TECHMIND RESEARCH
ISSN: 2292-1648

International Journal of Management Excellence
Volume 12 No.3 April 2019

Measuring the Impact of Technological Pedagogical Content Knowledge on Teacher Resilience in Universities of Pakistan

Muddassaraha Sadaf[1*], Maria Tariq[2], Abdullah Haider[3]
Lecturer, Department of Management Sciences, National College of Business Administration & Economics[1]
Assistant Controller of Examination, National College of Business Administration & Economics[2]
Msc.National College of Business Administration & Economics[3]
mudasrasadafncbae@gmail.com[1]
mariatariq047@gmail.com[2]
abdullahhaider732@gmail.com[3]
[*]Corresponding author

Abstract- *The aim of this Empirical Paper is to determine the impact & linkage of Technological Pedagogical Content Knowledge with Teacher Resilience among teachers of Pakistan. Data collection was conducted in 7 universities, 5 Colleges, 3 Schools and 2 Academies including public and private educational institutes of 3 cities of Pakistan by using simple random sampling technique. Self-administered questionnaires were distributed among 425 teachers. With 92.94% response rate, 395 questionnaires were responded positively. 377 responses were found useable. Confirmatory Factor Analysis, Reliability Analysis, Frequency Distribution Analysis, Pearson's R correlation & Multiple linear Regressions analysis techniques were used to analyze the data on SPSS PSAW version 22.The Regression model is moderately parsimonious with 52.7% of the variance. TPACK Framework on the whole have positive impact (β=.439) & have positive strong significant relationship (.702**) at the 0.002 level of significance with teacher resilience. Technology Knowledge has positive impact (β=.478) & have positive moderate significant relationship (.461**),Pedagogy Knowledge has positive impact (β=.512) & have positive moderate significant relationship (.573**),Content Knowledge has positive impact (β=.412) & have positive moderate significant relationship (.398**),Pedagogical Content Knowledge has positive impact (β=.401) & has positive moderate significant relationship (.429**), Technological Pedagogical Knowledge has positive impact (β=.295) & have positive moderate significant relationship (.322**),Technological Content Knowledge has positive impact (β=.478) & have positive moderate significant relationship (.418**),Technological Pedagogical Content Knowledge has positive impact (β=.307) & have positive moderate significant relationship (.497**) & Context Knowledge has positive impact (β=.395) & has positive moderate significant relationship (.330**) with teacher resilience. This study is significant enough to support the teachers and educational policy makers to adopt technology based pedagogical approaches to foster resilience among teachers and educational settings. By using cross sectional research design, the study was conducted in context of Pakistan. The model can be studied by scholars in future by using longitudinal & time series research design to increase generalizability.*

Keywords- *Techno Resiliency; TPACK; Teacher Resilience; Education; Pakistan*

1. INTRODUCTION

Techno Resiliency as emerging theoretical framework of the century focus on techno pedagogical approaches to increase academic achievements (Graham, 2016)[6].Technology based pedagogical approaches are mixture of advanced analog and digital technologies and teaching approaches (Psillos & Paraskevas, 2017)[19]. The success of educational institutes is based on the level of understanding about changed paradigm of traditional approaches to ICT based modern teaching approaches (Urbina, Urbina, Polly, & Polly, 2017)[23].Now, Researchers have been focusing on Techno based pedagogical approaches in Science and Business educational institutes (Jang & Chen, 2010[10]; Rienties & Townsend, 2012)[20]. Academic scholars and Teachers consider ICT as a catalyst for change in Academic settings. Learning Styles, Teaching strategies, Class room effectiveness are molded according to new techno based pedagogical systems (Carlos, 2007[2]; Yuen, Law, & Wong, 2003)[26]. It is necessary for teachers to know the Technological pedagogical content knowledge (TPACK) to formulate strategies to bounce back in difficult situations not only in the student context but with the peer-competition context (Graham, 2016[6]; Jennings, Snowberg, Coccia, & Greenberg, 2011[11]; Urbina et al., 2017)[23].

From the start of 21st century, technology, pedagogy and knowledge, use of ICT (Information communication

technologies) are important aspects discussed under various studies (Rienties & Townsend, 2012)[20]. Students who study in traditional approaches used by instructors perform poor than pedagogical approaches used by instructors (Klimov, 2012)[12].The knowledge, usage and willingness to use ICT is important operant resource for teachers, which have hit the whole educational system(Rodriguez Casal, 2007)[21]. ICT facilitates a teacher to access the teaching material, disseminate information to their students and their instant response (Cox & Marshall, 2007)[3]. It is impossible to achieve high student engagement level without integrating ICT in classroom by teachers (Wankel & Blessinger, 2013)[24].

