Exploring Relationships among Use of TPACK Model and Teaching during COVID-19 at Secondary School Level

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ABSTRACT

Due to the 2020 outbreak of COVID-19, the entire education system was abruptly transferred to the online system. The government direct the schools to conduct teaching online, it was m mandatory for every teacher to teach online. For online teaching, teachers used technology (online recourses) as a tool for learning. As the TPACK model is significant model for teaching through the technology. The purpose of this study is to scrutinize the relationship between the utilization of the TPACK model and teaching during COVID-19 at secondary school level. The study was delimited to the private sector schools of Wah Cantt. The research was pure quantitative and research design was survey descriptive research. The population of the study were the private sector teachers of Wah Cantt, whereas random sampling techniques were utilized to analyze the sample size (n=76). The data were collected through the online questionnaire self-developed on five point Likert scale. The data through respondents is analyze by the descriptive and inferential statistics. The results depicted relationships exist between the use of TPACK Model and Teaching during COVID-19 at secondary school level. More over study predict that there is lack of technical knowledge, the online teaching in covid-19 prepared teachers for new challenges and increase teachers autonomy. It is recommended that there should be teacher's training program to improve teachers technological knowledge and dire need to provide free internet resources for teachers and students for active participation.

Keywords

Teaching During COVID-19, Use of TPACK Model, Secondary School Level, Private Sector Teachers

Introduction

The world is overwhelmed by corona virus, also known as COVID-19. The infection were a pestilence that has spread from China to the world. This zoonosis infection, had a gravely impact in Italy and Iran after China. Today, it has attacked much of the world's population and the word has no option to control the quicker predation of this hazardous sickness. The most ideal approach to battle the sickness is to "stay at home, be protected" in that maintaining social distancing. Keeping up social isolation in instructive establishments is very troublesome, which is the reason a few nations have chosen e-learning in pandemic circumstance.

Pakistan is struggling to control conditions to replace physical classroom with e-classroom, time that the authority has begun learning with a similar path on the Internet. The Pakistani government quickly reacted to the spread of Covid-19, including the closure of schools and schools and college from 9 March for pandemic period. TPACK is an evolving form of knowledge that transcends all three "core" elements (content, pedagogy, and technology) (Angeli & Valanides, 2009). The knowledge of technical teaching content is an understanding arising from the interaction between content, pedagogy and technical knowledge (Sahin, 2011). Really meaningful and in-depth knowledge base TPACK technology professional teaching is different from understanding all three concepts separately(Cagle & Hornik, 2001).On the contrary, TPACK is the foundation for effective usage of technology for teaching, which requires the understanding of the concept of utilizing technology (Mishra and & Koehler, 2006).

Teaching methods that practice technology to teach content in a constructive way. Moreover that how learning concepts are difficult or easy to learn (Archambault, & Barnett, 2010). Teaching with technology can help to solve certain students' problems. It help the students' prior knowledge and epistemological build new ideas based on how to use technology (Graham, 2011). Knowledge theory can strengthen the knowledge of old knowledge theory (Ashe & Bibi, 2011).

Therefore, TCK's technical teaching knowledge is an empathetic that technology interact with content to restrict each other (Mishra and & Koehler, 2006). Teachers require to learn more about the subjects they are teaching. As they must have the deeper knowledge to modify materials by using certain techniques (or representations that can be made) (Abbitt, 2011). Teachers need to understand which specific technology is most suitable to solve the subject learning in their subject, how the content should indicate or possibly change the technology, and vice versa (Angeli & Valanides, 2009). TPK's technical education knowledge, when certain technologies are applied in a specific way they change teaching and learning (Cagle & Hornik, 2001). This includes the understanding of teaching ability and the limitations of many technical tools on the subject, as well as the development of appropriate teaching strategies (Archambault, & Barnett, 2010).

While teaching during COVID-19 intestinally or unintentionally teachers had utilized the TPACK Model. There were previous studies reviewed the TPACK Model, moreover there were lot of studies on COVID-19 learning and online learning but current study is exploring the relationship between the use of TPACK Model and Teaching during COVID-19 at Secondary School Level.

