An analysis of Table 4.24 confirms that F ratio 4.900 for influence of type of school on TPK of secondary school social studies teachers with df (1, 145) was found to be significant ($p=0.028<0.05$) leading to the inference that type of school have a significant effect on TPK of secondary school social studies teachers. Therefore, the null hypothesis H_07 (a), “There is no significant influence of Type of school on Technological Pedagogical Knowledge of Secondary school social studies teachers” was rejected. Further, Table 4.22 shows the mean score of TPK of Government secondary school social studies teachers is 22.30, which is significantly lower than that of private secondary school social studies teachers whose mean score of TPK is 23.20. Therefore, it may be said that private secondary school social studies teachers were

found to have higher TPK as compared to government secondary school social studies teachers.

4.8.3 To study the influence of locality of school on Technological Pedagogical Knowledge (TPK) of secondary school social studies teachers

On perusal of the Table 4.24, it is clear that F-ratio 2.221 for influence of locality on TPK of secondary school social studies teachers with df (1, 145) was found not be significant ($p=0.138>0.05$) leading to the inference that locality of school does not influence TPK of secondary school social studies teachers. Further, it indicates that the mean score of TPK of secondary school social studies teachers working in rural and urban areas did not differ significantly. So, there was no significance influence of locality of school on TPK. Therefore, the null hypothesis H_{07} (b), “There is no significant influence of Locality of school on Technological Pedagogical Knowledge of Secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in urban and rural areas school were found to have TPK to the same extent.

4.8.4 To study the interaction between type of school and locality on Technological Pedagogical Knowledge (TPK) of secondary school social studies teachers

From the Table 4.24 it can be seen that the F-ratio 0.307 for interaction between Type of school and locality with df (1, 145) was found not be significant ($p=0.580>0.05$) leading to the inference that mean score of TPK of Government and Private schools social studies teachers did not differ significantly with locality. So there was no significant interaction between type of school and locality on TPK of secondary school

social studies teachers. Thus, the null hypothesis H_07 (c), “There is no significant influence of interaction between Type of school and Locality of school on Technological Pedagogical Knowledge of Secondary school social studies teachers” was not rejected. It may therefore be said that TPK was found to be independent of interaction between types of school and locality. In order to know the trend of influence of interaction between type of school and locality of school on TPK of secondary school social studies teachers, Figure 4.8 was plotted.

Figure 4.8

Estimated marginal means of TPK

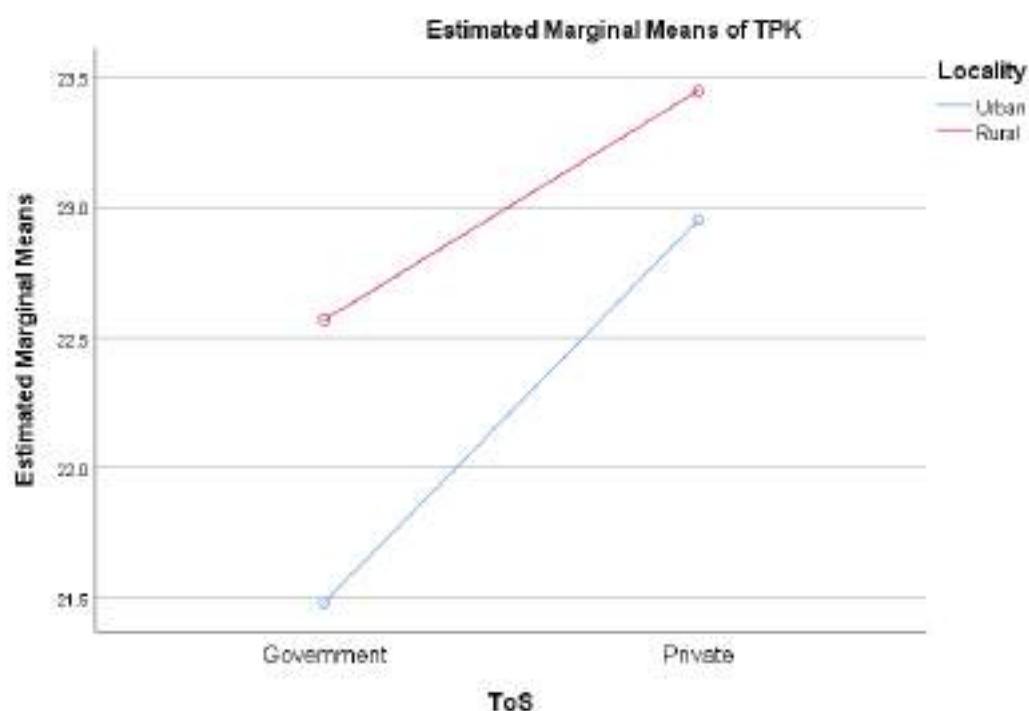


Figure 4.8 showing secondary school social studies teachers teaching in government secondary schools of rural area have higher mean score of TPK in comparison to that of government secondary school social studies teachers teaching in urban area. While there is sharp increase in mean score of TPK of private secondary school social studies

teachers teaching in rural and urban area school in comparison to government secondary school social studies teachers teaching in rural and urban area. Similar to government secondary school social studies teachers teaching in urban and rural area, teachers of private schools in rural area have comparatively higher mean score of TPK than that of teachers of private schools in urban area.

4.9 Influence of Type of school, Locality of school and their interaction on Technological Pedagogical Content Knowledge (TPCK) of Secondary school social studies teachers.

Table 4.25

Descriptive statistics of TPCK

Descriptive Statistics						
Dependent Variable: TPCK						
ToS	Locality	Mean	Std. Deviation	N	Skewness	Kurtosis
Government	Urban	26.48	2.833	27		
	Rural	26.35	2.895	81		
	Total	26.38	2.867	108		
Private	Urban	26.95	2.439	21		
	Rural	27.15	1.927	20		
	Total	27.05	2.179	41		
Total	Urban	26.69	2.651	48		
	Rural	26.50	2.741	101		
	Total	26.56	2.705	149	-.529	.742

4.9.1 Levene's Test of Homogeneity of Variance for Technological Pedagogical Content Knowledge (TPCK)

Table 4.26*Levene's Test of Homogeneity of Variance*

F	df1	df2	P	Remarks
.509	3	145	.677	NS

Table no. 4.26 shows the value of Homogeneity of Variance where $p=.677>.05$.

Therefore, assumption of homogeneity of variance was fulfilled.

Table 4.27

Summary of two way ANOVA for TPCK of secondary school social studies teachers with respect to Type of School and Locality of school

Tests of Between-Subjects Effects					
Dependent Variable: TPCK					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	14.080a	3	4.693	.637	.592
Intercept	77780.882	1	77780.882	10554.564	.000
ToS	11.062	1	11.062	1.501	.222
Locality	.026	1	.026	.004	.953
ToS * Locality	.756	1	.756	.103	.749
Error	1068.564	145	7.369		
Total	106222.000	149			
Corrected Total	1082.644	148			

a. R Squared = .013 (Adjusted R Squared = -.007)

4.9.2 To study the influence of type of school on Technological Pedagogical Content Knowledge (TPCK) of secondary school studies teachers.

On perusal of the Table 4.27, it is clear that F-ratio 1.501 for influence of type of school on TPCK of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.222>0.05$) leading to the inference that type of school does not influence TPCK of secondary school social studies teachers. Further, it indicates that the mean score of TPCK of secondary school social studies teachers working in Government and Private schools did not differ significantly. So, there was no significance influence of type of school on TPCK. Therefore, the null hypothesis H_0 (a), “There is no significant influence of Type of school on Technological Pedagogical Content Knowledge of Secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in Government and Private schools were found to have TPCK to the same extent.

4.9.3 To study the influence of locality of school on Technological Pedagogical Content Knowledge (TPCK) of secondary school social studies teachers

On perusal of the Table 4.27, it is clear that F-ratio 0.004 for influence of locality on TPCK of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.953>0.05$) leading to the inference that locality of school does not influence TPCK of secondary school social studies teachers. Further, it indicates that the mean score of TPCK of secondary school social studies teachers working in rural and urban areas did not differ significantly. So, there was no significance influence of locality of school on TPCK. Therefore, the null hypothesis H_0 (b), “There is no significant influence of Locality of school on Technological Pedagogical Content Knowledge of Secondary school social studies teachers” was not rejected. It may

therefore be said that the teachers working in urban and rural areas school were found to have TPCK to the same extent.

4.9.4 To study the interaction between Type of school and Locality on Technological Pedagogical Content Knowledge (TPCK) of secondary school social studies teachers

From the Table 4.27 it can be seen that the F-ratio 0.103 for interaction between Type of school and Locality with df (1, 145) was found not to be significant ($p=0.749>0.05$) leading to inference that mean score of TPCK of Government and Private schools social studies teachers teaching in school situated in Urban and Rural area did not differ significantly. So there was no significance interaction between type of school and locality of school on TPCK of secondary school social studies teachers. Thus, the null hypothesis H_08 (c), “There is no significant influence of interaction between Type of school and Locality of school on Technological Pedagogical Content Knowledge of Secondary school social studies teachers” was not rejected. It may therefore be said that TPCK was found to be independent of interaction between type of school and locality. In order to know the trend of influence of interaction between type of school and locality of school on TPCK of secondary school social studies teachers, Figure 4.9 was plotted.

Figure 4.9

Estimated marginal means of TPCK

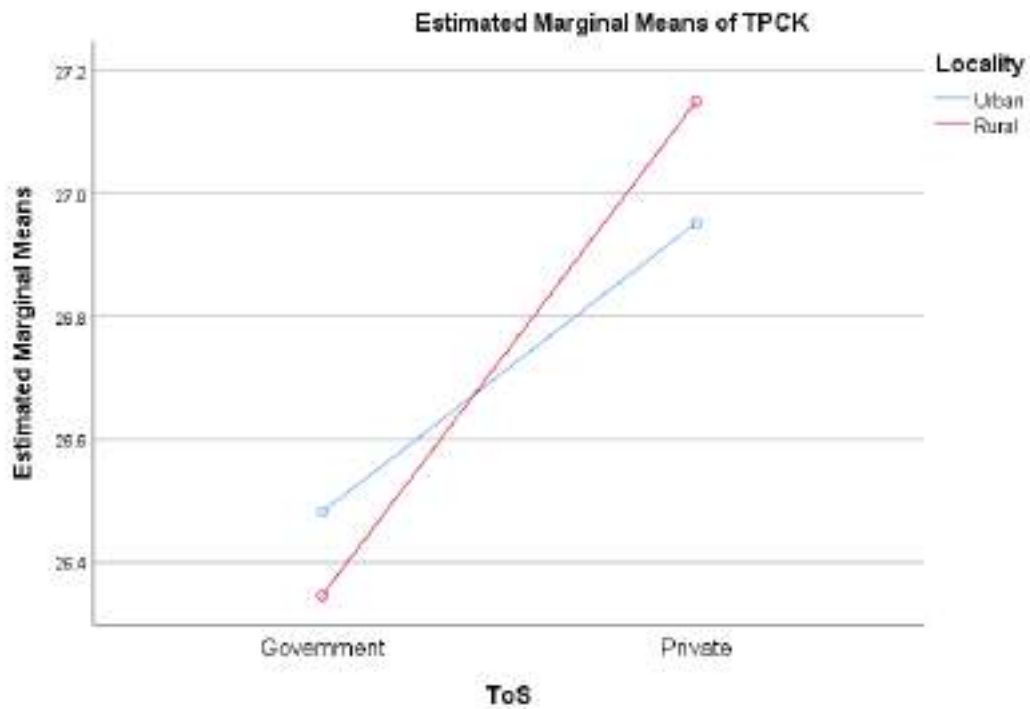


Figure 4.9 showing secondary school social studies teachers teaching in government secondary schools of rural area have lower mean score of TPCK in comparison to that of government secondary school social studies teachers teaching in urban area. While there is sharp increase in mean score of TPCK of private secondary school social studies teachers situated in rural and urban area in relation to government secondary school social studies teachers of rural and urban area. In addition to this, it is evident from figure 4.9 that secondary school social studies teachers teaching in private secondary schools of rural area have higher mean score of TPCK in comparison to that of private secondary school social studies teachers teaching in urban area.

4.10 Self-efficacy of Secondary school social studies teachers

Table 4.28

Frequency distribution of Secondary school social studies teachers with respect to Self-efficacy score

Class Intervals (Self-efficacy)	Frequency (No. of Secondary school social studies teachers)	Cumulative Frequency
130-140	4	4
140-150	44	48
150-160	59	107
160-170	31	138
170-180	10	148
180-190	1	149

Table 4.29

Distribution of Secondary school social studies teachers with respect to Self-efficacy level

Levels of Self-efficacy (Score)	Frequency (No. of Secondary school social studies teachers)	Percentage of Secondary school social studies teachers
Very Low	0	0
Low	37	24.83
Average	79	53.02
High	30	20.13
Very High	3	2.02

Table 4.30

Descriptive statistics with respect to Self-efficacy of Secondary school social studies teachers

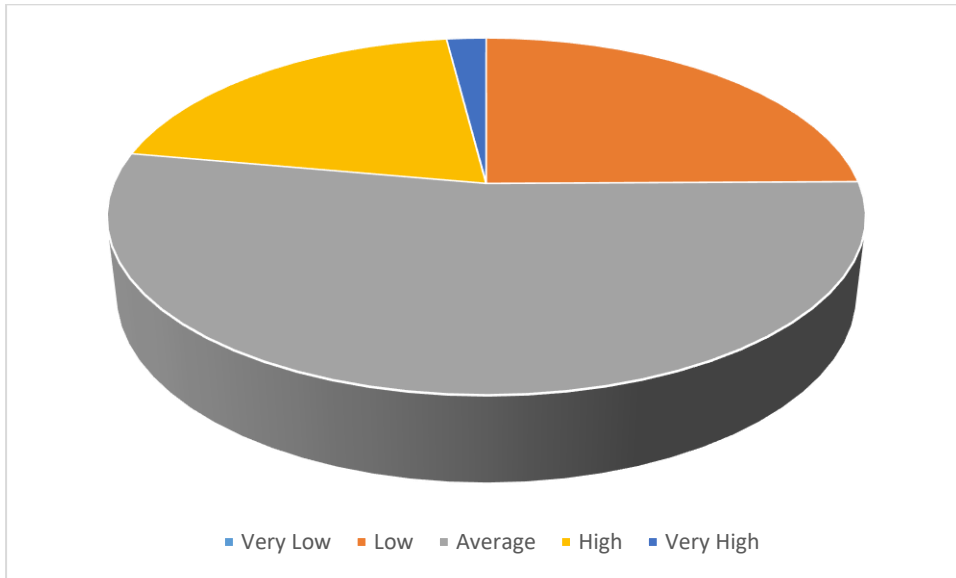
Descriptive statistics	Values
No. of Secondary school social studies teachers (N)	149
Mean	154.95

Median	153
Mode	153
Std. Deviation	9.411
Skewness	.485
Std. Error of Skewness	.199
Kurtosis	-.333
Std. Error of Kurtosis	.395
Range	44
Minimum	137
Maximum	181

It is evident from table no. 4.30 that self-efficacy score of Secondary school social studies teachers varied from 137 to 181 displaying a range of 44. The mean of Self-efficacy was found to be 154.95 which indicates Secondary school social studies teachers have Average level of Self-efficacy. Further table no. 4.29 shows that 24.83 % of Secondary school social studies teachers have Low level of Self-efficacy, 20.13 % of Secondary school social studies teachers have High level of Self-efficacy, 53.02 % of Secondary school social studies teachers have Average level of Self-efficacy, there is not a single Secondary school social teachers which has very low level of Self-efficacy while nominal 2.02% Secondary school social studies teachers have very high Self-efficacy. Figure 4.10 showing percentage of Secondary school social studies teachers with respect to their Self-efficacy.

Figure 4.10

Pie-Chart of Percentage distribution of Secondary school social studies teachers with respect to their Self-efficacy



4.11 Influence of Type of school, Locality of school and their interaction on Self-efficacy of Secondary school social studies teachers.

Table 4.31

Descriptive statistics of Self-efficacy of Teachers

Descriptive Statistics						
Dependent Variable: Self_efficacy_Teachers						
ToS	Locality	Mean	Std. Deviation	N	Skewness	Kurtosis
Government	Urban	153.74	8.786	27		
	Rural	154.26	9.045	81		
	Total	154.13	8.943	108		
Private	Urban	159.71	9.382	21		
	Rural	154.35	10.840	20		
	Total	157.10	10.353	41		
Total	Urban	156.35	9.441	48		
	Rural	154.28	9.369	101		

	Total	154.95	9.411	149	.485	-.333
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4.11.1 Levene's Test of Homogeneity of Variance for Self-efficacy

Table 4.32

Levene's Test of Homogeneity of Variance

F	df1	df2	P	Remarks
1.153	3	145	.330	NS

Table no. 4.32 shows the value of Homogeneity of Variance where $p=.330 > .05$.

Therefore, assumption of homogeneity of variance was fulfilled.

Table 4.33

Summary of two way ANOVA for Self-efficacy of Secondary school social studies

teachers with respect to Type of School and Locality of school

Tests of Between-Subjects Effects					
Dependent Variable: Self_efficacy_Teachers					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	561.994a	3	187.331	2.165	.095
Intercept	2632376.414	1	2632376.414	30424.635	.000
ToS	250.171	1	250.171	2.891	.091
Locality	159.736	1	159.736	1.846	.176
ToS * Locality	235.422	1	235.422	2.721	.101
Error	12545.576	145	86.521		
Total	3590353.000	149			
Corrected Total	13107.570	148			

a. R Squared = .043 (Adjusted R Squared = .023)

4.11.2 To study the influence of type of school on Self-efficacy of secondary school studies teachers.

On perusal of the Table 4.33, it is clear that F-ratio=2.891 for influence of type of school on self-efficacy of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.091>0.05$) leading to the inference that type of school does not influence self-efficacy of secondary school social studies teachers. Further, it indicates that the mean score of self-efficacy of secondary school social studies teachers working in Government and Private schools did not differ significantly. So, there was no significance influence of type of school on self-efficacy. Therefore, the null hypothesis H_09 (a), “There is no significant influence of Type of school on Self-efficacy of Secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in Government and Private schools were found to have self-efficacy to the same extent.