This study has theoretical roots in Techno Resiliency .it is new theoretical framework in Education. It changed the scholar's view of increasing academic Resilience (Graham, 2016)[6]. According to Techno Resiliency Theory, Knowledge and applications of IT based pedagogical approaches fosters academic Resilience (Graham, 2016)[6]. As this is emerging area so viewing the academic related concept through techno resiliency theory is still missing. After reviewing research articles on technology-enriched teaching strategies and learning pedagogical approaches in Education Settings & Resilience, it is found that researchers had studied the relationship of IT & PEDAGOGY with teacher's efficacy. A lack of explorations regarding study the relationship of technology-enriched teaching strategies and learning pedagogical approaches particularly TPACK with Resilience among teachers in general (Yuen et al., 2003)[26]. To bridge this gap, this study put a complete focus on studying the impact of Technology based pedagogy on teacher's resilience. This objective of study was to determine the impact of TPACK on Teacher's Resilience among teachers of Pakistan. This research question of study is:

"Does Technological Pedagogical Content Knowledge has any impact on resilience among teachers of Pakistan?"

2. REVIEW OF LITERATURE

Mishra and Koehler (2006)[15] framework for technological pedagogical content knowledge (TPACK) is one of the brief and most common theoretical frameworks for technology integration in educational settings. The knowledge and use of technology fosters educational competencies through improving pedagogical approaches (Urbina, Urbina, Polly, & Polly, 2017)[23]. TPACK is often described in the form of Venn diagram shown in Figure 1.

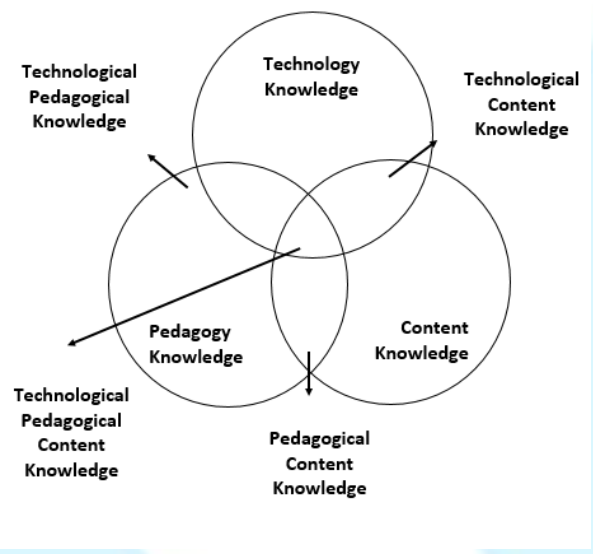

Figure 1: TPACK FRAMEWORK BY Mishra and Koehler (2006)

ICT creates and supports critical intellectual ability, artistic and imaginative intellectual and problem solving ability of teachers and students (Carlos, 2007)[2]. TPACK framework is extension of (Gudmundsdottir & Shulman, 1987)[7] PCK Framework by integration of Technology.(Pierson, 2001)[17] was the first scholar who realized the need of technology integration in PCK framework by (Gudmundsdottir & Shulman, 1987)[7].

Table 1: Brief Description of TPACK Framework

Construct	Definition
Technology Knowledge	*"The knowledge of operating systems, computer hardware, and the talent to install & use of software" (Bilici, Yamak, Kavak, & Guzey, 2013; Jang & Chen, 2010; Mishra & Koehler, 2006).*
Pedagogy Knowledge	*"Pedagogical knowledge (PK) is knowledge to teach in different methodologies" (Bilici et al., 2013; Jang & Chen, 2010; Mishra & Koehler, 2006).*