1.1 Statement of the problem

Though technology is developing day by day and integrated in to the human lives. The world is adopting the technology as tool and resource from communication to medical. The education is also dependent on technology now a days.

But after the breakdown of the COVID-19, the educational system is transferred to online system. Any kind of online activity is not possible without the technology. These currents observations forces researchers to study the relationships among use of TPACK Model and Teaching during COVID-19 at Secondary School Level.

1.2 Objectives of the Study

The objectives of the research were:

1 To examine the perception of the teachers regarding use of TPACK Model at Secondary School Level.
2 To examine the perception of the teachers regarding teaching during COVID-19 at Secondary School Level.
3 To highlight the sub factors of TPACK Model while teaching in COVID-19 at Secondary School Level.
4 To explore the factors of teaching during COVID-19 at Secondary School Level.
5 To explore the relationship between the use of TPACK Model and Teaching during COVID-19 at Secondary School Level.

1.3 Hypothesis of the Study

The hypothesis of the research were

$^{1}H_0$: There were no significant relationship between the use of TPACK Model and Teaching during COVID-19 at Secondary School Level.

1.3 Research Questions of the Study

The research questions of the research were

1 What is the perception of the teachers regarding use of TPACK Model at Secondary School Level.
2 What the perception of the teachers regarding teaching during COVID-19 at Secondary School Level.
3 What are the sub factors of TPACK Model while teaching in COVID-19 at Secondary School Level.
4 What are the basic factors of teaching during COVID-19 at Secondary School Level.

1.5 Theoretical & Conceptual Framework

The study were supported by the TPACK Model had taken for the research from the research conducted in 2006, 2008, 2011 by Mishra and Koehler.

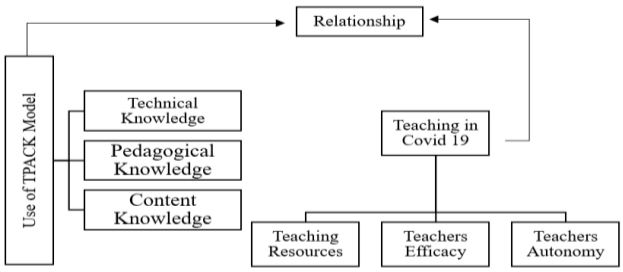


Figure 1.5: Theoretical and Conceptual Framework of the Relationships Among Use of TPACK Model and Teaching during COVID-19 at Secondary School Level

Literature Review

The TPACK Model one of the teaching model that helps and guide the teachers while teaching with the technology due to the COVID-19 all fields are became slave of technology. The online mean were excellent as the alternative but technology play an vital role. E-learning cannot be possible without technology.

2.1 TPACK Model

The TPACK concept labelled here has industrialized over time and finished numerous publication. The TPACK model is based description of PCK and describes how a mutual understanding of teacher education technology and PCK affects effective technical education (Mishra & Koehler, 2006,2008). Whereas there were many other researchers and authors, who have discussed alike concepts, although diverse notation schemes are often used (Graham, 2011).

2.1.1 Content Knowledge

Content knowledge (CK) can be explained as the teacher's knowledge of the concerned one subject that he is going to taught. The content of high school courses differs from the content of university art evaluation courses or postgraduate seminars in astrophysics (Sahin, 2011). Knowledge of the content is essential for the teachers. As noted, this knowledge should include:

1. Concepts
2. Theories
3. Ideas
4. Organizational models
5. Knowledge about evidence
6. Established practices and methods to underpin this knowledge (Kang, 2012).

The nature of knowledge and research varies greatly from field to field, and teachers need to understand the deeper knowledge base of the subject they are teaching (Abbitt, 2011). In science, for example, this includes scientific facts and theoretical knowledge, scientific methods, and evidence-based reasoning. When appreciating art, this knowledge includes knowledge of art history, famous paintings, sculptures, artists, and their historical background, as well as knowledge of the aesthetic and psychological theories used to evaluate art (Allan, Erickson, Brookhouse, & Johnson, 2010).

Not having a comprehensive content knowledge base can be excessive, such as students may obtain improper material and misunderstand the field of content (Angeli & Valanides, 2009). However, knowledge of content itself is a poorly structured area, as evidenced by the judicial battles of cultural wars (Allan et al., 2010), The Big Book debates, and evolutionary teaching. The content of the curriculum can be an area of great debate and disagreement (Ashe & Bibi, 2011).