4.11.3 To study the influence of locality of school on Self-efficacy of secondary school social studies teachers

On perusal of the Table 4.33, it is clear that F-ratio 1.846 for influence of locality on self-efficacy of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.176>0.05$) leading to the inference that locality of school does not influence self-efficacy of secondary school social studies teachers. Further, it indicates that the mean score of self-efficacy of secondary school social studies teachers working in rural and urban areas did not differ significantly. So, there was no significance influence of locality of school on self-efficacy. Therefore, the null hypothesis H_09 (b), “There is no significant influence of Locality of school on Self-

efficacy of Secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in urban and rural areas school were found to have self-efficacy to the same extent.

4.11.4 To study the interaction between Type of school and Locality on self-efficacy of secondary school social studies teachers

From the Table 4.33 it can be seen that the F-ratio 2.721 for interaction between Type of school and Locality with df (1, 145) was found not to be significant ($p=0.101>0.05$) leading to inference that mean score of self-efficacy of Government and Private schools social studies teachers teaching in school situated in Urban and Rural area did not differ significantly. So there was no significance interaction between type of school and locality of school on self-efficacy of secondary school social studies teachers. Thus, the null hypothesis H_{09} (c), “There is no significant influence of interaction between Type of school and Locality of school on Self-efficacy of Secondary school social studies teachers” was not rejected. It may therefore be said that self-efficacy was found to be independent of interaction between type of school and locality. In order to know the trend of influence of interaction between type of school and locality of school on self-efficacy of secondary school social studies teachers, Figure 4.11 was plotted.

Figure 4.11

Estimated marginal means of self-efficacy

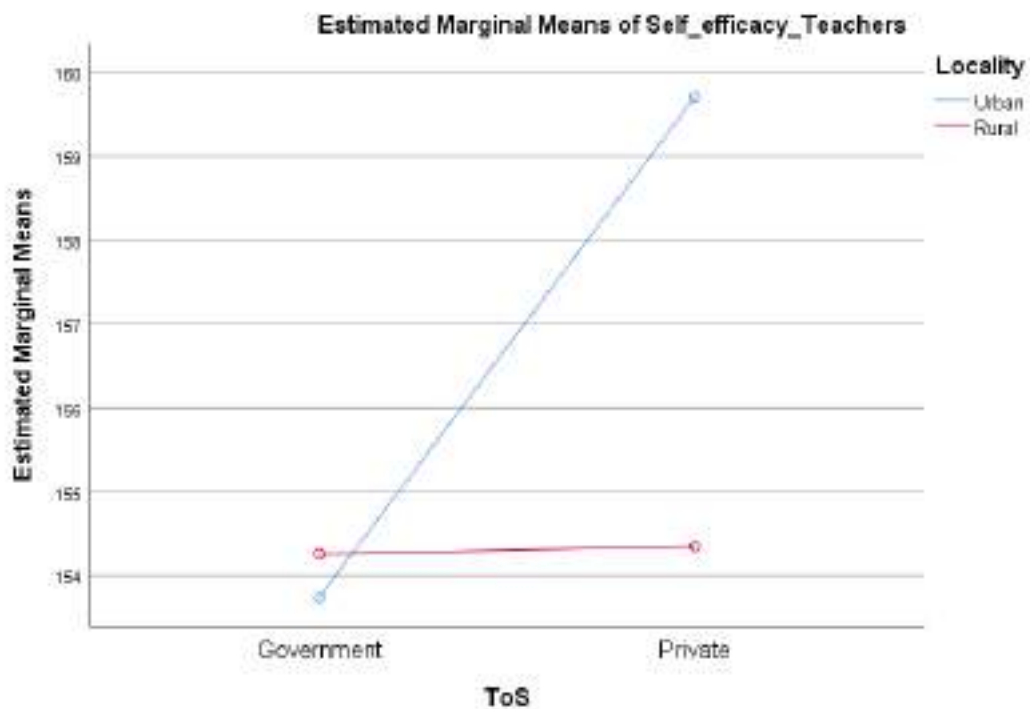


Figure 4.11 showing secondary school social studies teachers teaching in government secondary schools of rural area have higher mean score of self-efficacy in comparison to that of government secondary school social studies teachers teaching in urban area. While there is sharp increase in mean score of self-efficacy of private secondary school social studies teachers situated in urban area in relation to government secondary school social studies teachers of urban area. In addition to this, it is evident from figure 4.11 that secondary school social studies teachers teaching in private secondary schools of rural area have lower mean score of self-efficacy in comparison to that of private secondary school social studies teachers teaching in urban area.

4.12 Influence of Type of school, Locality of school and their interaction on Efficacy to influence decision making of Secondary school social studies teachers.

Table 4.34

Descriptive statistics of efficacy to influence decision making

Descriptive Statistics						
Dependent Variable: Efficacy to influence decision-making						
ToS	Locality	Mean	Std. Deviation	N	Skewness	Kurtosis
Government	Urban	23.81	2.732	27		
	Rural	24.17	2.333	81		
	Total	24.08	2.431	108		
Private	Urban	23.24	3.081	21		
	Rural	22.00	2.636	20		
	Total	22.63	2.905	41		
Total	Urban	23.56	2.873	48		
	Rural	23.74	2.536	101		
	Total	23.68	2.641	149	.071	.261

4.12.1 Levene's Test of Homogeneity of Variance for efficacy to influence decision making

Table 4.35

Levene's Test of Homogeneity of Variance

F	df1	df2	P	Remarks
.889	3	145	.448	NS

Table no. 4.35 shows the value of Homogeneity of Variance where $p=.448>.05$.

Therefore, assumption of homogeneity of variance was fulfilled.

Table 4.36

Summary of two way ANOVA for efficacy to influence decision making of secondary school social studies teachers with respect to Type of School and Locality of school

Tests of Between-Subjects Effects					
Dependent Variable: Efficacy to influence decision-making					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	80.711a	3	26.904	4.100	.008
Intercept	59122.014	1	59122.014	9010.003	.000
ToS	51.428	1	51.428	7.838	.006
Locality	5.269	1	5.269	.803	.372
ToS * Locality	17.330	1	17.330	2.641	.106
Error	951.464	145	6.562		
Total	84615.000	149			
Corrected Total	1032.174	148			

a. R Squared = .078 (Adjusted R Squared = .059)

4.12.2 To study the influence of type of school on efficacy to influence decision making of secondary school studies teachers.

On perusal of Table 4.36 it is evident that F-ratio 7.838 for influence of type of school on efficacy to influence decision making of secondary school social studies teachers with df (1, 145) was found to be significant ($p=0.006<0.05$) leading to the inference that type of school have a significant influence on efficacy to influence decision making of secondary school social studies teachers. Therefore, the null hypothesis H_{010} (a), “There is no significant influence of Type of school on efficacy to influence decision making of Secondary school social studies teachers” was rejected. Further, Table 4.34 shows the mean score of efficacy to influence decision making score of Government secondary school social studies teachers is 24.08, which is higher than that of Private secondary school social studies teachers whose mean score of efficacy to influence

decision making is 22.63. It may therefore be said that Private secondary school social studies teachers were found to have lower efficacy to influence decision making as compared to Government secondary school social studies teachers.

4.12.3 To study the influence of locality of school on efficacy to influence decision making of secondary school social studies teachers

On perusal of the Table 4.36, it is clear that F-ratio=0.803 for influence of locality on efficacy to influence decision making of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.372>0.05$) leading to the inference that locality of school does not influence efficacy to influence decision making of secondary school social studies teachers. Further, it indicates that the mean score of efficacy to influence decision making of secondary school social studies teachers working in rural and urban areas did not differ significantly. So, there was no significance influence of locality of school on efficacy to influence decision making. Therefore, the null hypothesis H_0 10 (b), “There is no significant influence of Locality of school on efficacy to influence decision making of Secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in urban and rural areas school were found to have efficacy to influence decision making to the same extent.

4.12.4 To study the interaction between Type of school and Locality on efficacy to influence decision making of secondary school social studies teachers

From the Table 4.36 it can be seen that the F-ratio 2.641 for interaction between Type of school and Locality with df (1, 145) was found not to be significant ($p=0.106>0.05$) leading to inference that mean score of efficacy to influence decision making of Government and Private schools social studies teachers teaching in school situated in

Urban and Rural area did not differ significantly. So there was no significance interaction between type of school and locality of school on efficacy to influence decision making of secondary school social studies teachers. Thus, the null hypothesis H_{010} (c), “There is no significant influence of interaction between Type of school and Locality of school on efficacy to influence decision making of Secondary school social studies teachers” was not rejected. It may therefore be said that efficacy to influence decision making was found to be independent of interaction between type of school and locality. In order to know the trend of influence of interaction between type of school and locality of school on efficacy to influence decision making of secondary school social studies teachers, Figure 4.12 was plotted.

Figure 4.12

Estimated marginal means of efficacy to influence decision making

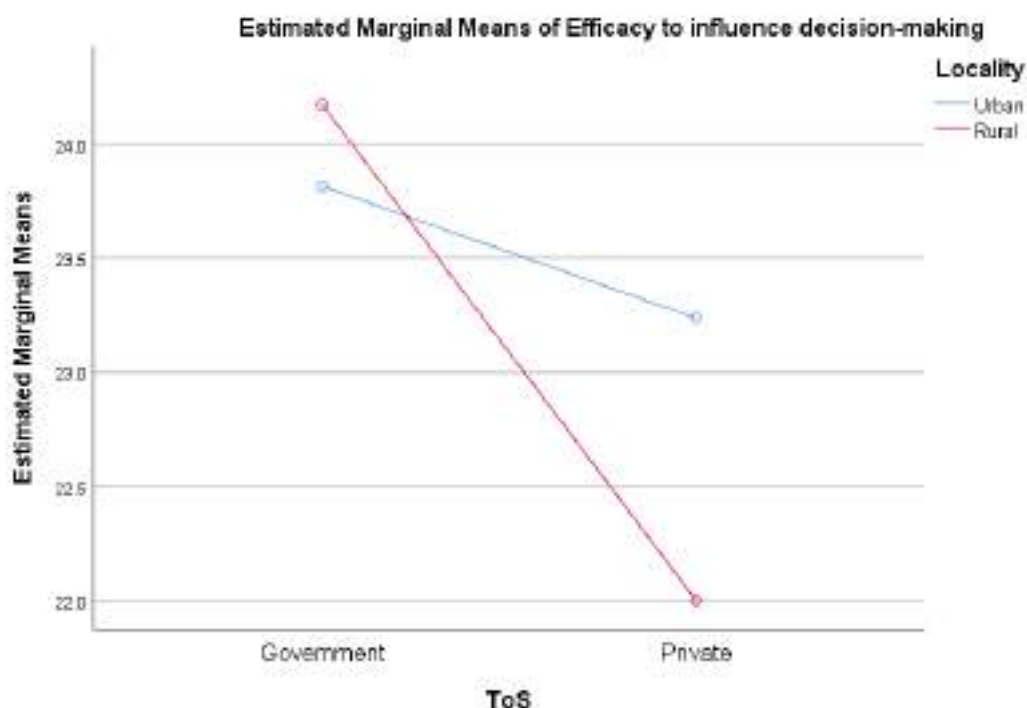


Figure 4.12 showing secondary school social studies teachers teaching in government secondary schools of rural area have higher mean score of efficacy to influence decision making in comparison to that of government secondary school social studies teachers teaching in urban area. While there is sharp decrease in mean score of efficacy to influence decision making of private secondary school social studies teachers situated in rural area in relation to government secondary school social studies teachers of rural area. In addition to this, it is evident from figure 4.12 that secondary school social studies teachers teaching in private secondary schools of rural area have lower mean score of efficacy to influence decision making in comparison to that of private secondary school social studies teachers teaching in urban area.

4.13 Influence of Type of school, Locality of school and their interaction on Instructional self-efficacy of Secondary school social studies teachers.

Table 4.37

Descriptive statistics of instructional self-efficacy

Descriptive Statistics						
Dependent Variable: Instructional self-efficacy						
ToS	Locality	Mean	Std. Deviation	N	Skewness	Kurtosis
Government	Urban	41.52	3.179	27		
	Rural	41.37	2.943	81		
	Total	41.41	2.989	108		
Private	Urban	43.76	3.477	21		
	Rural	42.50	3.663	20		
	Total	43.15	3.582	41		
Total	Urban	42.50	3.464	48		

	Rural	41.59	3.112	101		
	Total	41.89	3.246	149	.641	.186

4.13.1 Levene's Test of Homogeneity of Variance for instructional self-efficacy

Table 4.38

Levene's Test of Homogeneity of Variance

F	df1	df2	P	Remarks
.837	3	145	.476	NS

Table no. 4.38 shows the value of Homogeneity of Variance where $p=.476>.05$.

Therefore, assumption of homogeneity of variance was fulfilled.

Table 4.39

Summary of two way ANOVA for instructional self-efficacy of secondary school social studies teachers with respect to Type of School and Locality of school

Tests of Between-Subjects Effects					
Dependent Variable: Instructional self-efficacy					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	106.621a	3	35.540	3.548	.016
Intercept	194637.059	1	194637.059	19431.020	.000
ToS	77.395	1	77.395	7.727	.006
Locality	13.525	1	13.525	1.350	.247
ToS * Locality	8.438	1	8.438	.842	.360
Error	1452.439	145	10.017		
Total	262969.000	149			

Corrected Total	1559.060	148			
a. R Squared = .068 (Adjusted R Squared = .049)					

4.13.2 To study the influence of type of school on instructional self-efficacy of secondary school social studies teachers.

On perusal of Table 4.39 it is evident that F-ratio 7.727 for influence of type of school on instructional self-efficacy of secondary school social studies teachers with df (1, 145) was found to be significant ($p=0.006<0.05$) leading to the inference that type of school have a significant influence on instructional self-efficacy of secondary school social studies teachers. Therefore, the null hypothesis H_{011} (a), “There is no significant influence of Type of school on instructional self-efficacy of Secondary school social studies teachers” was rejected. Further, Table 4.37 shows the mean score of instructional self-efficacy score of Government secondary school social studies teachers is 41.41, which is higher than that of Private secondary school social studies teachers whose mean score of instructional self-efficacy is 43.15. It may therefore be said that Private secondary school social studies teachers were found to have lower instructional self-efficacy as compared to Government secondary school social studies teachers.

4.13.3 To study the influence of locality of school on instructional self-efficacy of secondary school social studies teachers

On perusal of the Table 4.39, it is clear that F-ratio=1.350 for influence of locality on instructional self-efficacy of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.247>0.05$) leading to the inference that locality of school does not influence instructional self-efficacy of secondary school social studies

teachers. Further, it indicates that the mean score of instructional self-efficacy of secondary school social studies teachers working in rural and urban areas did not differ significantly. So, there was no significance influence of locality of school on instructional self-efficacy. Therefore, the null hypothesis H_{011} (b), “There is no significant influence of Locality of school on instructional self-efficacy of Secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in urban and rural areas school were found to have instructional self-efficacy to the same extent.

4.13.4 To study the interaction between Type of school and Locality on instructional self-efficacy of secondary school social studies teachers

From the Table 4.39 it can be seen that the F-ratio 0.842 for interaction between Type of school and Locality with df (1, 145) was found not to be significant ($p=0.360>0.05$) leading to inference that mean score of instructional self-efficacy of Government and Private schools social studies teachers teaching in schools situated in Urban and Rural area did not differ significantly. So there was no significance interaction between type of school and locality of school on instructional self-efficacy of secondary school social studies teachers. Thus, the null hypothesis H_{011} (c), “There is no significant influence of interaction between Type of school and Locality of school on instructional self-efficacy of Secondary school social studies teachers” was not rejected. It may therefore be said that instructional self-efficacy was found to be independent of interaction between type of school and locality. In order to know the trend of influence of interaction between type of school and locality of school on instructional self-efficacy of secondary school social studies teachers, Figure 4.13 was plotted.

Figure 4.13

Estimated marginal means of instructional self-efficacy

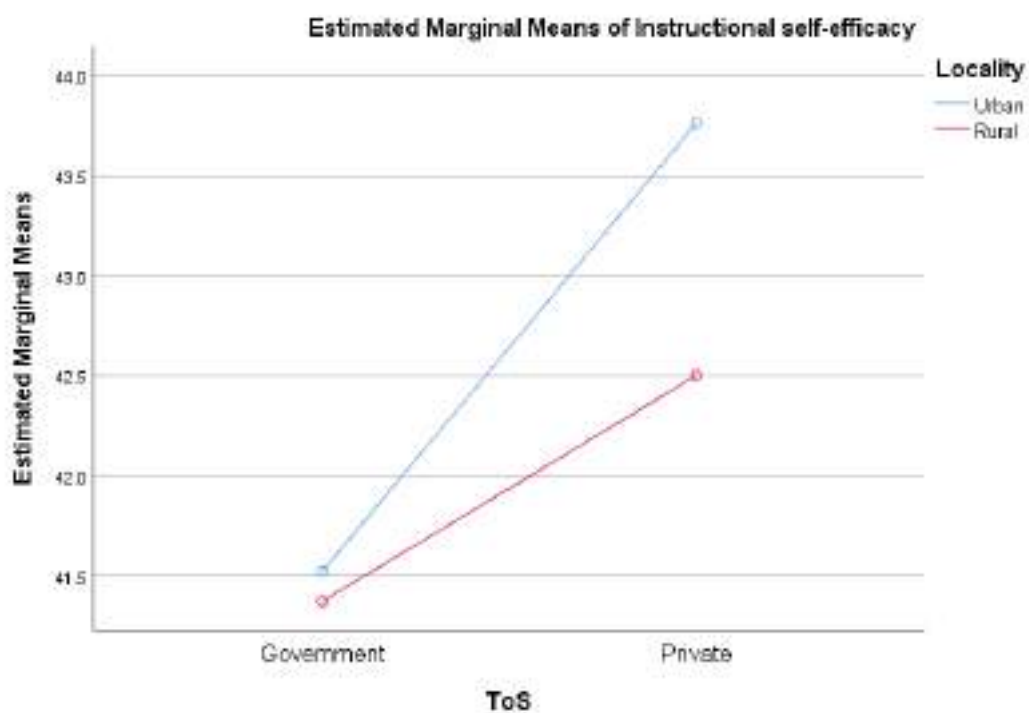


Figure 4.13 showing secondary school social studies teachers teaching in government secondary schools of rural area have lower mean score of instructional self-efficacy in comparison to that of government secondary school social studies teachers teaching in urban area. While there is sharp increase in mean score of instructional self-efficacy of private secondary school social studies teachers situated in urban and rural area in relation to government secondary school social studies teachers of urban and rural area. In addition to this, it is evident from figure 4.13 that secondary school social studies teachers teaching in private secondary schools of rural area have lower mean score of

instructional self-efficacy in comparison to that of private secondary school social studies teachers teaching in urban area.