Content Knowledge	*"Content knowledge (CK) is knowledge of topics to be communicated by teacher" (Bilici et al., 2013; Jang & Chen, 2010; Mishra & Koehler, 2006).*
Pedagogical Content Knowledge	*"PCK is the knowledge to integrate pedagogy and content.it is used by teachers that how content is represented by different pedagogical & instructional approaches" (Bilici et al., 2013; Jang & Chen, 2010; Mishra & Koehler, 2006).*
Technological Pedagogical Knowledge	*"TPK is knowledge of the mixture of technology with pedagogy that how a teacher can integrate technologies with pedagogical approaches" (Bilici et al., 2013; Jang & Chen, 2010; Mishra & Koehler, 2006).*
Technological Content Knowledge	*"TCK is knowledge that how a teacher use technology to represent content" (Bilici et al., 2013; Jang & Chen, 2010; Mishra & Koehler, 2006).*
Technological Pedagogical Content Knowledge	*"TPCK is the mixture of teaching methodologies and technology.it is the knowledge that how teacher can use technologies to support existing teaching content and methodologies" (Bilici et al., 2013; Jang & Chen, 2010; Mishra & Koehler, 2006).*
Context Knowledge	*"CxK is the knowledge about context & how technology act in that context such as how teacher's views about culture & characteristics of students" (demographic and physical characteristics (Bilici et al., 2013; Jang & Chen, 2010; Mishra & Koehler, 2006).*
Teacher Resilience	*"The ability of teachers to bounce back in difficult situations" (Patterson, Collins, & Abbott, 2004; Smith et al., 2008).*

Resilience theory is based on how people deal with difficult situations and recover from difficult situations (Jennings, Snowberg, Coccia, & Greenberg, 2011)[11]. The theoretical roots of Resilience theory had been found in Children study who are more resilient than elders no matter what they faced in childhood (Goldstein & Brooks, 2005)[5]. Wellbeing, kindness, tractability, and ability to bounce back is fostered by Resilience in a worse environment (Mark & Semaan, 2008[14]; Pretsch, Flunger, & Schmitt, 2012)[18] .Teacher's resilience upsurge teacher's wellbeing and links with academic performance (Day & Kington, 2008[4]; Lyublinskaya & Tournaki, 2011[13]; Pretsch et al., 2012)[18][19]. There is clearly a need to better understand how the resilience process takes place within individual teachers and the role that technology and pedagogy play (Psillos & Paraskevas, 2017)[19]. According to TECHNO Resiliency theory, use of IT OR technology-enriched teaching strategies and learning pedagogical approaches in Education Settings creates a resilient academic culture (Graham, 2016)[6]. Much empirical work has to be done to investigate Resilience through perspective of techno resiliency theory (Graham, 2016)[6] . This study is a microscopic effort to explore the impact of TPACK on Teacher Resilience as Teachers are important to create personalities and communities. Based on Literature Review, the Model of the study had been expressed as;

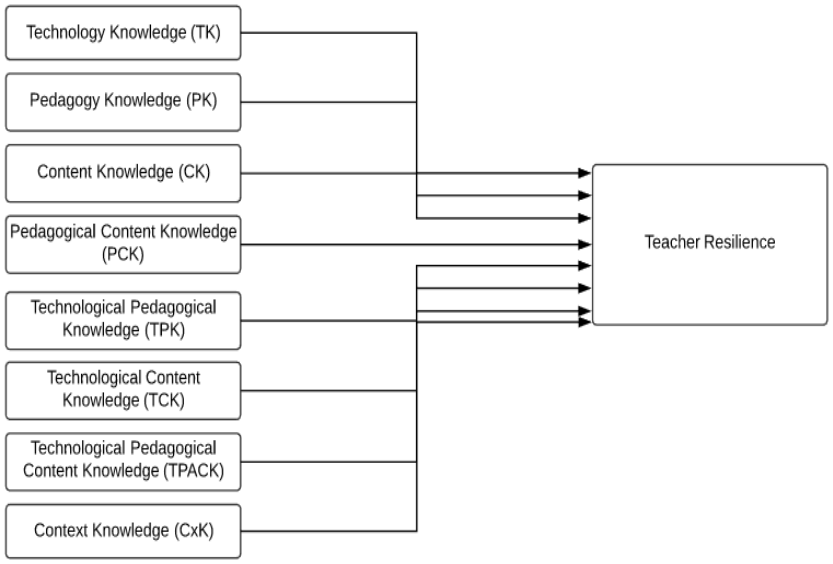

Figure 2: Model of Research Study

Hypothesis of this research study had been formulated on the base of Model of the study.

Hypothesis 1(H1).Teacher Resilience is related & reliant on TPACK Framework in educational institutes of Pakistan.