2.2 Pedagogical Knowledge

Pedagogical knowledge (PE) is an inside and out comprehension of a showing cycle, practice, or instructing strategy. These incorporate general instructive objectives, qualities, and objectives (Bull, Hammond, & Ferster, 2008). This overall type of knowledge is appropriate for getting understudies 'learning styles, general homeroom authority abilities, exercise plans, and understudy evaluation (Chai, Koh, &Tsai, 2010).

This includes knowledge of classroom techniques or methods, the nature of the target audience, and strategies for assessing students ’understanding (Cagle & Hornik, 2001). Teachers with deep teaching knowledge understand how students develop basic knowledge and skills and how to develop positive thinking habits and learning trends (Cox & Graham, 2009). Therefore, pedagogical knowledge should include the cognitive, social, and developmental theories of learning and how they are applied to classroom students (Cradler, Freeman, Cradler, & McNabb, 2002).

2.2.1 Pedagogical Content Knowledge

The pedagogical knowledge of (PCK) is consistent and similar, the latter being suitable for teaching specific content (Bull et al., 2008). The essence of Schulman’s concept of PCK is to transform the concept of teaching topics(Chai et al., 2010; Cox & Graham, 2009). This change occurred after the teacher explained the topic, found different ways to represent the topic, and adapted the curriculum based on alternative concepts and students ’prior knowledge (Cradler et al., 2002; Cagle & Hornik, 2001).

The PCK shelters the main activities of:

1. Teaching
2. Learning
3. Curriculum
4. Assessment and reporting

Such as the favorable conditions for learning and the relationship between curriculum(Yılmaz, 2016), assessment and pedagogy (Gur & Karamete, 2015). Understand misunderstandings and opinions about them, the position of linking various ideas that based on content, the flexibility of students 'backgrounds. Moreover the importance of alternative teaching strategies, and exploring alternative methods to explore the same ideas or problems (Jimoyiannis & Gravani, 2011). Effective teaching is essential (Karatas, Piskin-Tunc, Demiray, & Yılmaz, 2016).

2.3 Technology Knowledge

Compared to the other two basic areas of the TPACK model, technical knowledge (TK) has always been popular (Karatas et al., 2016). Therefore, it is difficult to determine. At the time of publication, any definition of technical knowledge may be out of date (Keengwe & Georgina, 2012). In other words, certain methods of thinking and using technology can be applied to all technical tools and resources (Kirikcilar & Yildiz, 2018). The definition of TC used in the TPK model is similar to IT Fitness, as recommended by the Information Literacy Committee of the National Research Council (Lee & Tsai, 2010).

Fitness is considered to go beyond the traditional concept of computer knowledge (Mishra, Koehler, & Henriksen, 2011). It expects individuals to comprehend IT broadly enough to apply it viably in work and everyday life, perceive how IT can help or obstruct the acknowledgment of objectives, and keep on adjusting to IT changes (Mishra, & Koehler, 2006; Mishra et al., 2011).

Therefore, compared with the traditional definition of computer knowledge (Niess, Vanzee, & Gillow-Wiles, 2010), Wellness requires a more profound and more intensive arrangement and authority of data technology for data handling, correspondence and critical thinking (Yigit, Alev, Yurt, & Mazlum, 2017). Getting customary knowledge in this manner permits individuals to utilize data technology to perform different errands and build up the execution of explicit undertakings in an unexpected way (Mishra et al., 2011; Lee & Tsai, 2010). The idea of conventional knowledge doesn't mean the "last state", however as an advancement created through an open and open life that associates with technology(Yigit et al., 2017; Niess et al., 2010).

2.3.1 Importance of Technological Content Knowledge

Knowledge of technology and subject content is of profound authentic root (Chai et al., 2010). Advances in different fields, for example, medication, history, paleontology, and material science, harmonize with the improvement of new innovations that offer strategies for addressing and handling information in new and successful manners (Karatas et al., 2016; Keengwe and Georgina, 2012). Technological change also provides new metaphors for understanding the world (Jimoyiannis & Gravani, 2011) . The heart as a pump and the brain as an information processor are just some of the ways in which technology offers new perspectives for understanding phenomena (Archambault, & Barnett, 2010).