4.14 Influence of Type of school, Locality of school and their interaction on Disciplinary self-efficacy of Secondary school social studies teachers.

Table 4.40

Descriptive statistics of disciplinary self-efficacy

Descriptive Statistics						
Dependent Variable: Disciplinary self-efficacy						
ToS	Locality	Mean	Std. Deviation	N	Skewness	Kurtosis
Government	Urban	20.67	1.881	27		
	Rural	20.41	1.716	81		
	Total	20.47	1.753	108		
Private	Urban	21.71	2.101	21		
	Rural	20.70	1.780	20		
	Total	21.22	1.994	41		
Total	Urban	21.12	2.028	48		
	Rural	20.47	1.724	101		
	Total	20.68	1.846	149	.464	-.084

4.14.1 Levene's Test of Homogeneity of Variance for disciplinary self-efficacy

Table 4.41

Levene's Test of Homogeneity of Variance

F	df1	df2	P	Remarks
.556	3	145	.645	NS

Table no. 4.41 shows the value of Homogeneity of Variance where $p=.645>.05$. Therefore, assumption of homogeneity of variance was fulfilled.

Table 4.42

Summary of two way ANOVA for disciplinary self-efficacy of secondary school social studies teachers with respect to Type of School and Locality of school

Tests of Between-Subjects Effects					
Dependent Variable: Disciplinary self-efficacy					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	28.496a	3	9.499	2.893	.037
Intercept	47416.480	1	47416.480	14442.844	.000
ToS	12.219	1	12.219	3.722	.056
Locality	11.033	1	11.033	3.361	.069
ToS * Locality	3.878	1	3.878	1.181	.279
Error	476.041	145	3.283		
Total	64213.000	149			
Corrected Total	504.537	148			
a. R Squared = .056 (Adjusted R Squared = .037)					

4.14.2 To study the influence of type of school on disciplinary self-efficacy of secondary school studies teachers.

On perusal of the Table 4.42, it is clear that F-ratio=3.722 for influence of type of school on disciplinary self-efficacy of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.056>0.05$) leading to the inference that type of school does not influence disciplinary self-efficacy of secondary school social studies

teachers. Further, it indicates that the mean score of disciplinary self-efficacy of secondary school social studies teachers working in Government and Private schools did not differ significantly. So, there was no significance influence of type of school on disciplinary self-efficacy. Therefore, the null hypothesis H_{012} (a), “There is no significant influence of Type of school on disciplinary self-efficacy of Secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in Government and Private schools were found to have disciplinary self-efficacy to the same extent.

4.14.3 To study the influence of locality of school on disciplinary self-efficacy of secondary school social studies teachers

On perusal of the Table 4.42, it is clear that F-ratio=3.361 for influence of locality on disciplinary self-efficacy of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.069>0.05$) leading to the inference that locality of school does not influence disciplinary self-efficacy of secondary school social studies teachers. Further, it indicates that the mean score of disciplinary self-efficacy of secondary school social studies teachers working in rural and urban areas did not differ significantly. So, there was no significance influence of locality of school on disciplinary self-efficacy. Therefore, the null hypothesis H_{012} (b), “There is no significant influence of Locality of school on disciplinary self-efficacy of Secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in urban and rural areas school were found to have disciplinary self-efficacy to the same extent.

4.14.4 To study the interaction between Type of school and Locality on disciplinary self-efficacy of secondary school social studies teachers

From the Table 4.42 it can be seen that the F-ratio 1.181 for interaction between Type of school and Locality with df (1, 145) was found not to be significant ($p=0.279>0.05$) leading to inference that mean score of disciplinary self-efficacy of Government and Private schools social studies teachers teaching in schools situated in Urban and Rural area did not differ significantly. So there was no significant interaction between type of school and locality of school on disciplinary self-efficacy of secondary school social studies teachers. Thus, the null hypothesis H_{012} (c), “There is no significant influence of interaction between Type of school and Locality of school on disciplinary self-efficacy of Secondary school social studies teachers” was not rejected. It may therefore be said that disciplinary self-efficacy was found to be independent of interaction between type of school and locality. In order to know the trend of influence of interaction between type of school and locality of school on disciplinary self-efficacy of secondary school social studies teachers, Figure 4.14 was plotted.

Figure 4.14

Estimated marginal means of disciplinary self-efficacy

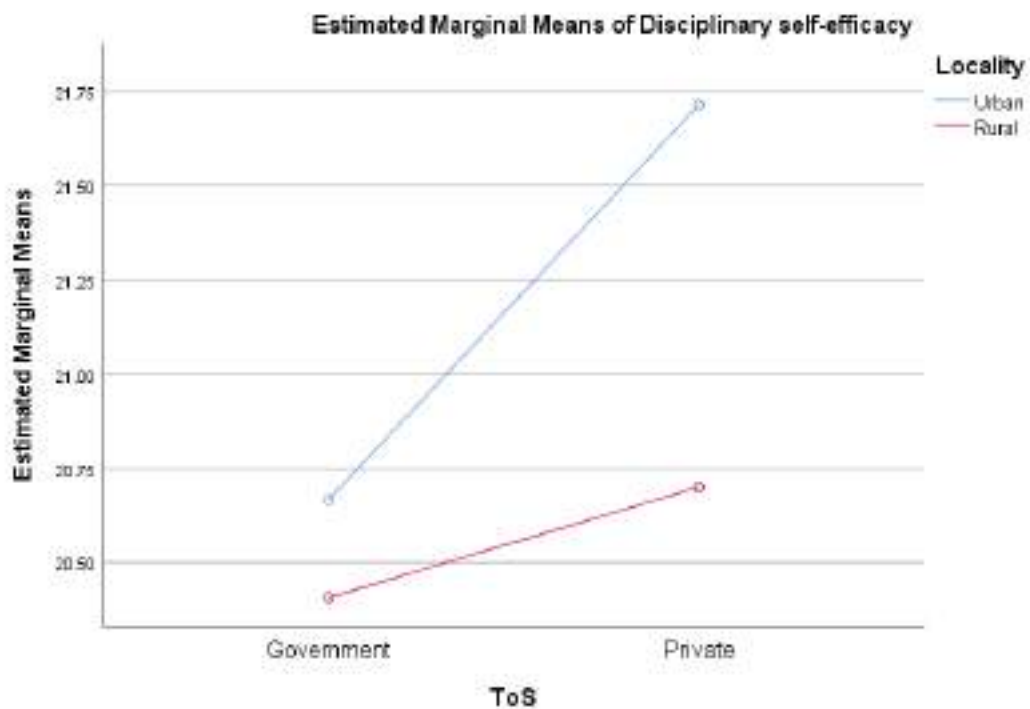


Figure 4.14 showing secondary school social studies teachers teaching in government secondary schools of rural area have lower mean score of disciplinary self-efficacy in comparison to that of government secondary school social studies teachers teaching in urban area. While there is sharp increase in mean score of disciplinary self-efficacy of private secondary school social studies teachers situated in urban area in relation to government secondary school social studies teachers of urban area. In addition to this, it is evident from figure 4.14 that secondary school social studies teachers teaching in private secondary schools of rural area have lower mean score of disciplinary self-efficacy in comparison to that of private secondary school social studies teachers teaching in urban area.

4.15 Influence of Type of school, Locality of school and their interaction on efficacy to parental involvement of Secondary school social studies teachers

Table 4.43*Descriptive statistics of efficacy to parental involvement*

Descriptive Statistics						
Dependent Variable: Efficacy to parental involvement						
ToS	Locality	Mean	Std. Deviation	N	Skewness	Kurtosis
Government	Urban	17.93	2.702	27		
	Rural	18.30	3.104	81		
	Total	18.20	3.001	108		
Private	Urban	20.43	2.785	21		
	Rural	18.35	3.438	20		
	Total	19.41	3.256	41		
Total	Urban	19.02	2.986	48		
	Rural	18.31	3.155	101		
	Total	18.54	3.110	149	.117	-.708

4.15.1 Levene's Test of Homogeneity of Variance for efficacy to parental involvement

Table 4.44*Levene's Test of Homogeneity of Variance*

F	df1	df2	P	Remarks
1.045	3	145	.357	NS

Table no. 4.44 shows the value of Homogeneity of Variance where $p=.357>.05$.

Therefore, assumption of homogeneity of variance was fulfilled.

Table 4.45

Summary of two way ANOVA for efficacy to parental involvement of secondary school social studies teachers with respect to Type of School and Locality of school

Tests of Between-Subjects Effects					
Dependent Variable: Efficacy to parental involvement					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	90.613a	3	30.204	3.267	.023
Intercept	38265.657	1	38265.657	4139.347	.000
ToS	44.455	1	44.455	4.809	.030
Locality	19.850	1	19.850	2.147	.145
ToS * Locality	40.798	1	40.798	4.413	.037
Error	1340.434	145	9.244		
Total	52630.000	149			
Corrected Total	1431.047	148			
a. R Squared = .063 (Adjusted R Squared = .044)					

4.15.2 To study the influence of type of school on efficacy to parental involvement of secondary school social studies teachers.

On perusal of Table 4.45 it is evident that F-ratio 4.809 for influence of type of school on efficacy to parental involvement of secondary school social studies teachers with df (1, 145) was found to be significant ($p=0.030 < 0.05$) leading to the inference that type of school have a significant influence on efficacy to parental involvement of secondary school social studies teachers. Therefore, the null hypothesis H_0 13 (a), “There is no significant influence of Type of school on efficacy to parental involvement of Secondary school social studies teachers” was rejected. Further, Table 4.43 shows the

mean score of efficacy to parental involvement score of Government secondary school social studies teachers is 18.20, which is lower than that of Private secondary school social studies teachers whose mean score of efficacy to parental involvement is 19.41. It may therefore be said that Private secondary school social studies teachers were found to have higher efficacy to parental involvement as compared to Government secondary school social studies teachers.

4.15.3 To study the influence of locality of school on efficacy to parental involvement of secondary school social studies teachers

On perusal of the Table 4.45, it is clear that F-ratio=2.147 for influence of locality on efficacy to parental involvement of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.145>0.05$) leading to the inference that locality of school does not influence efficacy to parental involvement of secondary school social studies teachers. Further, it indicates that the mean score of efficacy to parental involvement of secondary school social studies teachers working in rural and urban areas did not differ significantly. So, there was no significance influence of locality of school on efficacy to parental involvement. Therefore, the null hypothesis H_0 13 (b), “There is no significant influence of Locality of school on efficacy to parental involvement of Secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in urban and rural area school were found to have efficacy to parental involvement to the same extent.

4.15.4 To study the interaction between type of school and locality of school on efficacy to parental involvement of secondary school social studies teachers

It is evident from Table 4.45 that F-ratio 4.413 for interaction between type of school and locality on efficacy to parental involvement of the secondary school social studies teachers with df (1, 145) was found to be significant ($p=0.037<0.05$) leading to inference that mean score of efficacy to parental involvement of government and private schools social studies teachers differs with locality of the school. So there was significant interaction between types of school and locality of school on efficacy to parental involvement of secondary school social studies teachers. Thus, the null hypothesis H_{013} (c), “There is no significant influence of interaction between Type of school and Locality of school on efficacy to parental involvement of Secondary school social studies teachers” was rejected. It may therefore be said that efficacy to parental involvement was found to have significant interaction between type of school and locality of school. In order to know the trend of influence of interaction between type of school and locality of school on efficacy to parental involvement of secondary school social studies teachers, Figure 4.15 was plotted.

Figure 4.15

Estimated Marginal Means of Efficacy to parental involvement

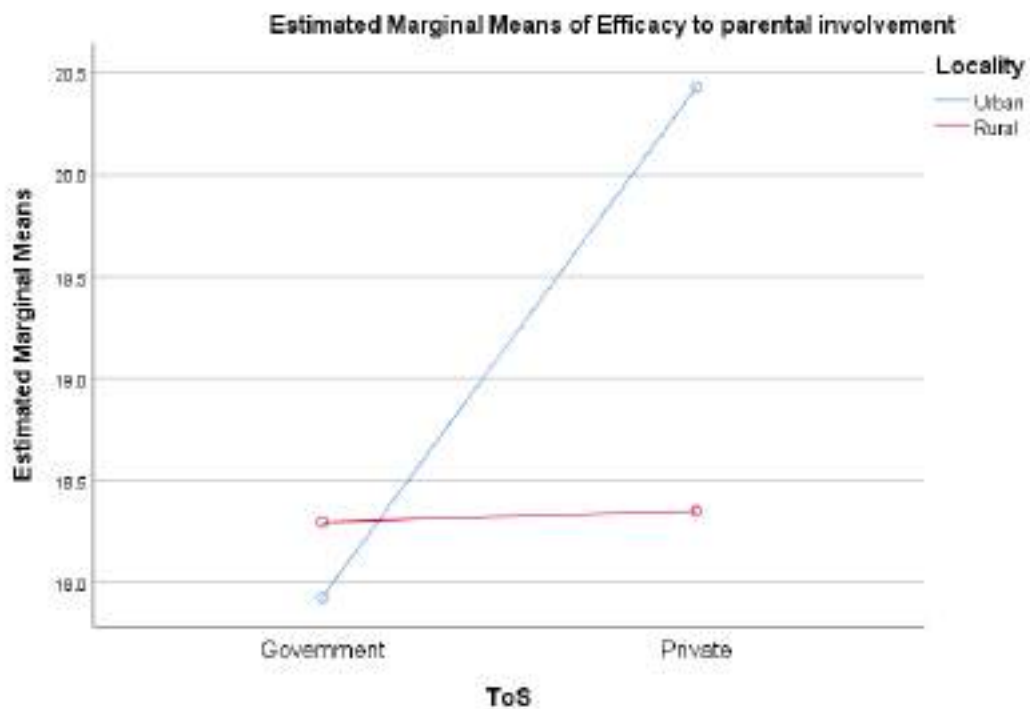


Figure 4.15 showing secondary school social studies teachers teaching in government secondary schools of rural area have higher mean score of efficacy to parental involvement in comparison to that of government secondary school social studies teachers teaching in urban area. While there is sharp increase in mean score of efficacy to parental involvement of private secondary school social studies teachers situated in urban area in relation to government secondary school social studies teachers of urban area. In addition to this, it is evident from figure 4.15 that secondary school social studies teachers teaching in private secondary schools of rural area have lower mean score of efficacy to parental involvement in comparison to that of private secondary school social studies teachers teaching in urban area.

4.16 Influence of Type of school, Locality of school and their interaction on Efficacy to enlist community involvement of Secondary school social studies teachers.

Table 4.46*Descriptive statistics of efficacy to efficacy to enlist community involvement*

Descriptive Statistics						
Dependent Variable: Efficacy to enlist community involvement						
ToS	Locality	Mean	Std. Deviation	N	Skewness	Kurtosis
Government	Urban	17.70	3.349	27		
	Rural	17.62	3.121	81		
	Total	17.64	3.164	108		
Private	Urban	19.57	2.942	21		
	Rural	18.65	2.815	20		
	Total	19.12	2.883	41		
Total	Urban	18.52	3.281	48		
	Rural	17.82	3.077	101		
	Total	18.05	3.150	149	.073	-.781

4.16.1 Levene's Test of Homogeneity of Variance for Efficacy to enlist community involvement

Table 4.47*Levene's Test of Homogeneity of Variance*

F	df1	df2	P	Remarks
.913	3	145	.436	NS

Table no. 4.47 shows the value of Homogeneity of Variance where $p=.436>.05$.

Therefore, assumption of homogeneity of variance was fulfilled.

Table 4.48

Summary of two way ANOVA for efficacy to enlist community involvement of secondary school social studies teachers with respect to Type of School and Locality of school

Tests of Between-Subjects Effects					
Dependent Variable: Efficacy to enlist community involvement					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	74.213a	3	24.738	2.572	.056
Intercept	36791.987	1	36791.987	3825.742	.000
ToS	57.228	1	57.228	5.951	.016
Locality	6.910	1	6.910	.719	.398
ToS * Locality	4.743	1	4.743	.493	.484
Error	1394.458	145	9.617		
Total	49997.000	149			
Corrected Total	1468.671	148			
a. R Squared = .051 (Adjusted R Squared = .031)					

4.16.2 To study the influence of type of school on efficacy to enlist community involvement of secondary school studies teachers.

On perusal of Table 4.48 it is evident that F-ratio 5.951 for influence of type of school on efficacy to enlist community involvement of secondary school social studies teachers with df (1, 145) was found to be significant ($p=0.016<0.05$) leading to the inference that type of school have a significant influence on efficacy to enlist community involvement of secondary school social studies teachers. Therefore, the null hypothesis H_0 14 (a), “There is no significant influence of Type of school on efficacy to

enlist community involvement of Secondary school social studies teachers” was rejected. Further, Table 4.46 shows the mean score of efficacy to enlist community involvement score of Government secondary school social studies teachers is 17.64, which is lower than that of Private secondary school social studies teachers whose mean score of efficacy to enlist community involvement is 19.12. It may therefore be said that Private secondary school social studies teachers were found to have higher efficacy to enlist community involvement as compared to Government secondary school social studies teachers.

4.16.3 To study the influence of locality of school on efficacy to enlist community involvement of secondary school social studies teachers

On perusal of the Table 4.48, it is clear that F-ratio=0.719 for influence of locality on efficacy to enlist community involvement of secondary school social studies teachers with df (1, 145) was found not to be significant ($p=0.398>0.05$) leading to the inference that locality of school does not influence efficacy to enlist community involvement of secondary school social studies teachers. Further, it indicates that the mean score of efficacy to enlist community involvement of secondary school social studies teachers working in rural and urban areas did not differ significantly. So, there was no significant influence of locality of school on efficacy to enlist community involvement. Therefore, the null hypothesis H_{014} (b), “There is no significant influence of Locality of school on efficacy to enlist community involvement of Secondary school social studies teachers” was not rejected. It may therefore be said that the teachers working in urban and rural area school were found to have efficacy to enlist community involvement to the same extent.