Hypothesis 1.1 (H1.1). Teacher Resilience is related & reliant on Technology Knowledge in educational institutes of Pakistan.
Hypothesis 1.2 (H1.2). Teacher Resilience is related & reliant on Pedagogy Knowledge in educational institutes of Pakistan.
Hypothesis 1.3 (H1.3). Teacher Resilience is related & reliant on Content Knowledge in educational institutes of Pakistan.
Hypothesis 1.4 (H1.4). Teacher Resilience is related & reliant on Pedagogical Content Knowledge in educational institutes of Pakistan.
Hypothesis 1.5 (H1.5). Teacher Resilience is related & reliant on Technological Pedagogical Knowledge in educational institutes of Pakistan.
Hypothesis 1.6 (H1.6). Teacher Resilience is related & reliant on Technological Content Knowledge in educational institutes of Pakistan.
Hypothesis 1.7 (H1.7). Teacher Resilience is related & reliant on Technological Pedagogical Content Knowledge in educational institutes of Pakistan.
Hypothesis 1.8 (H1.8). Teacher Resilience is related & reliant on Context Knowledge in educational institutes of Pakistan.

3. METHODOLOGY

Positivism is philosophical approach used in this study. The ontology of positivism is objectivity that there is one truth exists. By using deductive approach in quantitative research, 425 self-administered questionnaires were distributed in 7 universities, 5 Colleges, 3 Schools and 2 Academies including public and private educational institutes of 3 cities of Pakistan by using simple random sampling technique. With 92.94% response rate, 395 questionnaires were responded positively. 377 responses were found useable. The 377 respondents (Males: 125, Females: 188) of this study were university, college, school and academy level teachers of Pakistan. TPACK-SES survey developed by (Bilici et al., 2013) was used to measure Technology Knowledge (6 Items),Pedagogy Knowledge (8 Items), Content Knowledge (2 Items), Pedagogical Content Knowledge (10 Items),Technological Pedagogical Knowledge (7 Items),Technological Content Knowledge (4 Items),Technological Pedagogical Content Knowledge (6 Items), Context Knowledge (5 Items). 6 item- Brief Resilience Scale developed by (Smith et al., 2008) was used to measure Teacher Resilience. Five point Likert scale range from 1 (Strongly Disagree) to 5 (Strongly Agree).

4. DATA ANALYSIS

The model is analyzed through Confirmatory Factor Analysis (Principle Component Method), Reliability Analysis, Frequency Distribution Analysis and Multiple Regression Analysis by using SPSS PSAW Ver. 22.Factor loadings of items of each variable is examined through use of Principle Component Method. Confirmatory factor analysis (CFA) is a statistical technique used to verify the factor structure of a set of observed variables. CFA allows the researcher to test the hypothesis that a relationship between observed variables and their underlying latent constructs exists. Principal component analysis (PCA) is a statistical procedure that uses an orthogonal transformation to convert a set of observations of possibly correlated variables into a set of values of linearly uncorrelated variables called principal components. According to (J.F. Hair, Black, Babin, & Anderson, 2013), Factor loading between .3 & .4 is minimally acceptable.

5. RESULTS

5.1. Confirmatory Factor Analysis

Table 2 shows the factor loading of each item. All items were added as factor loadings of each item is greater than .30.

Table 2: Confirmatory Factor Analysis

Items of each Variable			Factor Loadings
1	Pedagogical Knowledge 1	I recognize individual differences in students.	.563
2	Pedagogical Knowledge 2	I can take steps to reduce the likelihood of disruptive student behavior in the classroom.	.688
3	Pedagogical Knowledge 3	I can manage my classroom effectively.	.496
4	Pedagogical Knowledge 4	I can prepare assessment tools for specific purposes.	.615
5	Pedagogical Knowledge 5	I can score assessment tools for specific purposes.	.624
6	Pedagogical Knowledge 6	I can use a variety of instructional strategies effectively.	.461
7	Content Knowledge 1	I can explain various concepts relevant to my subject.	.810
8	Content Knowledge 2	When I teach a content area, I can make appropriate connections to other content areas.	.810