These representational and metaphorical relationships are not superficial. They usually lead to fundamental changes in the nature of the subject (Allan et al., 2010; Angeli & Valanides, 2009). Understanding the impact of technology on the practice and knowledge of a given discipline is essential for the development of appropriate technical tools for educational purposes (Cagle & Hornik, 2001; Cox & Graham, 2009). The choice of technology ensures and limits the content creativity that can be taught(Chai et al., 2010).

Similarly, some content decisions may limit the types of technologies that can be used. Technology can limit the possible types of representation, but it can also provide newer and more diverse representation structures (Angeli & Valanides, 2009). In addition, technical devices can provide a greater degree of flexibility between these representations. An important part of understanding TPK is understanding technical skills and using them differently depending on the context and change of purpose (Allan et al., 2010).

In order to build a TPK, it is necessary to have a deeper understanding of the constraints and capabilities of technology and the disciplinary

environment in which they play a role (Abbitt, 2011) For example, consider using whiteboards in the classroom (Graham, 2011). Because the board is usually motionless, visible to many people, and easy to modify, it should be used in the classroom (Kang, 2012). Therefore, the board is usually placed in front of the classroom and directed by the teacher (Sahin, 2011).

By deciding the situation of the table and seat and the idea of the understudy's connection with the educator, this position recommends a particular actual request in the study hall, as understudies can normally just utilize it in line with the instructor. (Chai et al., 2010; Cox & Graham, 2009). Notwithstanding, it is inaccurate to say that there is just a single method to utilize the table. In a publicizing organization meeting to generate new ideas, individuals simply need to contrast the utilization of announcements with see a totally extraordinary utilization of the innovation. For this situation, the board isn't heavily influenced by a solitary individual. Anybody in the gathering can utilize it, which is the focal point of conversation and arrangement/report building (Allan et al., 2010; Graham, 2011)

TPK turns out to be particularly significant in light of the fact that the most famous programming isn't intended for instructive purposes. Programming projects, for example, Microsoft Office Suite (Word, PowerPoint, Excel, Entourage and MSN Messenger) are normally intended for business conditions. Online innovations, for example, writes or digital broadcasts are utilized for diversion, correspondence, and informal communication. Educators need to dispose of the imperatives of fixed capacities, create abilities, outperform the most usually utilized innovations, and reconfigure them for customized instructive purposes. Consequently, TPK requires a forward-looking, innovative and edified quest for the utilization of innovation, not for its own motivations, but rather to advance understudy learning and comprehension (Abbitt, 2011).

2.4 Technology, Pedagogy, and Content Knowledge

TPACK is an evolving form of knowledge that transcends all three “core” components (content, pedagogy, and technology)(Cagle & Hornik, 2001). Knowledge of the content of technical curriculum is an understanding of the interaction between content, pedagogy and technical knowledge (Cox & Graham, 2009). TPACK is the foundation of a truly deep and skilled technology that differs from knowledge of all three concepts (Abbitt, 2011).

On the contrary, TPACK is the basis for the effective use of technology in education and the concept of the use of technology must be understood (Kang, 2012). Teaching methods that use technology to teach content constructively; understand what makes the concept difficult or easy to master and how technology can help solve some of students ’problems; understand students' prior knowledge and epistemological theories; and how technology can be used to build up current knowledge with the knowledge needed to develop a new epistemology or reinforce old epistemological knowledge(Allan et al., 2010; Graham, 2011).

By concurrently integrating technical knowledge, pedagogy, and content knowledge, experienced teachers can play the role of TPACK at any time while teaching(Chai et al., 2010; Cagle & Hornik, 2001). Each situation presented to teachers is a unique combination of these three factors, so there is no single technical solution for every teacher, every course, or every aspect of teaching. (Allan et al., 2010; Angeli & Valanides, 2009).

Instead, the solution lies in the teacher moving flexibly in the space defined by the three content elements, pedagogy and technology, and the complex interactions of these elements in a given context (Cagle & Hornik, 2001; Cox & Graham, 2009). Ignoring the inherent complexity of each component of knowledge or the complexity of the relationship between the components leads to oversimplification or failure of the solution (Chai et al., 2010).