4.16.4 To study the interaction between Type of school and Locality on efficacy to enlist community involvement of secondary school social studies teachers

From the Table 4.48 it can be seen that the F-ratio 0.493 for interaction between Type of school and Locality with df (1, 145) was found not to be significant ($p=0.484>0.05$) leading to inference that mean score of efficacy to enlist community involvement of Government and Private schools social studies teachers teaching in schools situated in Urban and Rural area did not differ significantly. So there was no significant interaction between type of school and locality of school on efficacy to enlist community involvement of secondary school social studies teachers. Thus, the null hypothesis H_0 14 (c), “There is no significant influence of interaction between Type of school and Locality of school on efficacy to enlist community involvement of Secondary school social studies teachers” was not rejected. It may therefore be said that efficacy to enlist community involvement was found to be independent of interaction between type of school and locality. In order to know the trend of influence of interaction between type of school and locality of school on efficacy to enlist community involvement of secondary school social studies teachers, Figure 4.16 was plotted.

Figure 4.16

Estimated marginal means of efficacy to enlist community involvement

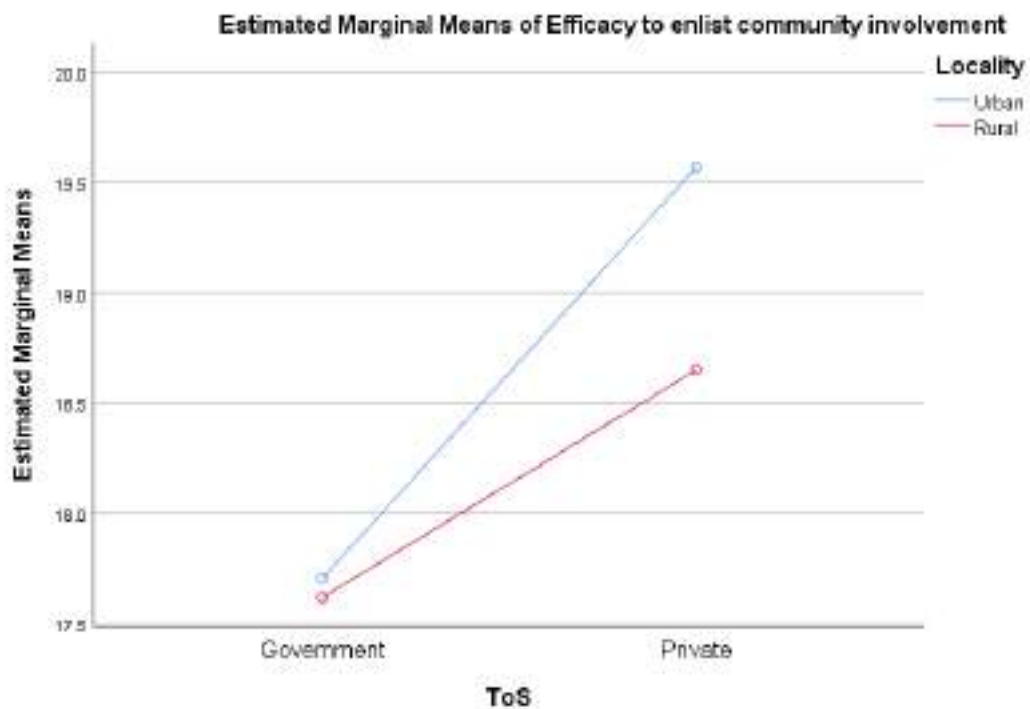


Figure 4.16 showing secondary school social studies teachers teaching in government secondary schools of rural area have lower mean score of efficacy to enlist community involvement in comparison to that of government secondary school social studies teachers teaching in urban area. While there is sharp increase in mean score of efficacy to enlist community involvement of private secondary school social studies teachers situated in urban and rural area in relation to government secondary school social studies teachers of urban and rural area. In addition to this, it is evident from figure 4.16 that secondary school social studies teachers teaching in private secondary schools of rural area have lower mean score of efficacy to enlist community involvement in comparison to that of private secondary school social studies teachers teaching in urban area.

4.17 Influence of Type of school, Locality of school and their interaction on Efficacy to create positive school climate of Secondary school social studies teachers.

Table 4.49

Descriptive statistics of efficacy to efficacy to create positive school climate

Descriptive Statistics						
Dependent Variable: Efficacy to create positive school climate						
ToS	Locality	Mean	Std. Deviation	N	Skewness	Kurtosis
Government	Urban	32.11	1.987	27		
	Rural	32.40	1.618	81		
	Total	32.32	1.712	108		
Private	Urban	31.00	1.924	21		
	Rural	32.15	1.531	20		
	Total	31.56	1.817	41		
Total	Urban	31.63	2.017	48		
	Rural	32.35	1.596	101		
	Total	32.11	1.769	149	-.257	-.003

4.17.1 Levene's Test of Homogeneity of Variance for Efficacy to create positive school climate

Table 4.50

Levene's Test of Homogeneity of Variance

F	df1	df2	P	Remarks
.583	3	145	.627	NS

Table no. 4.50 shows the value of Homogeneity of Variance where $p=.627>.05$. Therefore, assumption of homogeneity of variance was fulfilled.

Table 4.51

Summary of two way ANOVA for efficacy to create positive school climate of secondary school social studies teachers with respect to Type of School and Locality of school

Tests of Between-Subjects Effects					
Dependent Variable: Efficacy to create positive school climate					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	32.486a	3	10.829	3.647	.014
Intercept	110856.483	1	110856.483	37331.943	.000
ToS	12.511	1	12.511	4.213	.042
Locality	13.988	1	13.988	4.710	.032
ToS * Locality	5.102	1	5.102	1.718	.192
Error	430.575	145	2.969		
Total	154129.000	149			
Corrected Total	463.060	148			
a. R Squared = .070 (Adjusted R Squared = .051)					

4.17.2 To study the influence of type of school on efficacy to create positive school climate of secondary school studies teachers.

On perusal of Table 4.51 it is evident that F-ratio=4.213 for influence of type of school on efficacy to create positive school climate of secondary school social studies teachers with df (1, 145) was found to be significant ($p=0.042<0.05$) leading to the inference that type of school have a significant influence on efficacy to create positive school climate of secondary school social studies teachers. Therefore, the null hypothesis H_{015}

(a), “There is no significant influence of Type of school on efficacy to create positive school climate of Secondary school social studies teachers” was rejected. Further, Table 4.49 shows the mean score of efficacy to create positive school climate score of Government secondary school social studies teachers is 32.32, which is higher than that of Private secondary school social studies teachers whose mean score of efficacy to create positive school climate is 31.56. It may therefore be said that Private secondary school social studies teachers were found to have lower efficacy to create positive school climate as compared to Government secondary school social studies teachers.

4.17.3 To study the influence of locality of school on efficacy to create positive school climate of secondary school studies teachers.

On perusal of Table 4.51 it is evident that F-ratio=4.710 for influence of locality of school on efficacy to create positive school climate of secondary school social studies teachers with df (1, 145) was found to be significant ($p=0.032<0.05$) leading to the inference that locality of school have a significant influence on efficacy to create positive school climate of secondary school social studies teachers. Therefore, the null hypothesis H_0 15 (b), “There is no significant influence of Locality of school on efficacy to create positive school climate of Secondary school social studies teachers” was rejected. Further, Table 4.49 shows the mean score of efficacy to create positive school climate score of urban school social studies teachers is 31.63, which is lower than that of rural school social studies teachers whose mean score of efficacy to create positive school climate is 32.35. It may therefore be said that urban secondary school social studies teachers were found to have lower efficacy to create positive school climate as compared to rural secondary school social studies teachers.

4.17.4 To study the interaction between Type of school and Locality on efficacy to create positive school climate of secondary school social studies teachers

From the Table 4.51 it can be seen that the F-ratio=1.718 for interaction between Type of school and Locality with df (1, 145) was found not to be significant ($p=0.192>0.05$) leading to inference that mean score of efficacy to create positive school climate of Government and Private schools social studies teachers teaching in schools situated in Urban and Rural area did not differ significantly. So there was no significant interaction between type of school and locality of school on efficacy to create positive school climate of secondary school social studies teachers. Thus, the null hypothesis H_{015} (c), “There is no significant influence of interaction between Type of school and Locality of school on efficacy to create positive school climate of Secondary school social studies teachers” was not rejected. It may therefore be said that efficacy to create positive school climate was found to be independent of interaction between type of school and locality. In order to know the trend of influence of interaction between type of school and locality of school on efficacy to create positive school climate of secondary school social studies teachers, Figure 4.17 was plotted.

Figure 4.17

Estimated marginal means of efficacy to create positive school climate

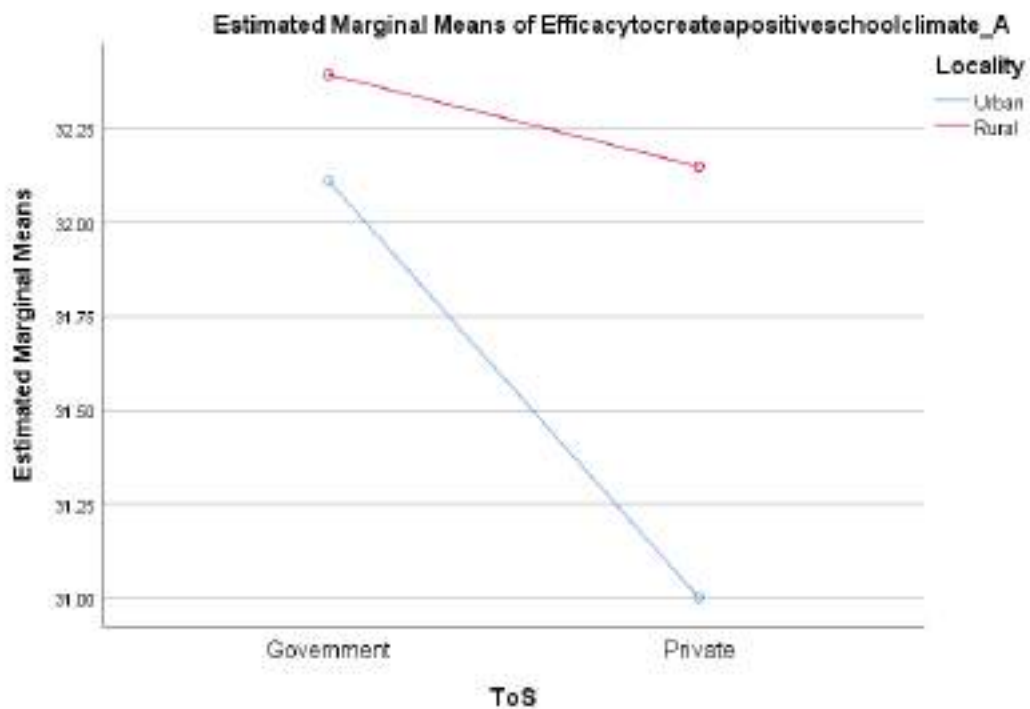


Figure 4.17 showing secondary school social studies teachers teaching in government secondary schools of rural area have higher mean score of efficacy to create positive school climate in comparison to that of government secondary school social studies teachers teaching in urban area. While there is sharp decrease in mean score of efficacy to create positive school climate of private secondary school social studies teachers situated in urban area in relation to government secondary school social studies teachers of urban area. In addition to this, it is evident from figure 4.17 that secondary school social studies teachers teaching in private secondary schools of rural area have higher mean score of efficacy to create positive school climate in comparison to that of private secondary school social studies teachers teaching in urban area.

4.18 Correlation between Self-efficacy of teachers and Total TPCK and its Dimensions

In order to study the correlation between Self-efficacy and TPCK along with its seven domains, Pearson Product Moment Correlation method was applied. The value of correlation coefficient for Self-efficacy and Total TPCK along with its domains are presented in Table 4.52.

Table 4.52

Correlation coefficient for Self-efficacy of teachers and Total TPCK along with its domain

S. N.	Self-efficacy of Teachers	TPCK and its domains	Correlation Coefficient	p-value.	Remarks
1.	Self-efficacy	Total TPCK	.291	.000	
2.		Technological Knowledge (TK)	.202	.013	
3.		Pedagogical Knowledge (PK)	.383	.000	
4.		Content Knowledge (CK)	.029	.728	
5.		Pedagogical Content Knowledge	.228	.005	

6.		Technological Content Knowledge	.048	.563	
7.		Technological Pedagogical Knowledge	.071	.390	
8.		Technological Pedagogical Content Knowledge (TPCK)	.021	.803	

On perusal of Table 4.52, it is evident that it is found to be significant positive correlation between Self-efficacy and Total TPCK, Technological Knowledge (TK), Pedagogical Knowledge (PK), Pedagogical Content Knowledge (PCK) at .05 level of confidence although the strength of correlation is low. Therefore, the null hypothesis H₀₁₆ “there is no significant correlation between self-efficacy and Total TPCK, Technological Knowledge (TK), Pedagogical Knowledge (PK), Pedagogical Content Knowledge (PCK)” were rejected. It may, therefore, be said that self-efficacy and Total TPCK, Technological Knowledge (TK), Pedagogical Knowledge (PK), Pedagogical Content Knowledge (PCK) were found to positively and significantly related while, null hypothesis H₀₁₆ “There is no significant correlation between self-efficacy and Content Knowledge (CK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK) and Technological Pedagogical Content Knowledge

(TPCK)” were not rejected. It may, therefore, be said self-efficacy and Content Knowledge (TK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK) and Technological Pedagogical Content Knowledge (TPCK) were found positive but not to be significantly co-related.

Chapter-5

Discussion, Findings, Conclusion,
Educational Implications and
Further Suggestions

Chapter V

Discussion, Findings, Conclusion, Educational implications and Further Suggestions

5.1 Discussion

In the present section, the results of the data analysis have been discussed. The aim of the study was to study the Technological Pedagogical Content Knowledge and Self-efficacy of secondary school social studies teachers. The results obtained from analysis of data have been found accepted some of the null hypothesis and rejected some of them.

The result of data analysis has been found to reject the hypothesis H_01 (a), “There is no significant influence of type of school on total TPCK of secondary school social studies teachers” which suggests that there is significance influence of government secondary schools and private secondary schools on total TPCK of secondary school social studies teachers. This finding suggests that based on government and private schools there is significance difference on total TPCK. Private secondary school social studies teachers were found to be better than Government schools with respect to their total TPCK. This may be because of various reasons like training programs, uses of smart classes, trained teachers, selection process and other benefits provided to their teachers. No previous research finding was encountered by the researcher to either support or reject this finding.

The analysis of data found to accept the hypothesis H_01 (b), “There is no significant influence of Locality on total TPCK of secondary school social studies teachers” which suggests that there is no significance influence of schools functioning in Urban and

Rural locality on total TPCK of secondary school social studies teachers. The reason behind this may be that social studies teachers teaching in Urban and Rural secondary schools are integrating technology in a similar manner. Electricity penetration and Internet coverage in both urban and rural areas may also be the reason behind it. No previous research finding was came across by the researcher to either support or reject this finding.

The analysis of data led to reject the null hypothesis H_{01} (c), “There is no significant influence of interaction between type of school and locality of school on total TPCK of Secondary school social studies teachers” which means total TPCK of government and private schools social studies teachers teaching in school situated in urban and rural area have same level. The reason behind this may be the same level of opportunities being provided. The investigator did not find any previous study to either confirm or disconfirm this finding.

The result of data analysis led to reject the null hypothesis H_{02} (a), “There is no significant influence of Type of school on Technological Knowledge of Secondary school social studies teachers” which means Technological Knowledge of government and private secondary school social studies teachers significantly influenced by Type of school. Private secondary school social studies teachers were found to be better Technological Knowledge as compare to Government secondary school social studies teachers. This may be because of better facilities being provided in the private schools.

An analysis of data suggested not to reject the null hypothesis H_{02} (b), “There is no significant influence of Locality of school on Technological Knowledge of Secondary school social studies teachers” which means secondary school social studies teachers

teaching in urban or rural area school were found to have same extent of Technological Knowledge. The reason behind this may be same level of facilities, services, and opportunities being provided to the secondary school social studies teachers.

The result of data analysis led to accept the null hypothesis H₀₂ (c), “There is no significant influence of interaction between Type of school and Locality of school on Technological Knowledge of Secondary school social studies teachers” which means that mean score of TK of Government and Private schools social studies teachers teaching in school situated in Urban and Rural area did not differ significantly.

The outcome of data analysis led to accept the null hypothesis H₀₃ (a), “There is no significant influence of Type of school on Pedagogical Knowledge of Secondary school social studies teachers” which means teachers working in government and private schools were found to have Pedagogical Knowledge to the same extent. The reason behind it may be that both government and private secondary school social studies teachers have similar way of teaching social studies.

The analysis of data headed to accept the null hypothesis H₀₃ (b), “There is no significant influence of Locality of school on Pedagogical Knowledge of Secondary school social studies teachers” which means teachers teaching in urban and rural area schools were found to have same extent of Pedagogical Knowledge. Locality of school does not influence the way of teaching social studies.

The analysis of data led to accept the null hypothesis H₀₃ (c), “There is no significant influence of interaction between Type of school and Locality of school on Pedagogical Knowledge of Secondary school social studies teachers” which indicates that mean score of PK of Government and Private secondary schools social studies teachers

teaching in school situated in urban and rural area did not differ significantly. The investigator did not find any previous study to either confirm or disconfirm this finding.

The analysis of data led to reject the null hypothesis H_04 (a), “There is no significant influence of Type of school on Content Knowledge of Secondary school social studies teachers” which indicates that type of school had significant influence on secondary school social studies teachers content knowledge. Government secondary school social studies teachers were found to have higher mean score of Content Knowledge as compared to private secondary school social studies teachers. The reason behind this may be the selection process, various in-service training programs, and subject specific programs etc. which are being provided to government secondary school teachers.

The analysis of data led to accept the null hypothesis H_04 (b), “There is no significant influence of Locality of school on Content Knowledge of Secondary school social studies teachers” which means locality of school does not have significant influence on Content Knowledge of secondary school social studies teachers. Secondary school social studies teachers working in rural or urban area had same extent of Content Knowledge of social studies.

The analysis of data led to reject the null hypothesis H_04 (c), “There is no significant influence of interaction between Type of school and Locality of school on Content Knowledge of Secondary school social studies teachers” which means that mean score of Content Knowledge of government and private schools secondary school social studies teachers teaching in urban and rural area differs significantly.

The analysis of data led to accept the null hypothesis H_05 (a), “There is no significant influence of Type of school on Pedagogical Content Knowledge of Secondary school

social studies teachers” which means type of school had no significant influence on Pedagogical Content Knowledge of secondary school social studies teachers. In other words, government and private secondary school social studies teachers were found to have same extent of Pedagogical Content Knowledge.

The analysis of data led to accept the null hypothesis H_{05} (b), “There is no significant influence of Locality of school on Pedagogical Content Knowledge of Secondary school social studies teachers” which means locality of school had no significant influence on Pedagogical Content Knowledge of secondary school social studies teachers teaching rural and urban area.

An analysis of data led to accept the null hypothesis H_{05} (c), “There is no significant influence of interaction between Type of school and Locality of school on Pedagogical Content Knowledge of Secondary school social studies teachers” which means secondary school social studies teachers of government or private schools teaching in urban or rural area were found to have same extent of Pedagogical Content Knowledge.

The analysis of data led to reject the null hypothesis H_{06} (a), “There is no significant influence of Type of school on Technological Content Knowledge of Secondary school social studies teachers” which means type of school had significant influence on Technological Content Knowledge of secondary school social studies teachers. Private secondary school social studies teachers were found to have higher Technological Content Knowledge as compared to Government secondary school social studies teachers. The reason behind this may be facilities being provided in private schools are better than government schools.

The analysis of data led to accept the null hypothesis H₀₆ (b), “There is no significant influence of Locality of school on Technological Content Knowledge of Secondary school social studies teachers” which means locality of school had no significance influence on Technological Content Knowledge of secondary school social studies teachers. Secondary school social studies teachers teaching in rural and urban schools were found to have same extent of Technological Pedagogical Knowledge.

The analysis of data led to accept the the null hypothesis H₀₆ (c), “There is no significant influence of interaction between Type of school and Locality of school on Technological Content Knowledge of Secondary school social studies teachers” which means that mean score of Technological Content Knowledge of Government and Private secondary schools social studies teachers did not differ significantly with locality of school.

The analysis of data led to reject the null hypothesis H₀₇ (a), “There is no significant influence of Type of school on Technological Pedagogical Knowledge of Secondary school social studies teachers” which means type of school had significant influence on Technological Pedagogical Knowledge of secondary school social studies teachers. Private secondary school social studies teachers were found to have higher Technological Pedagogical Knowledge as compared to government secondary school social studies teachers. This finding was supported by the study conducted by Prakash and Hooda (2018) who found that private school teachers had better technological pedagogical competency than the government school teachers.

The analysis of data suggested to accept the null hypothesis H₀₇ (b), “There is no significant influence of Locality of school on Technological Pedagogical Knowledge

of Secondary school social studies teachers” which means locality of school had no significant influence on Technological Pedagogical Knowledge of secondary school social studies teachers. Secondary school social studies teachers teaching in rural or urban area school were found to have same extent of Technological Pedagogical Knowledge. This finding was in contradiction with the finding of Prakash and Hooda (2018) who found significance differences in mean score of Technological Pedagogical Competency between rural and urban school teachers.

The analysis of data led to accept the null hypothesis H_{07} (c), “There is no significant influence of interaction between Type of school and Locality of school on Technological Pedagogical Knowledge of Secondary school social studies teachers” which means that mean score of TPK of Government and Private schools social studies teachers did not differ significantly with locality of school. No previous study was encountered by the researcher to confirm or disconfirm this finding.

The result of the data analysis has been found to accept the null hypothesis H_{08} (a), “There is no significant influence of Type of school on Technological Pedagogical Content Knowledge of Secondary school social studies teachers” which means that type of school had no significant influence on Technological Pedagogical Content Knowledge of secondary school social studies teachers. Mean score of Technological Pedagogical Content Knowledge of secondary school social studies teachers working in government and private school did not differ significantly. This findings was in contradiction with the finding of Beri and Sharma (2019) who found that type of institutions influence the Technological Pedagogical Content Knowledge.

The result of the data analysis has been found to accept the null hypothesis H₀₈ (b), “There is no significant influence of Locality of school on Technological Pedagogical Content Knowledge of Secondary school social studies teachers” which means locality of school had no significant influence on Technological Pedagogical Content Knowledge of secondary school social studies teachers. Mean score of Technological Pedagogical Content Knowledge of secondary school social studies teachers working in rural and urban schools did not differ significantly. This finding was in contradiction to the finding of Beri and Sharma (2019) who found that locality of institutions influence the Technological Pedagogical Content Knowledge.

The analysis of data led to accept the null hypothesis H₀₈ (c), “There is no significant influence of interaction between Type of school and Locality of school on Technological Pedagogical Content Knowledge of Secondary school social studies teachers” which means that mean score of Technological Pedagogical Content Knowledge of Government and Private schools social studies teachers teaching in school situated in Urban and Rural area did not differ significantly. Investigator did not find any previous study to either confirm or disconfirm this finding.

The result of the data analysis led to accept the null hypothesis H₀₉ (a), “There is no significant influence of Type of school on Self-efficacy of Secondary school social studies teachers” which means type of school had no significant influence on self-efficacy of secondary school social studies teachers. It shows that the mean score of self-efficacy of secondary school social studies teachers working in government and private school did not differ significantly. This finding was in contradiction with the study conducted by Kumar and Papaiah (2012) who found that type of school had

significant influence on self-efficacy of high school teachers. Punia and Kaushik (2012) also found that there were significant differences in self-efficacy between government and private school teachers.

An analysis of data led to accept the null hypothesis H₀₉ (b), “There is no significant influence of Locality of school on Self-efficacy of Secondary school social studies teachers” which means locality of school had no significant influence on self-efficacy of secondary school social studies teachers. This finding was in line with the study conducted by Byrd (2002) who found that locality of school had no significant influence on self-efficacy of teachers.

The result of data analysis led to accept the null hypothesis H₀₉ (c), “There is no significant influence of interaction between Type of school and Locality of school on Self-efficacy of Secondary school social studies teachers” which means that mean score of self-efficacy of Government and Private schools social studies teachers teaching in school situated in Urban and Rural area did not differ significantly. No previous study was found to either confirm or disconfirm this finding.

The result of data analysis led to reject the null hypothesis H₀₁₀ (a), “There is no significant influence of Type of school on efficacy to influence decision making of Secondary school social studies teachers” which means type of school had significant influence on efficacy to influence decision making of secondary school social studies teachers. Private secondary school social studies teachers were found to have lower efficacy to influence decision making as compared to Government secondary school social studies teachers. The reason behind this may be government school teachers are

getting more opportunities to participate in decision making process. No previous study found by the investigator to either confirm or disconfirm this finding.

The analysis of data led to accept the null hypothesis H_0 10 (b), “There is no significant influence of Locality of school on efficacy to influence decision making of Secondary school social studies teachers” which means locality of school had no significant influence on efficacy to influence decision making of secondary school social studies teachers. Teachers working in urban and rural area school were found to have efficacy to influence decision making to the same extent. The researcher did not encountered with any previous study which confirm or disconfirm this finding.

The analysis of data led to accept the null hypothesis H_0 10 (c), “There is no significant influence of interaction between Type of school and Locality of school on efficacy to influence decision making of Secondary school social studies teachers” which suggests that mean score of efficacy to influence decision making of Government and Private schools social studies teachers teaching in school situated in Urban and Rural area did not differ significantly. No previous study was found to either support or contradict this finding.

The analysis of data led to reject the null hypothesis H_0 11 (a), “There is no significant influence of Type of school on instructional self-efficacy of Secondary school social studies teachers” which means type of school had significant influence on instructional self-efficacy of secondary school social studies teachers. Private secondary school social studies teachers were found to have lower instructional self-efficacy as compared to Government secondary school social studies teachers. The investigator did not find any previous study to either confirm or disconfirm the present finding.

The analysis of data led to accept the null hypothesis H₀₁₁ (b), “There is no significant influence of Locality of school on instructional self-efficacy of Secondary school social studies teachers” which means locality of school had no significant influence on instructional self-efficacy of secondary school social studies teachers. Teachers working in urban and rural areas school were found to have instructional self-efficacy to the same extent.

The result of the data analysis found to accept the null hypothesis H₀₁₁ (c), “There is no significant influence of interaction between Type of school and Locality of school on instructional self-efficacy of Secondary school social studies teachers” which means that mean score of instructional self-efficacy of Government and Private schools social studies teachers teaching in schools situated in Urban and Rural area did not differ significantly. The investigator did not find any previous study to either support or contradict this finding.

The analysis of data found to accept the null hypothesis H₀₁₂ (a), “There is no significant influence of Type of school on disciplinary self-efficacy of Secondary school social studies teachers” which means type of school had no significant influence on disciplinary self-efficacy of secondary school social studies teachers. Secondary school social studies teachers working in government and private school were found to have same extent of disciplinary self-efficacy. No empirical evidence was encountered to confirm or disconfirm with this finding.

The analysis of data found to accept the null hypothesis H₀₁₂ (b), “There is no significant influence of Locality of school on disciplinary self-efficacy of Secondary school social studies teachers” which means locality of school had no significant

influence on disciplinary self-efficacy of secondary school social studies teachers. Secondary school social studies teachers working in urban or rural area schools were found to have same extent of disciplinary self-efficacy.

The analysis of data led to accept the null hypothesis H_{012} (c), “There is no significant influence of interaction between Type of school and Locality of school on disciplinary self-efficacy of Secondary school social studies teachers” which means that mean score of disciplinary self-efficacy of Government and Private schools social studies teachers teaching in schools situated in Urban and Rural area did not differ significantly. No previous study found to support or contradict this finding.

The analysis of data found to reject the null hypothesis H_{013} (a), “There is no significant influence of Type of school on efficacy to parental involvement of Secondary school social studies teachers” which means type of school had significant influence on efficacy to parental involvement of secondary school social studies teachers. Private secondary school social studies teachers were found to have higher efficacy to parental involvement as compared to government secondary school social studies teachers. The reason behind this may be private school teachers regularly interact with parents of the students. No previous study was found by the investigator to either confirm or disconfirm this finding.

The analysis of data led to accept the null hypothesis H_{013} (b), “There is no significant influence of Locality of school on efficacy to parental involvement of Secondary school social studies teachers” which means locality of school had no significant influence on efficacy to parental involvement of secondary school social studies teachers. Mean score of efficacy to parental involvement of secondary school social studies teachers

working in rural and urban areas did not differ significantly. Investigator did not encounter any previous study to either support or contradict.

The analysis of data suggested to reject the null hypothesis H_{013} (c), “There is no significant influence of interaction between Type of school and Locality of school on efficacy to parental involvement of Secondary school social studies teachers” which means mean score of efficacy to parental involvement of government and private schools social studies teachers differs with locality of the school. The investigator did not find any previous study to support or contradict this finding.

The analysis of data found to reject the null hypothesis H_{014} (a), “There is no significant influence of Type of school on efficacy to enlist community involvement of Secondary school social studies teachers” which means type of school had significant influence on efficacy to enlist community involvement of secondary school social studies teachers. Private secondary school social studies teachers were found to have higher efficacy to enlist community involvement as compared to Government secondary school social studies teachers. The reason behind this may be private school teachers continuously interacted with community members.

The analysis of data found to accept the null hypothesis H_{014} (b), “There is no significant influence of Locality of school on efficacy to enlist community involvement of Secondary school social studies teachers” which means locality of school had no significant influence on efficacy to enlist community involvement of secondary school social studies teachers. Teachers working in rural or urban schools had same extent of efficacy to enlist community involvement. The investigator did not find any previous study to either support or contradict this finding.

The analysis of data led to accept the the null hypothesis H_{014} (c), “There is no significant influence of interaction between Type of school and Locality of school on efficacy to enlist community involvement of Secondary school social studies teachers” which means that mean score of efficacy to enlist community involvement of Government and Private schools social studies teachers teaching in schools situated in Urban and Rural area did not differ significantly.

The analysis of data found to reject the null hypothesis H_{015} (a), “There is no significant influence of Type of school on efficacy to create positive school climate of Secondary school social studies teachers” which means type of school had significant influence on efficacy to create positive school climate of secondary school social studies teachers. Private secondary school social studies teachers were found to have lower efficacy to create positive school climate as compared to Government secondary school social studies teachers. The investigator did not find any previous study to confirm or disconfirm this finding.

The analysis of data found to reject the null hypothesis H_{015} (b), “There is no significant influence of Locality of school on efficacy to create positive school climate of Secondary school social studies teachers” which means locality of school had significant influence on efficacy to create positive school climate of secondary school social studies teachers. Urban secondary school social studies teachers were found to have lower efficacy to create positive school climate as compared to rural secondary school social studies teachers.

The analysis of data led to accept the null hypothesis H_{015} (c), “There is no significant influence of interaction between Type of school and Locality of school on efficacy to

create positive school climate of Secondary school social studies teachers” which means that mean score of efficacy to create positive school climate of Government and Private schools social studies teachers teaching in schools situated in Urban and Rural area did not differ significantly. The researcher did not find any previous study to either confirm or disconfirm this finding.

5.2 Findings of the study

- Secondary school social studies teachers had average level of Total Technological Pedagogical Content Knowledge.
- Type of school had significant influence on Total Technological Pedagogical Content Knowledge of Secondary school social studies teachers
- Private secondary school social studies teachers were found to have higher Total Technological Pedagogical Content Knowledge as compared to Government secondary school social studies teachers.
- Locality of the school had no significant influence on Total Technological Pedagogical Content Knowledge of Secondary school social studies teachers.
- Secondary school social studies teachers working in urban and rural areas schools were found to have same extent of total Technological Pedagogical Content Knowledge.
- Type of school and Locality of school had no significant interaction influence on Total Technological Pedagogical Content Knowledge of Secondary school social studies teachers.

- Mean score of total Technological Pedagogical Content Knowledge of Government and Private school social studies teachers teaching in schools situated in urban and rural area did not differ significantly.
- Type of school had significant influence on Technological Knowledge (TK) of Secondary school social studies teachers.
- Private secondary school social studies teachers were found to have higher Technological Knowledge (TK) as compared to Government secondary school social studies teachers.
- Locality of school had no significant influence on Technological Knowledge (TK) of Secondary school social studies teachers.
- Secondary school social studies teachers working in urban and rural area schools were found to have same extent of Technological Knowledge (TK).
- Type of school and Locality of school had no significant interaction influence on Technological Knowledge (TK) of Secondary school social studies teachers.
- Mean score of Technological Knowledge (TK) of Government and Private school social studies teachers teaching in schools situated in urban and rural area did not differ significantly.
- Type of school had no significant influence on Pedagogical Knowledge (PK) of Secondary school social studies teachers.
- Secondary school social studies teachers working in Government and Private schools were found to have same extent of Pedagogical Knowledge (PK).
- Locality of school had no significant influence on Pedagogical Knowledge (PK) of Secondary school social studies teachers.

- Secondary school social studies teachers working in urban and rural area schools were found to have same extent of Pedagogical Knowledge (PK).
- Type of school and Locality of school had no significant interaction influence on Pedagogical Knowledge (PK) of Secondary school social studies teachers.
- Mean score of Pedagogical Knowledge (PK) of Government and Private school social studies teachers teaching in schools situated in urban and rural area did not differ significantly.
- Type of school had significant influence on Content Knowledge (CK) of Secondary school social studies teachers.
- Government secondary school social studies teachers were found to have higher Content Knowledge (CK) as compared to Private secondary school social studies teachers.
- Locality of school had no significant influence on Content Knowledge (CK) of Secondary school social studies teachers.
- Type of school and locality of school had significant interaction influence on Content Knowledge (CK) of Secondary school social studies teachers.
- Mean score of Content Knowledge (CK) of government and private schools social studies teachers differs with locality of the school.
- Type of school had no significant influence on Pedagogical Content Knowledge (PCK) of Secondary school social studies teachers.
- Locality of school had no significant influence on Pedagogical Content Knowledge (PCK) of Secondary school social studies teachers.

- Type of school and Locality of school had no significant interaction influence on Pedagogical Content Knowledge (PCK) of Secondary school social studies teachers.
- Type of school had significant influence on Technological Content Knowledge (TCK) of Secondary school social studies teachers.
- Private secondary school social studies teachers was found to have higher Technological Content Knowledge as compared to Government secondary school social studies teachers.
- Locality of school had no significant influence on Technological Content Knowledge (TCK) of Secondary school social studies teachers.
- Type of school and Locality of school had no significant interaction influence on Technological Content Knowledge (TCK) of Secondary school social studies teachers.
- Type of school had significant influence on Technological Pedagogical Knowledge (TPK) of Secondary school social studies teachers.
- Private secondary school social studies teachers were found to have higher Technological Pedagogical Knowledge (TPK) as compared to government secondary school social studies teachers.
- Locality of school had no significant influence on Technological Pedagogical Knowledge (TPK) of Secondary school social studies teachers.
- Type of school and Locality of school had no significant interaction influence on Technological Pedagogical Knowledge (TPK) of Secondary school social studies teachers.

- Type of school had no significant influence on Technological Pedagogical Content Knowledge of Secondary school social studies teachers.
- Locality of school had no significant influence on Technological Pedagogical Content Knowledge of Secondary school social studies teachers.
- Type of school and Locality of school had no significant interaction influence on Technological Pedagogical Content Knowledge of Secondary school social studies teachers.
- Secondary school social studies teachers had average level of Self-efficacy.
- Type of school had no significant influence on Self-efficacy of Secondary school social studies teachers.
- Locality of school had no significant influence on Self-efficacy of Secondary school social studies teachers.
- Type of school and Locality of school had no significant interaction influence on Self-efficacy of Secondary school social studies teachers.
- Type of school had significant influence on Efficacy to influence decision making of Secondary school social studies teachers.
- Mean score of Government secondary school social studies teachers were found to have higher Efficacy to influence decision making as compared to Private secondary school social studies teachers.
- Locality of school had no significant influence on Efficacy to influence decision making of Secondary school social studies teachers.
- Type of school and Locality of school had no significant interaction influence on Efficacy to influence decision making of Secondary school social studies teachers.

- Type of school had significant influence on Instructional self-efficacy of Secondary school social studies teachers.
- Government secondary school social studies teachers had higher mean score of Instructional self-efficacy as compared to Private secondary school social studies teachers.
- Locality of school had no significant influence on Instructional self-efficacy of Secondary school social studies teachers.
- Type of school and Locality of school had no significant interaction influence on Instructional self-efficacy of Secondary school social studies teachers.
- Type of school had no significant influence on Disciplinary self-efficacy of Secondary school social studies teachers.
- Locality of school had no significant influence on Disciplinary self-efficacy of Secondary school social studies teachers.
- Type of school and Locality of school had no significant interaction influence on Disciplinary self-efficacy of Secondary school social studies teachers.
- Type of school had significant influence on Efficacy to Parental involvement of Secondary school social studies teachers.
- Private secondary school social studies teachers were found to have higher Efficacy to Parental involvement as compared to Government secondary school social studies teachers.
- Locality of school had no significant influence on Efficacy to Parental involvement of Secondary school social studies teachers.
- Type of school and Locality of school had significant interaction influence on Efficacy to Parental involvement of Secondary school social studies teachers.