Therefore, teachers need not only to develop cognitive fluency and flexibility in all key areas (T, P, and C), but also to relate these areas to the parameters of the context in order to build effective solutions (Karatas et al., 2016; Keengwe & Georgina, 2012). It is our deep, flexible, pragmatic and subtle understanding of the technology for treating TPACK as a professional knowledge structure (Jimoyiannis & Gravani, 2011). This compensation is more evident when the application of new educational technology

suddenly forces teachers to address basic educational problems and restore a dynamic balance between the three elements (Archambault, & Barnett, 2010).

This view overturns the traditional view that educational goals and techniques come from courses in the content domain (Abbitt, 2011). Things are rarely that simple, especially when applying new technologies (Graham, 2011). The introduction of the Internet, especially the rise of online learning, is an example of the emergence of technology that is forcing educators to think about basic educational issues, such as how to present content online and connect with students. Theme and each other (Karatas et al., 2016; Archambault, & Barnett, 2010).

It is difficult to teach with technique (Cagle & Hornik, 2001). The TPACK model shows that content, pedagogy, technology, and the teaching environment can work both individually and together (Abbitt, 2011). Successful use of technology for teaching requires the continuous creation, maintenance, and reconstruction of a dynamic balance between all components(Cagle & Hornik, 2001; Abbitt, 2011). It is worth noting that a number of factors influence the achievement of this balance(Karatas et al., 2016; Graham, 2011)

2.5 TPACK model implications during of COVID-19

It believes that teaching is a complex and chaotic field. However, the foundation of this complexity is the three key segments of instructor knowledge: comprehension of content, comprehension of educating, and comprehension of technology (Kang, 2012).

The intricacy of technology mix comes from the comprehension of the rich associations of knowledge between these three segments and the intricate strategies for applying them to a multifaceted unique homeroom climate (Kang, 2012). Since the last part of the 1960s, a progression of instructive examination has been led to comprehend and clarify "how and why perceptible exercises in the encouraging calling capacity in their structure and capacity" (Sahin, 2011). The principle reason for this examination is to comprehend the connection between two key areas:

1. Knowledge and content thought process by the teacher
2. The observable effects on the teaching practice while utilizing technology.

The design of the TPACK model is based on the introduction of the traditional and conventional studio technology for the integration of various technologies that can be considered to be a significant source of energy(Mishra, & Koehler, 2006; Mishra et al., 2011).

In this model, the TPACK can be used as an auxiliary and a well-developed technology for scoping and describer come to implement and not even understand the relative competitiveness of the technology (Abbitt, 2011). In addition, the type of contextual richness of the environment (internship, pedagogy, technology, ambient and interactive form), the educator can be considered to be different from the integration of the technology (Graham, 2011).

From the revised literature it is clear that, the TPACK model has a high degree of stability in the promotion of insecticides, which is a professionally used insecticide and a technology for which insecticides have been used. Formalization of the visual phenomena of compression (come with the integration of technology), which is essential to the analysis and development of technology.

Research Methodology

3.1 Research Methodology

The research was quantitative and descriptive design were selected by the researchers for the exploration of the relationship between teaching with technology (TPACK Model) and teaching during COVID-19.

3.2 Population and Sample size

The population of the research were the teachers of private sector at Wah Cantt, situated at Pakistan. The research were delimited were secondary level because current research is about the teachers experience during COVID-19. There were total 200 teachers. The sample should be drawn on the probability. The sample size were 76 teachers from the private sector at secondary school Level from Wah Cantt. The random sampling technique were selected because of the COVID-19 situation. Forty percent of population

were the target but due to COVID thirty eight percent can target.

3.3 Instrumentation

The research instrument were developed under the light of objectives of study and theoretical and conceptual framework of the current research. The research instrument were a closed ended items questionnaire based on five linker scale.

Table 3.3.1: *Development of the Research Instrument*

Development of the Research Instrument Five Linkert scale			
Use of TPACK Model		Teaching during COVID-19	
Technical Knowledge	3 items	Teaching Resources	3 items
Pedagogical Knowledge	3 items	Teacher Efficacy	4 items
Content Knowledge	4 items	Teacher Autonomy	3 items
10 items		10 items	
Total 20 Items			

The content validity of the tool were taken by the expert of Educational technology and instructional strategies of teaching working in the field of education.