- Type of school had significant influence on Efficacy to enlist community involvement of Secondary school social studies teachers.
- Private secondary school social studies teachers were found to have higher Efficacy to enlist community involvement as compared to Government secondary school social studies teachers.
- Locality of school had no significant influence on Efficacy to enlist community involvement of Secondary school social studies teachers.
- Type of school and Locality of school had no significant interaction influence on Efficacy to enlist community involvement of Secondary school social studies teachers.
- Type of school had significant influence on Efficacy to create positive school climate of Secondary school social studies teachers.
- Private secondary school social studies teachers were found to have lower Efficacy to create positive school climate as compared to Government secondary school social studies teachers.
- Locality of school had significant influence on Efficacy to create positive school climate of Secondary school social studies teachers.
- Urban secondary school social studies teachers were found to have lower Efficacy to create positive school climate as compared to rural secondary school social studies teachers.
- Type of school and Locality of school had no significant interaction influence on Efficacy to create positive school climate of Secondary school social studies teachers.

- Significant positive correlation was found between self-efficacy and Total Technological Pedagogical Content Knowledge, Technological Knowledge, Pedagogical Knowledge, Pedagogical Content Knowledge.

5.3 Conclusions

Writing conclusion is one of the important part of the research report as it arranges everything together. The present research was directed to study the Technological Pedagogical Content Knowledge and Self-efficacy of secondary school social studies teachers with respect to type of school and locality of school. It was started to examine the Technological Pedagogical Content Knowledge and Self-efficacy of secondary school social studies teachers. Influence of type of school, locality of school and their interaction were examined both domain wise and as a total. Secondary school social studies teachers were found to have an average level of total technological pedagogical content knowledge and self-efficacy.

Influence of type of school were found to be significant in the case of total technological pedagogical content knowledge, Technological Knowledge, Content Knowledge, Technological Content Knowledge, Technological Pedagogical Knowledge, Efficacy to influence decision making, instructional self-efficacy, Efficacy to parental involvement, Efficacy to enlist community involvement and, Efficacy to create positive school climate, while influence of type of school were found not to be significant in the case of Pedagogical Knowledge, Pedagogical Content Knowledge, Technological Pedagogical Content Knowledge, Self-efficacy and Disciplinary self-efficacy.

Influence of locality of school was found to be significant in the case of Efficacy to create positive school climate only while influence of locality of school was found not

to be significant in the case of total Technological Pedagogical Content Knowledge, Technological Knowledge, Pedagogical Knowledge, Content Knowledge, Pedagogical Content Knowledge, Technological Content Knowledge, Technological Pedagogical Knowledge, Technological Pedagogical Content Knowledge, Self-efficacy, Efficacy to influence decision making, Instructional self-efficacy, Disciplinary self-efficacy, Efficacy to parental involvement and, Efficacy to enlist community involvement.

Significant interaction influence of type of school and locality of school was reported with Content Knowledge and Efficacy to parental involvement while, No significant interaction influence of type of school and locality of school was reported with total Technological Pedagogical Content Knowledge, Technological Knowledge, Pedagogical Knowledge, Pedagogical Content Knowledge, Technological Content Knowledge, Technological Pedagogical Knowledge, Technological Pedagogical Content Knowledge, Efficacy to influence decision making, Instructional self-efficacy, Disciplinary self-efficacy, Efficacy to enlist community involvement and efficacy to create positive school climate.

Self-efficacy of teacher had positive correlation with all the domain of Technological Pedagogical Content Knowledge, however, significant positive correlation was found between self-efficacy and total Technological Pedagogical Content Knowledge, Technological Knowledge, Pedagogical Knowledge and Pedagogical Content Knowledge only.

5.4 Educational implications of the study

Findings of the research has very important and substantial implications in school education, teacher education in general and in social studies particular. The key

variables of research were Technological Pedagogical Content Knowledge (TPCK) and Self-efficacy of social studies teachers which are the pivotal determinants of the quality school education. The research work can be treated as worthwhile when it produces such information which plays significant role in improving the existing educational practices in a positive way. It is not considered as effective unless it brings implications for existing practices. The findings of the present investigation provide some significant educational implications for respective stakeholders.

The findings of the investigation revealed that secondary school social studies teachers had an average level of total technological pedagogical content knowledge. This cannot be a good sign for any effective educational system. Therefore, in order to improve the level of technological pedagogical content knowledge of secondary school social studies teachers, teachers need to be given attentions. They should be provided such facilities which can play significant role to develop their professional skills. Teachers are one of the important assets of a country. They play significant role in the development of a nation. Therefore, their strengthening of professional skills lie on policy makers of a nation. To improve their technological pedagogical content knowledge, they need to be provided different types of training programs like workshops, refresher courses, online programs, technology integrated sessions etc. Teachers should have knowledge of emerging technologies and their integration in teaching-learning process.

In relation to Technological Pedagogical Content Knowledge (TPCK), there is requirement of Research and Development (R&D) cell at district level which can provide, facilitate, monitor and organise the professional development programs

focused on TPCK. The R&D cell should share technological breakthroughs with different stake holders like policy makers, teachers, teacher educator institutions, etc. so that integration of domain knowledge may get effective.

Various Information and Communication Technology based programs like, DIKSHA, NISHTHA, UNNAYAN etc. are being run by Central and State governments in school education. To be effective such programs, it widely depends on teachers' technological pedagogical content knowledge. Respective government need to provide such training programs to teachers having low and average level of total Technological Pedagogical Content Knowledge so that these programs can achieve their objectives.

In line with the objectives of National Education Policy 2020, teachers need to be able to integrated technology into teaching and learning activities. For this very purpose it is vital to have high level of Technological Pedagogical Content Knowledge. New paradigm led teachers to adopt Artificial Intelligence, Machine Learning etc. technologies. Hence, teachers need to be provided Pre-service and In-service training to integrate technology with the teaching learning process.

Influence of type of school was found to be significant with total technological pedagogical content knowledge, Technological Knowledge, Content Knowledge, Technological Content Knowledge and, Technological Pedagogical Knowledge. Private secondary school social studies teachers were found to be better mean score on above domains. As most of students enrolled in government schools, Therefore, Government secondary school social studies teachers need to be provided better facilities, in-service training programs, refresher courses etc. so that they can compete with private school teachers in the above knowledge domains. Case studies and action

research may be conducted to identify the problems. Government should provide such programs where they may interact with private school social studies teachers.

Locality of school was not found to be significant with total Technological Pedagogical Content Knowledge and its domains. This is good sign because teachers working in urban and rural secondary schools do not get influenced by locality. It shows that teachers working in either urban or rural schools have positive attitude towards their professional commitments. This is good for different stake holders as they will have similar type of teachers having similar level of TPACK irrespective of locality.

The findings of the study indicated that secondary school social studies teachers had an average level of self-efficacy. Which is not a good indication for any educational system. Self-efficacy of teacher plays vital role in teaching learning activities. So it is necessary to take it into the consideration for planning the strategy for strengthen the self-efficacy of secondary school social studies teachers. There are several sources for increasing self-efficacy which are mastery experiences in which, one can gets expertise by performing the similar task; observing others work i.e., vicarious learning; verbal or social persuasion; and somatic and emotional states.

Teachers should be given opportunities to get involved such training programs in which they can participate in interesting and challenging tasks, they should be given opportunity to interact with those people who have expertise in their field, teachers may get motivated when someone encourages them in training programs. In-service training programs can include various strategies so that teachers may express their skills freely. Although it has been established that self-efficacy plays significant role in teacher

effectiveness, hardly any teacher training programs given proper attention on the development of self-efficacy of teacher.

There are many issues which are being faced by teachers which lead to anxiety. Some of them due to management of school and locality of school, etc. If teachers are depressed about their career, it is sure that they will not be able to perform their activities properly. Concerned body need to take care of those things which creates anxiety in teachers mind. They should not have depressing thoughts or anxiety, otherwise even if well trained, they will not be effective in their profession.

However, type of school had no significant influence on self-efficacy of secondary school social studies teachers which means government schools and private schools social studies teachers have similar level of self-efficacy of teaching social science yet, both the group are lacking high self-efficacy. Respective body need to take it into consideration to increase their self-efficacy.

Self-efficacy of teachers had positive moderate correlation with all the domains of technological pedagogical content knowledge. This indicates that higher the self-efficacy higher the integration of technology with pedagogy and content knowledge. Thus, proper focus should be given by respective management of schools to increase the level of self-efficacy. This will ultimately help the learners to achieve their learning objectives.

Before the appointment of secondary school social studies teachers, a separate test may be conducted to check the level of Technological Pedagogical Content Knowledge and Self-efficacy for quality education at secondary school level.

Teachers with high Technological Pedagogical Content Knowledge and Self-efficacy may be engaged with the Teacher Education Institutions. Teachers to share their real and field practices which are found effective. Teacher Education Institutions should conduct case studies to diagnose the teachers having low Technological Pedagogical Content Knowledge and Self-efficacy.

5.5 Further suggestions

No research study can be perfect keeping the feasibility aspect of the study. Similar to other studies this study too was delimited to some certain manner. The investigator came to know some other gap during the present investigation which can be investigated in future studies. Following suggestions can be helpful to fill the gap identified in the present study.

- The present investigation was conducted on secondary school teachers. Similar type of investigation may be conducted on Primary school teachers, senior secondary school teachers etc.
- This study was conducted on social studies teachers. Similar study may be carried on science teachers, language teachers etc.
- The present study was conducted on in-service teachers, similar studies may be conducted on pre-service teachers.
- In the present study, only two categorical variables- type of school and locality of school were considered. Similar studies can be conducted with some other categorical variables like, gender, teaching experience, etc.

- The present investigation was conducted on only affiliated to BSEB and CBSE board schools, similar type of studies may be carried on ICSE, BSMEB affiliated schools etc.
- This study was delimited to Darbhanga district of Bihar only. Similar studies may be extended to other districts, commissionerary etc.
- This study was conducted on 149 secondary school social studies teachers only. Similar studies can be conducted on larger sample of teachers for in-depth knowledge.
- This study was based on self-reported assessment by secondary school social studies teachers. It is suggested to conduct observational or different appropriate technique for further study.
- Studies can be conducted to identify factors which are helpful for developing Technological Pedagogical Content Knowledge and Self-efficacy of teachers.
- This study was descriptive survey method, but experimental research method may be conducted in further researches.

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Appendices

Secondary School Social Studies Teachers' TPCCK Scale

प्रिय शिक्षकगण,

इस प्रश्नावली का निर्माण माध्यमिक स्कूलों में कार्यरत सामाजिक अध्ययन के शिक्षकों के Technological Pedagogical Content Knowledge (TPCK) को जानने के लिए किया गया है। आपके जवाबों का उपयोग केवल इस अनुसंधान के उद्देश्यों के लिए किया जाएगा। आपकी पहचान और आपकी प्रतिक्रियाओं को गोपनीय रखा जाएगा। इस अनुसंधान के उद्देश्यों की पूर्ति के लिए आपका ईमानदारी पूर्वक दिया हुआ जवाब अत्यंत जरूरी है। आपका कोई भी जवाब सही या गलत नहीं है बल्कि ये केवल आपके उस संबंधित जानकारी की सतह को बताता है, इसलिए कृपया करके सभी कथनों का ईमानदारी से, दिये गए माप (Scale) जहां (1) पूर्णतः असहमत (2) असहमत (3) अनिश्चित (4) सहमत (5) पूर्णतः सहमत, को दर्शाता है पर चिन्ह लगा कर अपनी प्रतिक्रिया दें

नाम:.....लिंग: पुरुष महिला:

विद्यालय का प्रकार: सरकारी प्राइवेट

विद्यालय का नाम:

शैक्षणिक योग्यता :

विद्यालय में आप कौन विषय पढ़ाते हैं?.....

WhatsApp नंबर:

क्या आपके स्कूल में कंप्यूटर लैब है। हाँ नहीं

शिक्षण अनुभव : 0 से 5 वर्ष 5 से 10 वर्ष 10 से 15 वर्ष 15 से 20 वर्ष 20 वर्ष से अधिक

	Technological Knowledge	पूर्णतः असहमत	असहमत	अनिश्चित	सहमत	पूर्णतः सहमत
01	वर्ड प्रोसेसर (Word Processor) की मदद से मैं वर्णात्मक कार्य (पत्र लेखन, teaching Note लेखन etc) कर सकता/सकती हूँ।					
02	मुझे Internet जैसे, Google search, mail, संबंधित कार्य की जानकारी है।					
03	मुझे इंटरनेट पर उपलब्ध शिक्षण सामग्री तक पहुंच का ज्ञान है।					
04	सूचनाओं को जमा रखने में उपयुक्त होने वाले ICT (उपकरण) (Pen Drive, Hard Disk, CD) का उपयोग करना मुझे आता है।					
05	मुझे कम्प्यूटर Hardware जैसे, Printer, Digital Camera, Scanner से संबंधित कार्य की जानकारी है।					
06	मुझे Online माध्यम जैसे Google Meet, Zoom etc. के द्वारा Online Class लेने की जानकारी है।					
07	मैं Social Networking Platform जैसे Messenger, WhatsApp, Telegram, Twitter की मदद से ग्रुप बना कर छात्रों को जोड़ सकता/सकती हूँ।					
08	मुझे Digital Teaching Device (Smart Board) पर शैक्षिक काम करने का ज्ञान है।					
09	मैं YouTube पर शैक्षिक Video बना कर Upload कर सकता/सकती हूँ।					
10	मुझे शैक्षणिक App जैसे DIKSHA, NISHTHA, का इस्तेमाल करने आता है।					

	Pedagogical Knowledge	पूर्णतः असहमत	असह मत	अनिश्चित	सहमत	पूर्णतः सहमत
11	मैं अपने शिक्षण को योजनाबद्ध कर लेता/लेती हूँ।					
12	मैं कक्षा प्रबंधन (Classroom Management) को व्यवस्थित बनाए रखने में निपुण हूँ।					
13	मैं समकालीन शिक्षण विधियों से स्वयं को Update रखता/रखती हूँ।					
14	मैं विद्यार्थियों के सामाजिक एवं सांस्कृतिक पृष्ठभूमि से अवगत हो सकता/सकती हूँ।					
15	मैं विद्यालय में छात्रों के अंदर प्रजातंत्रीय मूल्यों के प्रति जागरूकता पैदा कर सकता/सकती हूँ।					
16	मैं 21वीं शताब्दी के लिए बच्चों में उनके कौशल का विकास कर सकता/सकती हूँ।					

17	मैं बच्चों को Experiential learning के लिए प्रेरित कर सकता/सकती हूँ।					
18	मैं अपने शिक्षण शैली (Teaching Style) को छात्रों के व्यक्तिगत विभिन्नताओं के अनुसार बदल सकता/सकती हूँ।					
19	मैं आम छात्रों की समझ (Understanding) और गलतफहमी (Misconceptions) से परिचित रहता/रहती हूँ।					
20	मुझे कक्षा में विभिन्न शिक्षण उपागम (Teaching Approach) जैसे Behaviourist, Constructivist इत्यादि के उपयोग का ज्ञान है।					
21	मैं कक्षा में शिक्षण के विस्तृत शृंखला जैसे Collaborative learning, Direct instruction, Inquiry instruction, Problem solving इत्यादि का प्रयोग कर सकता/सकती हूँ।					
22	मैं छात्रों के अधिगम का मूल्यांकन विभिन्न तरीके से कर सकता/सकती हूँ।					

	Content Knowledge	पूर्णतः असहमत	असहमत	अनिश्चित	सहमत	पूर्णतः सहमत
23	मुझे देश की सामाजिक स्थिति, उसमें होने वाले परिवर्तन और संबंधित चुनौतियों की गहरी समझ है।					
24	मुझे देश की अर्थव्यवस्था में हो रहे विकास और संबंधित चुनौतियों की गहरी समझ है।					
25	मुझे स्वतंत्रता संग्राम में देश के विभिन्न भागों के योगदान का ज्ञान है।					
26	मुझे भारतीय संविधान में वर्णित समानता, स्वतंत्रता, न्याय, भाईचारा, आत्मसम्मान, अनेकता इत्यादि की समझ है।					
27	मुझे सामाजिक अध्ययन के विभिन्न अध्यायों और उनके उपयुक्त उदाहरणों की जानकारी है।					
28	मैं सामाजिक अध्ययन से संबंधित समसामयिक घटना (Current Affairs) से परिचित रहता/रहती हूँ।					
29	मैं सामाजिक अध्ययन के विभिन्न विषयों के मध्य संबंध की पहचान कर सकता/सकती हूँ।					
30	मुझे सामाजिक अध्ययन विषय की आलोचनात्मक समझ (Critical Understanding) है।					
31	मैं सामाजिक अध्ययन के क्षेत्र में होने वाली नवीनतम विकास और खोज की घटना से जुड़ा रहता/रहती हूँ।					

	Pedagogical Content Knowledge	पूर्णतः असहमत	असहमत	अनिश्चित	सहमत	पूर्णतः सहमत
32	मैं सामाजिक अध्ययन विषय में छात्रों की आलोचनात्मक सोच और अधिगम के लिए प्रभावी शिक्षण उपागम (Effective Teaching Approach) का चयन कर सकता/सकती हूँ।					
33	मैं सामाजिक अध्ययन विषय को क्रिया-परक (Activity-based) विधि के साथ छात्रों को पढ़ा सकता/सकती हूँ।					
34	Archaeological Culture को Replica का उपयोग करके सामाजिक अध्ययन के शिक्षण में कर सकता/सकती हूँ।					
35	मुझे सामाजिक अध्ययन शिक्षण से संबंधित विभिन्न तरीके और रणनीति की समझ है।					
36	मैं सामाजिक अध्ययन के शिक्षण के लिए उपयुक्त शिक्षण-विधि का प्रयोग करता/करती हूँ।					
37	मैं भूत एवं वर्तमान के बीच संबंध निकालने की क्षमता का विकास छात्रों में कर सकता/सकती हूँ।					
38	मैं सामाजिक अध्ययन से संबंधित उपलब्धियों के मूल्यांकन के लिए वैकल्पिक/पूरे मूल्यांकन उपकरण (Evaluation Tool) का चयन कर सकता/सकती हूँ।					
39	सामाजिक अध्ययन के आँकड़े एवं सूचनाओं को संग्रहित करने की विधियों से परिचित करा सकता/सकती हूँ।					
40	सामाजिक अध्ययन के concepts को व्यक्तियों एवं समाज के live example की सहायता से स्पष्ट कर सकता/सकती हूँ।					