Table 3.3.2 : *Reliability of the Instrument*

Research Instrument	*No. of Items*	*Cronbach Alpha*
Relationships Among Use of TPACK Model and Teaching during COVID-19 at Secondary School Level	20	.869

The above table shows that the research instrument developed by the researchers for analysis relationships among use of TPACK model and teaching during COVID-19 at secondary school level with the Cronbach alpha value (.869).

3.4 Data Collection

The data were collected through the online means by the utilization of google form due the pandemic situation created by COVID-19.

3.5 Data Analysis

The research were quantitative and the quantitative data were analyzed through the descriptive and inferential analysis. The researchers had utilized the descriptive analysis by applying mean, frequency and percentage, whereas Pearson correlation were used for analyses the hypothesis of the study.

4 DATA ANALYSIS & INTERPRETATIONS

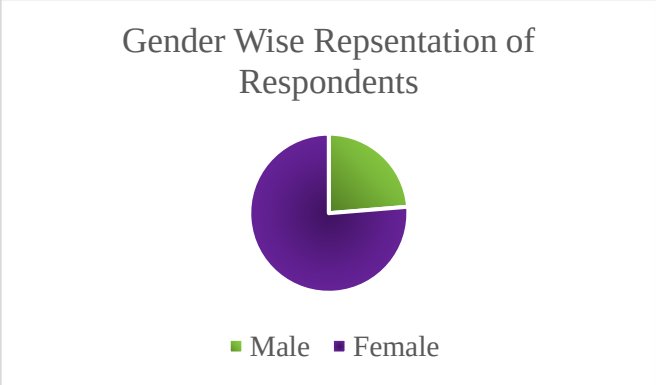
A. Descriptive Analysis

4.1 Representation of Respondents

Table 4.1: *Gender Wise Representation of Respondents*

Sr.no	*Gender*	*Frequency*	*Percentage*
1	Male	18	23.7
2	Female	58	76.3

Table 4.1 present the gender wise frequency teachers were participated male(F=18) and female(F=58).



Graph 4.1: *Gender Wise Representation of Respondents*

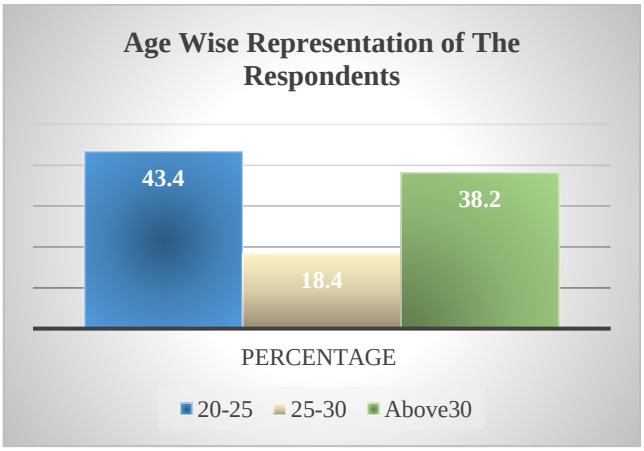
The above Graph 4.1 shows that from the sample the gender wise percentage teachers were participated male(P=23.7%) and female(P=76.3%).

4.2 Age Wise Representation of Respondents

Table 4.2: *Age Wise Representation of Respondents*

Sr.no	*Age*	*Frequency*	*Percent*
1	20-25	33	43.4
2	25-30	14	18.4
3	30 above	29	38.2

Table 4.2 present the age wise frequency teachers were participated were participated with age 20-25 (F=33), 25-30(F=14), and above 30 (F=29).

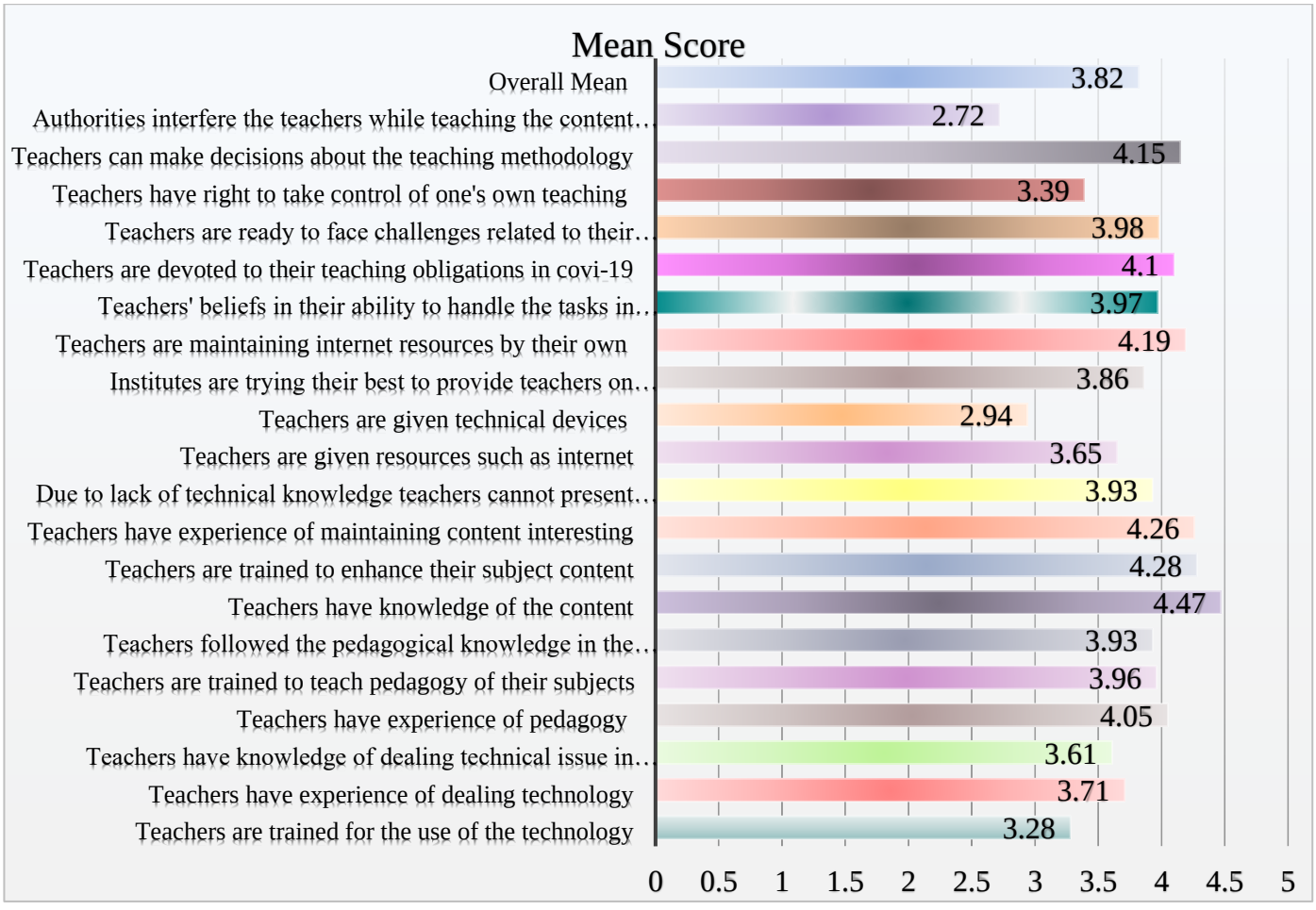


Graph 4.2: ***Age Wise Representation of Respondents***

The above Graph 4.2 present that from the sample age wise percentage of the teachers were participated with age 20-25 (P=43.3%), 25-30(P=18.4%), and above 30 (P=32.2%)

4.3 Item Wise Analysis

4.3.1 Mean Score Analysis



Graph 4.3: ***Mean Score Analysis of Items***

Above graph present the item wise mean score of the data. The highest mean score is (M=4.47) that mean teachers has full command on the content knowledge. Whereas lowest mean score is (M=2.72) which shows that there is lack of teachers autonomy in the classrooms as higher authorities interfere while teachers teaching.