	Technological Content Knowledge	पूर्णतः असहमत	असहमत	अनिश्चित	सहमत	पूर्णतः सहमत
41	मुझे उन Technologies की जानकारी है जिसके उपयोग से मैं सामाजिक अध्ययन विषय के विशिष्ट Concepts को पढ़ा सकता/सकती हूँ।					
42	मुझे सामाजिक अध्ययन के विभिन्न विषय-वस्तु को पढ़ाने के लिए Computer और Digital teaching device (Smart Board) की जानकारी है।					
43	मुझे सामाजिक अध्ययन के विशिष्ट Concepts को प्रस्तुत करने के लिए तकनीकी अभ्यावेदन (Technological Representation) जैसे Multimedia, Visual demonstration इत्यादि की जानकारी है।					
44	मैं छात्रों को उन घटनाओं का निरीक्षण करने के लिए Technology का प्रयोग करके आसान बना सकता/सकती हूँ जिनको शायद बिना Technology के निरीक्षण करना कठिन हो।					
45	मैं सामाजिक घटना के मॉडल जैसे Animation, Modelling इत्यादि को बनाने और उसमें उपयुक्त बदलाव करने के लिए					

Technology का उपयोग कर सकता/सकती हूँ					
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Technological Pedagogical Knowledge		पूर्णतः असहमत	असहमत	अनिश्चित	सहमत	पूर्णतः सहमत
46	मैं उन Technologies का चयन कर सकता/सकती हूँ जो सामाजिक अध्ययन के पाठ के लिए शिक्षण उपागम (Teaching Approach) को बेहतर बनाती है।					
47	मैं प्रभावी रूप से कक्षा प्रबंधन (Class Management) के लिए विभिन्न Educational technology का प्रयोग कर सकता/सकती हूँ।					
48	मैं कंप्यूटर की मदद से दैनिक, वार्षिक इकाई योजना बना सकता/सकती हूँ।					
49	मैं सामाजिक अध्ययन के Project और कक्षा गतिविधियों के विकास के लिए उपयुक्त Technology का प्रयोग कर सकता/सकती हूँ।					
50	मैं छात्रों को सामाजिक अध्ययन विषय के अधिगम में वृद्धि के लिए Technology का उपयुक्त प्रयोग कर सकता/सकती हूँ।					
51	मैं छात्रों के शैक्षिक मूल्यांकन के लिए विभिन्न Technologies का उपयुक्त प्रयोग कर सकता/सकती हूँ।					

Technological Pedagogical Content Knowledge		पूर्णतः असहमत	असहमत	अनिश्चित	सहमत	पूर्णतः सहमत
52	मैं अपने शिक्षण में सामाजिक अध्ययन विषय सामग्री, Technology और Teaching approach का उपयुक्त Integration करता/करती हूँ।					
53	मुझे अपने विषय के शिक्षण में उपयुक्त रणनीति (Strategy), विधि, Technique के साथ उपयुक्त Technology का प्रयोग करना आता है।					
54	Technology की मदद से ऐतिहासिक रूप से महत्वपूर्ण वस्तुओं, स्थानों को छात्रों को दिखा कर विषय को रोचक बना सकता/सकती हूँ।					
55	मैं अपनी कक्षा में सामाजिक अध्ययन विषय की सामग्री (Contents), Technologies, और शिक्षण उपागम (Teaching Approach) को संयोजित (Combine) करने वाली रणनीतियों का उपयोग कर सकता/सकती हूँ।					
56	भौगोलिक घटनाएं, राज व्यवस्था की गति-विधि या आर्थिक गति-विधि के लाइव events को दिखा कर शिक्षण कर सकता/सकती हूँ।					
57	मुझे सामाजिक अध्ययन विषय से संबंधित उभरती रणनीतियों, विधियों, तकनीकों, मॉडेल और Technology को अनुकूलित (Adapt) करने की जानकारी है।					
58	मैं Online माध्यमों का प्रभावी तरीकों से प्रयोग करके सामाजिक अध्ययन विषय की सामग्रियों को बेहतर तरीके से पढ़ा सकता/सकती हूँ।					



Self efficacy of Teachers Scale

शिक्षक आत्म-प्रभावकारिता मापनी

प्रिय शिक्षकगण,

इस प्रश्नावली का निर्माण उन चीजों की बेहतर समझ हासिल करने के उद्देश्य से किया गया है जो शिक्षकों को अपने विद्यालय संबंधी गतिविधियों में चुनौतियाँ पैदा करती हैं। इसलिए कृपया सभी कथनों का ईमानदारी से, दिये गए माप (Scale) (1) बिल्कुल ही नहीं कर सकता (2) नहीं कर सकता (3) अनिश्चित (4) कर सकता हूँ (5) बिल्कुल ही कर सकता हूँ, में से किसी एक पर चिन्ह लगा कर अपनी प्रतिक्रिया दें। आपकी पहचान और आपके प्रतिक्रियाओं को गोपनीय रखा जाएगा। इस प्रश्नावली का उपयोग केवल इस शोधकार्य के लिए किया जाएगा।

नाम:.....लिंग: पुरुष महिला:

विद्यालय का प्रकार: सरकारी प्राइवेट

विद्यालय का नाम:

शैक्षणिक योग्यता :

विद्यालय में आप कौन विषय पढ़ाते हैं?.....

WhatsApp नंबर:

क्या आपके स्कूल में कंप्यूटर लैब है। हाँ नहीं

शिक्षण अनुभव : 0 से 5 वर्ष 5 से 10 वर्ष 10 से 15 वर्ष 15 से 20 वर्ष 20 वर्ष से अधिक

	<u>निर्णयन को प्रभावित करने की प्रभावकारिता</u>	बिल्कुल ही नहीं कर सकता	नहीं कर सकता	अनिश्चित	कर सकता हूँ	बिल्कुल ही कर सकता हूँ
01	संस्था में जब कुछ गलत होता है तो मैं उसके विरुद्ध आवाज उठा सकता/सकती हूँ।					
02	संस्थान से संबंधित महत्वपूर्ण विषयों पर मैं अपना विचार प्रकट कर सकता/सकती हूँ।					
03	मैं समस्याओं की सटीक पहचान कर सकता/सकती हूँ।					
04	विभिन्न समस्याओं को हल करने में मैं संस्था की सहायता कर सकता/सकती हूँ।					
05	मैं उचित निर्णय लेने में योग्य हूँ।					
06	मैं उचित सूचनाओं का विश्लेषण करते हुए उपयुक्त निष्कर्ष पर पहुँच सकता/सकती हूँ।					

	<u>अनुदेशात्मक आत्म-प्रभावकारिता</u>	बिल्कुल ही नहीं कर सकता	नहीं कर सकता	अनिश्चित	कर सकता हूँ	बिल्कुल ही कर सकता हूँ
07	मैं अपने शिक्षण विषय के जटिल इकाइयों के प्रति छात्रों की रुचि बढ़ा सकता/सकती हूँ।					
08	मैं अपने शिक्षण विषय को छात्रों को समझने के लायक बना सकता/सकती हूँ।					
09	मैं छात्रों को सीखने के लिए संगठित कर सकता/सकती हूँ।					
10	नवीनतम विकसित तकनीक की मदद से मैं सीखने में छात्रों की सहायता कर सकता/सकती हूँ।					
11	मैं छात्रों के व्यक्तित्व को परख सकता/सकती हूँ।					
12	पाठ्यक्रमीय गतिविधि में कम रुचि रखने वाले छात्रों को मैं अभिप्रेरित कर सकता/सकती हूँ।					
13	मैं छात्रों को विषय सीखने में कम समय लगाने की क्षमता पैदा कर सकता/सकती हूँ।					
14	मैं छात्रों के पाठ्यक्रमीय कार्य को तय समय-सीमा में पूरा करा सकता/सकती हूँ।					
15	मैं छात्रों को पाठ्यक्रम से संबंधित महत्वपूर्ण सुझाव दे सकता/सकती हूँ।					
16	मैं छात्रों के अंदर सीखने के प्रति सकारात्मक सोच पैदा कर सकता/सकती हूँ।					

	<u>अनुशासनात्मक आत्म-प्रभावकारिता</u>	बिल्कुल ही नहीं कर सकता	नहीं कर सकता	अनिश्चित	कर सकता हूँ	बिल्कुल ही कर सकता हूँ
17	मैं कक्षा को अनुशासित रख सकता/सकती हूँ।					
18	मैं छात्रों को कक्षा के नियम का अनुसरण करने वाला बना सकता/सकती हूँ।					

19	समस्यात्मक छात्रों को मैं नियंत्रित कर सकता/सकती हूँ।					
20	मैं छात्रों को कक्षा के नियमों के प्रति संवेदनशील बना सकता/सकती हूँ।					
21	मैं कक्षा के अनुशासनहीनता के कारणों की पहचान कर सकता/सकती हूँ।					

	<u>अभिभावक के भागीदारी के लिए प्रभावकारिता</u>	बिल्कुल ही नहीं कर सकता	नहीं कर सकता	अनिश्चित	कर सकता हूँ	बिल्कुल ही कर सकता हूँ
22	मैं छात्रों के अभिभावक को विद्यालय संबंधी क्रिया-कलापों में शामिल रख सकता/सकती हूँ।					
23	मैं छात्रों के अभिभावक के अंदर विद्यालयी क्रिया-कलापों के प्रति रुचि पैदा कर सकता/सकती हूँ।					
24	मैं विद्यालय के वातावरण को छात्रों के अभिभावक के लिए सौहार्दपूर्ण बना सकता/सकती हूँ।					
25	छात्रों के सार्वजनिक विकास के लिए अभिभावक को सहयोगी बना सकता/सकती हूँ।					
26	मैं अभिभावक को विद्यालय के प्रति सकारात्मक भूमिका निभाने हेतु प्रेरित कर सकता/सकती हूँ।					

	<u>सामुदायिक समूह के भागीदारी की प्रभावकारिता</u>	बिल्कुल ही नहीं कर सकता	नहीं कर सकता	अनिश्चित	कर सकता हूँ	बिल्कुल ही कर सकता हूँ
27	मैं विद्यालय के आस-पास के सामुदायिक समूह से विद्यालय के विकास हेतु संपर्क बना सकता/सकती हूँ।					
28	मैं सामुदायिक समूह में विद्यालय के प्रति सहयोगी भाव पैदा कर सकता/सकती हूँ।					
29	मैं विद्यालय और आस-पास के सामुदायिक समूह के बीच कड़ी की भूमिका अदा कर सकता/सकती हूँ।					
30	मैं विद्यालय के क्रिया-कलापों के प्रति सामुदायिक समूह को संवेदनशील बना सकता/सकती हूँ।					
31	मैं छात्रों को सामुदायिक समूह की शैक्षणिक समस्याओं के हल करने के लिए प्रेरित कर सकता/सकती हूँ।					

	<u>विद्यालय के वातावरण को सकारात्मक बनाने की प्रभावकारिता</u>	बिल्कुल ही नहीं कर सकता	नहीं कर सकता	अनिश्चित	कर सकता हूँ	बिल्कुल ही कर सकता हूँ
32	मैं विद्यालय को सुरक्षित स्थान बना सकता/सकती हूँ।					
33	मैं शिक्षकों और छात्रों के सम्बन्धों को विश्वासपूर्ण बना सकता/सकती हूँ।					
34	मैं छात्रों के अंदर शिक्षकों के प्रति विश्वास की भावना को बढ़ा सकता/सकती हूँ।					
35	मैं सहकर्मी शिक्षकों के शिक्षण कौशल को बेहतर बनाने में मदद कर सकता/सकती हूँ।					
36	विद्यालय के सभी कर्मियों के परस्पर संबंध को अधिक बेहतर बना सकता/सकती हूँ।					
37	मैं छात्रों के शिक्षा को जारी रखने की प्रवृत्ति को मजबूत कर सकता/सकती हूँ।					
38	मैं छात्रों के आत्मविश्वास को बढ़ा सकता/सकती हूँ।					
39	मैं विपरीत सामाजिक वर्ग के सहकर्मी शिक्षकों के साथ समूह कार्य कर सकता/सकती हूँ।					



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TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE (TPCK) AND ITS IMPLICATION IN TEACHER EDUCATION

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Abstract

Quality of teacher education has been matter of concerns for a long time. Many means and measures have been taken to improve quality of teacher education time to time. Now days there are several changes are taking place in across the globe. Among them prevalent of ICT/Digital technology is prominent. These changes are manifesting in various forms which led changes in curricular structure of teacher education. Before the digital age, the content knowledge was given more emphasis and the pedagogical theories were not given proper attention. Integration of pedagogy with content transaction was theoretically discussed by Schulman (1986) which is taken now as Pedagogical Content Knowledge (PCK) framework in Teacher education. Pedagogy plays important role to deliver the content but in PCK technology was ignored in educational activity. As these days hardly, any walk of life is without technology so the field of education. So, the need of technology integration in education becomes core factors of quality education. Computer Assisted learning/ Teaching/Instruction/Assessment, e-learning, e-assessment, online/virtual learning environment, education apps and artificial intelligence in education have emerged steadily. Knowledge of contents, pedagogy and technology in quantum manner is not enough for effective teaching but integration of all these components together and its knowledge in a system manner is imperative. Based on Shulman (1986) PCK, Koehler and Mishra (2006) extended the idea of teacher's knowledge with emphasis on integration of technology in education and given a framework Technological Pedagogical Content Knowledge (TPCK). As in this digital era there are several changes emerging in education because of technology as being used in human activities other than education. The quality of education by an institution is now compared with one of parameters viz. how it is integrated effectively. Now a day the technology integration is becoming important not only in the teacher education but also in all kind of education and is becoming vital. TPCK has many implications in teacher education hence the present paper focuses on those implications.

Key Words: TPCK , PCK, Teacher Education

Introduction

Quality of teacher education has been matter of concern for a long time. There are many factors on which quality of teacher education depends. Teachers are one of the important parts of them. For teachers to be successful in their career, they need to develop themselves in pedagogy, technology and their content area (Sahin 2011). No doubt content is one of the most of important parts of the teaching process but now a day content in isolation cannot be the only part of quality education. Shulman (1986) worked on pedagogical content knowledge (PCK) and emphasized on use of proper pedagogy as per content matter. Shulman (1986) describes how pedagogy is useful in delivery of content. Knowledge of subject matter is different thing and how it is delivered effectively depends upon how much integration of pedagogy and content is. Teaching is complex matter and integrating it with proper pedagogy needs understanding of content and pedagogy. Pedagogical knowledge refers to understanding of how particulars topics, matters, contents presented and arranged and balanced according to the interest, diversification and characteristic of the target group of learners. While pedagogical content knowledge (PCK) constructed by Shulman (1986) combined the content knowledge and pedagogy into understanding of how these are blended for successful teaching.

In recent years, digital technology has become an important part of our life so as affecting our teaching and learning activities. Role of these technologies in our day to day life become widespread because these technologies gives individual with many

benefits and opportunities (Sahin 2011). For example, with the help of internet one can get lots of educational information. With the help of information and communication technology (ICT) learning and teaching process becoming more affecting than traditional method. Studies confirms when teachers integrate technology into teaching process, their students become more interested in subject matter (Schrum et al, 2007; Sweeder and Bednar, 2001). In relation with it use of computers and educational technologies may help increase students learning outcomes (Margerum-Leys and Marx, 2002).

Technological Pedagogical Content Knowledge (TPCK)

TPCK now it is also known as TPACK is a framework that introduces the relationship and complexities between all three basic components of (technology, pedagogy and content) knowledge (Koehler and Mishra, 2008; Mishra and Koehler, 2006). TPCK enables the teachers to successfully incorporate technology in teaching by enabling the teachers to make appropriate, context-specific strategies. There are seven components in TPCK framework. Koehler and Mishra and others describe all the components as follows:

Content Knowledge (CK): Content knowledge refers to the knowledge which has to deliver or learned. This is the knowledge which is to be taught or it answers the question of what will be taught (Margerum-Leys and Marx, 2002). Teachers must know the content which they are going to teach. They also know the nature of content as

nature of knowledge is different for different areas. For example, mathematics, economics, social studies, commerce etc. A teacher without this knowledge may be dangerous as it leads to wrong construction of knowledge. Teachers who do not have understanding of content matter can misrepresent subjects to their students (Ball &McDiarmid, 1990).

Pedagogical Knowledge (PK): Knowledge of nature of teaching and learning process, understanding of different topics, matters, issues are arranged, presented to learners. It helps to make teaching strategy to identify individuals' learning needs and methods of delivering the subject matter (Kanuka, 2006). It includes teaching methods, classroom management, planning of different instructional strategies, evaluation of students learning outcome etc.

Technological Knowledge (TK): Here technology includes both digital and analogue. It refers to knowledge of various technologies which is used in learning and teaching activities (Margerm-leys and Marx, 2002). Technology knowledge is always in state of flux (Koehler and Mishra 2009). It is highly dynamic in nature and everyday changes happens, in this situation teachers need to be highly active and be ready to have updated technological knowledge. Acquiring technological knowledge in this manner enables a person to accomplish a variety of different tasks using information technology and to develop different ways of accomplishing a given task (Koehler and Mishra, 2009).

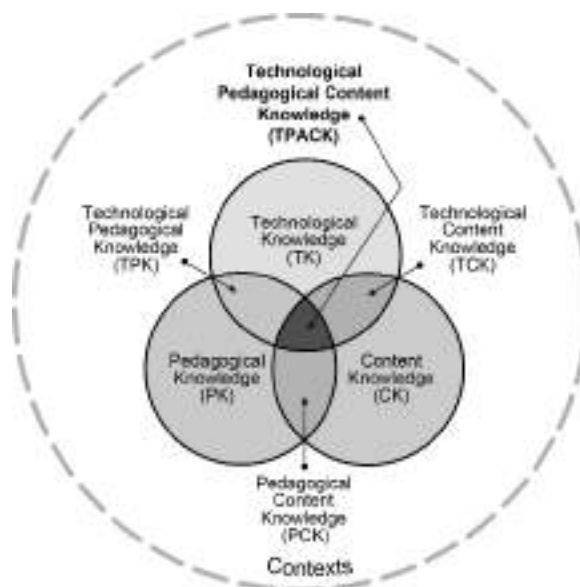
Pedagogical Content Knowledge (PCK): It is the integrated knowledge of pedagogy and content. This is Shulman's ideas of knowledge of pedagogy that is applicable to the

particular contents (Harris, Koehler and Mishra, 2007). Pedagogical content knowledge is different for various content matters. This knowledge is dynamic in nature and this is not like fit for all. Teachers need to adapt their knowledge as learners' requirements and characteristics.