4.4 Sub Factors Analysis

4.4.1 Sub factor analysis of use of TPACK Model

Table 4.4.1: ***Sub Factors Analysis of use of TPACK Model***

Sr.no	*Sub Factors*	*N*	*Means*
1	Technical Knowledge	76	10.618
2	Pedagogical Knowledge	76	11.94
3	Content Knowledge	76	13.02

The above table shows the factor wise analysis of mean score. The mean score is technical knowledge (M=10.618), pedagogical Knowledge(M=11.94) and content knowledge(M=13.02). Theses mean scores shows that teachers are not familiar with using the technology while teaching. More over the technical knowledge(M=10.618) has low mean score as compare to the pedagogical Knowledge(M=11.94) and content knowledge(M=13.02). The content knowledge(M=13.02) shows that teachers has full command on the content they have to teach whereas the pedagogical Knowledge(M=11.94) shows that teachers know that teaching strategies they need to teach the students.

4.4.2 Sub factor analysis of teaching during COVID-19

Table 4.4.2: ***Sub Factors Analysis of teaching during COVID-19***

Sr.no	*Sub Factors*	*N*	*Means*
1	Teaching Resources	76	14.57
2	Teacher Efficacy	76	10.276
3	Teacher Autonomy	76	12.065

Teaching during COVID-19 had three major factors Teaching Resources (M=14.57), Teacher Efficacy(M=10.276) and Teacher Autonomy(M=12.065). the mean scores shows that lack of technical effect the teachers efficacy(M=10.276) while teaching during COVID-19. Whereas institutions were trying their best to provide the teaching resources (M=14.57), to teachers but still they are insufficient. Teacher Autonomy(M=12.065) were not given to teacher but few teachers were agreed that there is write make their own decisions. interference by the educational authorities there is increase in teachers autonomy.

B. Inferential Statistics

4.5 Hypothesis Analysis

For hypothesis analysis researchers had utilized Pearson correlation formula to examine the relationship between the variables of the research.

Table 4.5: ***Pearson's Correlation Test***

	Test	*N*	*Results*	*Sig. (2-tailed)*
Relationships among use of TPACK Model and Teaching during COVID-19	Pearson Correlation	76	.619	0.01

By applying the Pearson correlation the data at the confidence level 90%and as (p=0.01, r=.619) shows that there is significant relationship between the both variables of the research at the 0.01 level (2-tailed) and the relationship is positive. Which means there is enough evidence to support the claim that there is relationship between the use of TPACK Model and teaching during COVID-19 at Secondary School Level.

Discussion

There is need to have a deeper understanding of the limitations and functions of the technology and the disciplinary environment in which it operates (Angeli & Valanides, 2009; Abbitt, 2011). Similarly in current research teaches efficacy is effected by the use of technology. Because there is lack of technical expertise and knowledge. In spite of the interference by the educational authorities there is increase in teachers autonomy.

Most of the teaches had fully command on the content knowledge but there is lack of technical and pedagogical knowledge, now a days teachers are taking command on the pedagogy. Whereas

according to present research teachers had command on content and pedagogy, as they are lacking behind in technology.

During COVID-19 the basic issue were the technical resources and their availability. Similarly according to the results of current research there were insufficient technical resources whereas educational institutes were trying their best in providing the recourses to the teachers.

Conclusions

The current study had concluded that there is the strong relationship between the utilization of TPACK Model and teaching practices during Pandemic 2020. Whereas there were lack of technical knowledge and teachers have fully command their content and pedagogy knowledge. Though the intervention of education authorities were exited, teachers' autonomy has increased to some extent. Moreover study results depicted that teachers were not trained for the use of technology and teachers need to trained about utilization of technology so that they can manage technology, content and pedagogy knowledge. Teachers were utilizing TPACK model intentionally and un intentionally.

Recommendations

The research recommended that:

1. Teachers should trained about the managing content and pedagogy knowledge with technology.
2. Teachers should be given proper technical resources for the teaching.
3. Teachers should be take command on technical knowledge ads it is the demand of 21st century.
4. There should be teacher's training program to improve teachers technological knowledge and dire need to provide free internet resources for teachers and students for active participation.

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