Technological Content Knowledge (TCK): TCK is defined as understanding of the manner in which technology and content influence and constrain one another. It refers to how an effective form of presentation can be prepared by integrating particular content area with the technology (Schmidt et al, 2009) Teachers need to master more than the content they teach. Teacher must have the knowledge regarding different technologies and subject matter. Teachers are expected to have knowledge that which technology is best suited for the subject matter and delivered effectively with the particular technology.

Technological Pedagogical Knowledge (TPK): This knowledge is an understanding of how teaching and learning changes when particular technologies are used. This consists knowing the affordances and constraints of a range of technological tools. There are many technologies and each one have own characteristics. **Technological Pedagogical Content knowledge (TPCK):** Knowledge of the complex interaction among the principle knowledge domains (Content, pedagogy and technology). The development of TPCK by teachers is important to effective teaching with technology. The integration of these content, pedagogy and technology of knowledge, both theoretical and practical. Technological pedagogical content knowledge is an understanding that emerges from interactions among content, pedagogy, and technology knowledge (Koehler and Mishra, 2009).

Figure 1: TPACK



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Implications of TPCK in Teacher Education

Emergence of the concept of TPCK framework has the significant implications in teacher education. Computer Assisted learning/Teaching/Instruction/Assessment, e-learning, e-assessment, online/virtual learning environment, education apps and artificial intelligence in education have emerged steadily. The inevitable nature of technological environment has created a dichotomy among the institutes of teacher education; one group is technology rich infrastructures and teachers with sound TPCK while other is deprived of it. National Council of Teacher Education has made ICT infrastructure mandatory for the institution, but it could not ensure the sound TPCK among teacher educators. The first implication of TPCK is the positive attitude towards technology in Teacher Educators and their higher authorities. For effective teaching

teacher must have ability to integrate optimally all the dimensions of education and technology both. To develop the TPCK among teachers there is need to update teachers' knowledge regarding different technologies, pedagogy and content. A periodic refresher course for content, pedagogy and the technology integration is imperative. All three are dynamic in nature. Therefore update knowledge of each must be ensured by Institute of Teacher Education. It can be managed through two ways, continuing education or providing autonomy to teacher educators so that they can evaluate the means and process of technology integration in curriculum transaction. TPCK framework seeks to assist the development of better technique for discovering and explaining how technology related professional knowledge is implemented in practice (Koehler and Mishra, 2009). Through pre-service and in-service training teachers develops their professional

abilities. For the quality teacher education teachers must be professionally sound. Many teacher education institutions added TPCK in their curriculum but there are most of teachers who is unaware of technology integration with pedagogy and content need to be updated.

TPCK offers several possibilities for promoting the effective teaching in different context. It creates many opportunities to develop technology integrated learning materials. As TPCK is different from individual knowledge of content, pedagogy and technology, instead it requires deep understanding of integration for effective teaching learning process. With the development of technology there is need of pedagogical approach in educational activity. As there are same technology is used in different field, for example Microsoft power point is used according to needs of the users. But use of Microsoft power point will be different from upper primary to higher secondary classes. Researcher needs to develop appropriate pedagogy for effective use of different learning materials. Action research should be encouraged among teacher educators involving school teachers who are using technology in their practices. A workshop may be organized to indentify the TPCK specific to contents, pedagogy and available technology/ies. Such TPCK be evaluated and analyzed by the Teacher educators and teachers both in their context. Hence TPCK framework creates many opportunities for researcher, teacher educators, and institutions to think how much it can be useful. On TPCK many researches are going on in different areas and contexts. Theoretical part of TPCK has been emphasized

but as of now practical part is lagging. Research suggests to update of teacher education curriculum and to add appropriate methodology.

Conclusions

Quality of teacher education depends on many things. Many mean and measures has been considered to improve quality of teacher education. Content knowledge is one of the important knowledge in this regard but only content knowledge in isolation cannot play important role in quality education. Considering this Shulman (1986) given a concept Pedagogical Content Knowledge (PCK) and he talked about integration of pedagogy with content. He emphasized that role of pedagogy is very important in delivering content knowledge. With the emergence of technology in education, Koehler and Mishra (2006) work further on this and they felt integration of technology in education is necessary for quality education. Based on Shulman PCK they developed a framework Technological Pedagogical Content Knowledge (TPCK). In this paper we discussed the implication of TPCK in teacher education and it can be concluded that TPCK has significant implications in teacher education. There is the need of present era to develop the TPCK among educators theoretically and practically too. Ignoring TPCK in teacher education will not only produce half trained human resources for schools but also there is apprehensions of that improper use of technology will be prevalent while there is soon arrival of Artificial Intelligence in teaching learning process.

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SELF-EFFICACY OF TEACHERS: A REVIEW OF THE LITERATURE

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Abstract

Teachers' effectiveness depends on various things and self-efficacy is one of them. The construct of self-efficacy was coined by psychologist Albert Bandura in his social cognitive theory. Self-efficacy refers to one's belief about his/her capabilities to accomplish specific tasks. Teachers who have a high sense of belief in their teaching capabilities will achieve higher goals while teachers who have a low sense of belief in their capabilities will be under the shadow of fear of failures. Over the last four decades, researchers have thrown the light on teachers' self-efficacy in teaching and learning and established it as one of the important effective constructs. Self-efficacy plays a vital role for teachers to accomplish their goals, tasks, and how they approach instructional challenges. Teachers with a low self-efficacy evade challenging activities, take creative activities and situations as difficult to do, take most of the things negative and lose confidence in their abilities while teachers with a high self-efficacy welcome challenging activities as to be mastered, create deeper interest in their activities, develops a high sense of commitments and mend swiftly from failures. The purpose of this study is to review the construct of teachers' self-efficacy and its importance in teachers' effectiveness.

Key Words: Self-efficacy, Teacher Self-efficacy, Measurement of Teacher Self-efficacy.

Introduction:

To be effective and to get success in any activity one must have sound belief in his/her ability. Without it, one cannot be worthy in society. Both characteristics have been the key yardsticks for evaluation of a professional viz, teachers, medical practitioners, engineers, managers, etc. Bandura (1977) identifies a psychological variable self-efficacy which is processed by an individual and his/her belief in his/her capability to get the success in a specific task. It is quite different from the concepts like self-confidence, self-esteem, and outcome expectancy. To distinguish the construct of self-efficacy from other similar variables it is better to analyze the other components of self-related concepts too. Self-efficacy can be defined in other words that one having faith in his/her ability to perform certain work. In contrast, self-confidence is a general belief rather than a specific belief in a

certain task. A person can be confident but may not be self-efficacious to a specific work. Also, self-efficacy and self-esteem are not the same as self-esteem is a perception of self-worth to others. Furthermore, outcome-expectancy is the level to which a person believes that a specific outcome will arise (Brown, et al. 2014). It is notable that there is a difference between actual skills and self-efficacy as self-efficacy is a person's belief to do a specific task having the skills they have (Bandura, 1997). It may be elaborated as performing/completing tasks cannot be taken into the same sense as the self-efficacy is perceived which is associated with just one's beliefs. A person may have a certain level of skills about an activity, but it does not mean that he/she has a belief about their capability to perform that very activity. Self-efficacy plays a vital role in changing our perception of experiences and it greatly influences thoughts, well-being, personal accomplishment, actions,

emotions, and human motivations. A person having a high sense of self-efficacy may have little fear of failures than a person who is having a low sense of self-efficacy. A person's way of thinking positively or negatively, in self-enhancing or self-debilitating affected by self-efficacy beliefs (Nabavi, 2012).

Development of Self-efficacy in an individual:

Formation of self-efficacy beliefs occurs mainly from four sources which are Mastery experiences, vicarious experiences, Social persuasion, and emotional and physiological states (Bandura, 1977).

Mastery experiences: This is the most influential source of efficacy development because it refers to the experience one attains when one successfully completes the previous tasks. Successful achievements develop a strong belief in one's self-efficacy. Carrying out a task positively reinforces our sense of self-efficacy. While failure of task or challenge can demoralize and fade up self-efficacy.

Vicarious experience or modelling: To develop the self-efficacy people observe others performing tasks. Sometimes people lack the confidence to work on something, but they try to learn by observing others' works. Therefore, it is also called observational learning. This learning has a great role in building self-efficacy because it facilitates the observer required strategies and technics which are useful to achieve the desired outcome (Wise & Trunnell, 2001). This source of self-efficacy is weaker than mastery experiences but a person having less knowledge about work then the role of this source plays an important role to develop the sense of self-efficacy (Pajares, 2002). The modelling effects are relevant in the context when the person has less experience of the task. The modelling effects have a positive role even with experienced and self-efficacious people if models are properly demonstrated with the task. Higher the similarity with work develops higher the self-efficacy (Pajares, 2002). Individuals seeing the others successful completed task can think if he/she can do then I can too.

Verbal persuasions: Verbal persuasion is also one of the important sources of developing self-efficacy. Because of verbal persuasions, they get from others; people develop self-efficacy too. It shows words can play a vital role to develop an individual's self-efficacy. Persuaders must be cautious about negative persuasions as it works more than positive persuasions. Positive verbal persuasions will encourage individuals to enhance their self-efficacy beliefs while negative verbal persuasions can demine the individual self-efficacy beliefs (Pajares, 2002). Coaches generally, use this type of persuasion to boost the self-efficacy of their teams. They motivate team members before the match starts. They psyche them that they are going to win the game.

Somatic and emotional states: Individual responses and emotional states like anxiety, arousal, stress, worry, fear of failures also play a vital role in self-efficacy. People having stress, fear can lead to a negative impact on self-efficacy. In coping with the situations, anxiety creates emotional arousal which leads to affects an individual's self-efficacy (Bandura and Adams, 1977). People new to performing a task, when he/she will realize that someone is watching him makes anxious and it may reduce their self-efficacy to that task.

An individual has a number of opportunities to improve his/her self-efficacy related to a particular task in which he/she engaged. Doctor in a medical profession, law councillor in legal practice, and chartered accountant in his account audit practices, bureaucrats in an administration, teacher in the teaching profession, and so on. The tasks mentioned here require sound self-efficacy among respective professions for effective results. The teaching and learning process is one of the highest valued activities for a nation. The teacher must be assessed and supervised in terms of their specific self-efficacy. Therefore, a researcher like Bandura (1977) and his successors took high interest in an exclusive kind of self-efficacy for a teacher and termed it as teacher self-efficacy.

Teacher self-efficacy:

Over the last four decades, researchers have shown a great interest in teacher self-efficacy and its related psychological issues (Zee & Koomen, 2016). Most of the researchers keep centered on the construct of Bandura's theory of self-efficacy (Berg & Smith, 2016). Teacher self-efficacy refers to the teachers' belief about their capability to bring out expected results of students. This belief has a powerful effect on students as it helps teachers to motivate even those students who are facing educational difficulties (Armor, et. al, 1976).

It has been established that teacher self-efficacy has significant roles on various educational outcomes not only on students' outcomes like students' achievements, motivation, and efficacy beliefs but also teachers' determination, passion, assurance, and instructional behavior (Tschannen-Moran & Hoy, 2001). Studies show that there has been a positive relationship between teacher efficacy and students' achievement (Ashton & Webb, 1986; Moore & Esselman, 1992 & Ross, 1992, Swarnalatha, 2019, Shahzad & Naureen, 2017). Teachers' efficacy has been directly or indirectly influenced the student's motivation and achievements (Dusek, 1985; Parsons, Kaczala, & Meece, 1982). Sehgal, Nambudiri, & Mishra (2017) recently studied teacher effectiveness through self-efficacy, collaboration, and principal and confirmed that there is a positive relationship between three dimensions of teacher effectiveness which are teachers' delivery of course material, teacher's role in teacher-student interactions, and teacher's role in regulating students' outcome. The study confirmed that there is a positive relationship between collaboration, principal leadership, and teacher self-efficacy.

Teacher self-efficacy has significantly affected the management of the classroom specifically confronting students' misbehaviour (Tilfarlioglu & Ulusoy, 2012). Teachers with a weak sense of self-efficacy get stressed by students' misbehaviour, which leads to taking strict action, makes them more authoritarian, and focused on teacher-centered approach, pinned around subject matters rather than students' achievements. Contrary to these, a high efficacious teacher professionally deals

with such issues, keeps calm, optimistic and creates such types of environments where students feel motivated (Melby, 1995). Researchers like, Baker, (2005); Gibson & Dembo, (1984) & Melby, (1995) studied the relationship between teachers' self-efficacy and their collaborative practices. The findings of the studies confirmed that the higher level of self-efficacy, the easier it is for teachers to take help from their colleagues.

A teacher having strong efficacy creates such an environment where students feel motivated and goal-oriented. Teachers having a stronger level of self-efficacy provides effective teaching outcomes, contributing to their students' higher level of motivation and which leads to better academic achievement (Caprara, et al. 2006). Generally, all people can set goals which they want to execute, things they want to achieve, however as we know that without converting into action it is not easy to reach the target. To approach the goals, tasks, and challenges, researchers like Bandura suggested that an individual's self-efficacy plays vital role. Individuals having efficacy belief in their capability can achieve goals easily. Up to a great extent of successful teaching activities and practices depend on teachers' self-efficacy to be updated what the changes happening in child-centered approaches (Rodriguez, et al. 2009).

Cherry (2020) finds that teachers with a high sense of teacher efficacy can develop an interest in academic activities, develop a higher sense of commitment to their interest and school activities, do not get out of control when they face difficulties and setbacks, welcome challenging activities as to be successful. Whereas teachers with a low sense of teacher efficacy escape challenging activities and make excuses, they feel that challenging tasks are outside of their capabilities, get focused on negative impacts and take it personal failings, eventually, they lose belief in personal capabilities.

Teacher efficacy has a great influence on educational planning and organizing different activities (Alliner, 1994). Strong self-efficacious teachers are more open to learn new ideas and are more curious to experiment with the latest teaching methods so that their

students can be benefitted optimally (Guskey, 1988).

Measuring teacher self-efficacy:

Several researchers developed the instruments to measure the efficacy of teachers. The first instrument was grounded in Rotter's social learning theory. To measure teacher efficacy, teachers were provided of two items instruments. This instrument was called Teacher efficacy. After the success of this instrument, researchers sought to expand the instrument developing a more reliable and valid instrument to capture more about teacher self-efficacy. Just after that, Guskey constructed a thirty-item instrument to measure responsibility for student achievement (Guskey, 1981).

Bandura's instrument consists of Efficacy to influence decision-making, Instructional self-efficacy, disciplinary self-efficacy, efficacy to enlist parental involvement, efficacy to enlist community involvement. Jerusalem and Schwarzer (1978) developed a general self-efficacy scale and it was first used from 1979 to 1981 in a panel discussion with secondary schools' students. Originally it had 20 items. After panel discussion it was finalized with 10 items. Respondents had to rate themselves on a scale from 1 to 4. The minimum and maximum scores lie between 10 and 40 per respondent. This scale was specially designed for adult respondents. Last 40 years several researchers studied teacher self-efficacy but still, there is a lack of reliability and validity in those instruments. It has created an opportunity for other researchers to reach a more valid and reliable instrument. Tschannen-Moran, & Hoy (2001) reviewed various instruments developed by Ashton et al., (1982); Gibson & Dembo, (1984); Riggs & Enochs, (1990); Emmer, (1990); Coladarsi & Breton, (1997); Meijer & Foster, (1988); Midgley et al., (1989) regarding teacher self-efficacy and based on a model of teacher efficacy of Tschannen-Moran, & Hoy (1998) developed a new more reliable and valid instrument, the Ohio state teacher efficacy scale (OSTES). The Ohio state teacher self-efficacy scale is a promising tool for researchers to capture the teacher self-efficacy construct. Recently, with special reference to Indian context, researchers like Sen (2017) and

Sharma (2017) also developed and validated teacher self-efficacy scale.

Educational Implications:

The construct of Bandura's self-efficacy attracted researchers to understand and promote the development of teacher self-efficacy. The findings suggest that teacher educators need to understand the importance of teacher self-efficacy. Teacher efficacy belief can be enhanced by taking appropriate measures. Recently, Kavita & Dahiya (2018) concluded in their experimental study that the self-efficacy of prospective teachers can be enhanced by using multimedia instructional packages. Teacher educators need to understand the key points of self-efficacy sources. Teachers should be allowed to be mastered in their respective areas. The mastery experience helps a teacher to boost their confidence as in this experience teachers get results directly by doing their own. Albert Bandura (1997) suggests that successful attempts foster teacher self-efficacy. Mastery experience of teachers can be increased by organizing workshops and training sessions. Teachers not only gain their effectiveness through mastery experiences but also vicarious learning. Watching or observing others' work, training sessions, class activities, role-playing can also play the role to develop the teacher's efficacy. During teaching practices at school, prospective teachers learn from other colleagues by observing them. Vicarious experience is the core of any training program. Teacher educators should consider arranging such types of training programs where teachers can enhance their self-efficacy. Wang, Ertmer, and Newby (2004) found that vicarious learning plays a significant role to enhance the prospective teachers' self-efficacy belief for technology integration into the classroom. Verbal or social persuasion is another way that can increase the efficacy of a teacher. The role of a leader is important in this source. For example, when the principal of a school expresses faith in the capabilities of school teachers it shows that he/she is persuading to maximize their efficacy. Somatic and emotional states too create a sense of efficacy. Bandura advocates that there should be a certain level of stress which motivates a person to work on it. For example, teachers should remember that they have some

assignments to complete and they should be prepared for them. Teacher educators should take care of emotional states as it affects efficacy and efficacy affects the further course of action.

Conclusion:

The development of a nation depends on various things, and the youth of the country is one of the most important assets. A country cannot develop until its youth be skilled so that it can contribute to the development of the country. The teachers must take care of their students particularly, the early stage of students (Sehgal, 2015). To get the desired results there is a need to check the quality and effectiveness of teachers. Various things make a teacher effective in their profession. Teacher self-efficacy has been significant to enhance the effectiveness of a teacher. Studies confirmed that the construct of self-efficacy has a greater role to increase the teacher's effectiveness. It is very useful, as it is open to interventions. In this review paper, we discussed self-efficacy, its sources, teacher self-efficacy. We also reviewed different studies and tried to find studies that have measured teacher self-efficacy. Finally, we discussed the implications of teacher self-efficacy.

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