9	Pedagogical Content Knowledge 1	I can my courses according to theoretical framework of national curriculum.	.432
10	Pedagogical Content Knowledge 2	I can identify instructional objectives for each topic in my course curriculum at each grade level.	.608
11	Pedagogical Content Knowledge 3	I can use a variety of instructional strategies to teach my course.	.364
12	Pedagogical Content Knowledge 4	I can use a variety of instructional methods for specific topics relevant to my course.	.367
13	Pedagogical Content Knowledge 5	I can address students' learning difficulties for specific topics relevant to my course.	.448
14	Pedagogical Content Knowledge 6	I can address students' misconceptions about specific topics relevant to my course.	.415
15	Pedagogical Content Knowledge 7	I can provide opportunities for students to conduct research on topics relevant to my course.	.411
16	Pedagogical Content Knowledge 8	I can choose appropriate assessment tools to evaluate students' learning of topics relevant to my course.	.527
17	Pedagogical Content Knowledge 9	I can determine what concepts need to be assessed in a specific topic relevant to my course.	.452
18	Pedagogical Content Knowledge 10	I can determine what skills need to be assessed for learning a specific topic relevant to my course.	.562
19	Technology Knowledge 1	I can explain the differences between hardware and software.	.636
20	Technology Knowledge 2	I can fix hardware problems.	.644
21	Technology Knowledge 3	I can install software.	.627
22	Technology Knowledge 4	I can use software.	.580
23	Technology Knowledge 5	I can choose appropriate technological tools.	.582
24	Technology Knowledge 6	I can explain the similarities between hardware and software.	.491
25	Technological Content Knowledge 1	I can prepare models that are used in my course related education with technological tools (animation and graphics software and etc.).	.643
26	Technological Content Knowledge 2	I can utilize technological tools to gather data relevant to my course.	.677
27	Technological Content Knowledge 3	I can use technological tools (e.g., spreadsheets, computer) to analyze data relevant to my course.	.733
28	Technological Content Knowledge 4	I can explain advantages of using technology in education relevant to my course.	.667
29	Technological Pedagogical Knowledge 1	I can determine technologies that are appropriate for students' grade level.	.951
30	Technological Pedagogical Knowledge 2	I can explain how to use technologies in my lesson plan.	.331
31	Technological Pedagogical Knowledge 3	I can explain how to manage a classroom that is equipped with technologies	.384
32	Technological Pedagogical Knowledge 4	I can answer students' questions about the technology use in my classroom.	.954
33	Technological Pedagogical Knowledge 5	I can utilize technological tools to make teaching processes more productive.	.530
34	Technological Pedagogical Knowledge 6	I can explain how technology affects student learning	.559
35	Technological Pedagogical Knowledge 7	I can assess student learning in a technology-rich lesson.	.954
36	Technological Pedagogical Content	I can use technological tools to determine students' misconceptions about my course.	.574

	Knowledge 1		
37	Technological Pedagogical Content Knowledge 2	I can use technological tools to assess student learning of my course.	.683
38	Technological Pedagogical Content Knowledge 3	I can apply my technological knowledge, content knowledge, and pedagogical knowledge all together to create an effective learning environment.	.577
39	Technological Pedagogical Content Knowledge 4	I can develop quality lesson plans using my technological knowledge, content knowledge, and pedagogical knowledge together.	.695
40	Technological Pedagogical Content Knowledge 5	I can use technological tools to assess students' prior knowledge about topics relevant to my course.	.676
41	Technological Pedagogical Content Knowledge 6	I can use technological tools to address students' misconceptions about topics relevant to my course.	.660
42	Context Knowledge 1	I consider students' socio-economic background, culture, and ethnicity when I teach my course.	.664
43	Context Knowledge 2	I take the physical characteristics of my classroom into account in my teaching.	.742
44	Context Knowledge 3	I consider the community around the school in my teaching.	.640
45	Context Knowledge 4	I assist my colleagues in blending technological knowledge, pedagogical knowledge, and content knowledge.	.679
46	Context Knowledge 5	I consider students' home environment in my teaching.	.643
47	Resilience 1	I tend to bounce back quickly after hard times (While Teaching my course).	.584
48	Resilience 2	I have a hard time making it through stressful events (While Teaching my course).	.695
49	Resilience 3	It does not take me long to recover from a stressful event (While Teaching my course).	.575
50	Resilience 4	It is hard for me to snap back when something bad happens (While Teaching my course).	.694
51	Resilience 5	I usually come through difficult times with little trouble (While Teaching my course).	.677
52	Resilience 6	I tend to take a long time to get over setbacks in my life (While Teaching my course).	.661

Extraction Method: Principal Component Analysis.
a. 1 components extracted.

5.2. Reliability Analysis

Cronbach's alpha is commonly used to check the reliability of measures (Joseph F Hair, Black, Babin, Anderson, & Tatham, 1998). Minimum acceptable Reliability value for Cronbach's alpha is .7 (Wu, Gennari, Huang, Xie, & Cao, 2017)[25]. According to Table 3, Data was found reliable as the value of Cronbach's Alpha is .743.

Table 3: Reliability Statistics

Cronbach's Alpha	N of Items
.743	54

5.3. Frequency Distribution Analysis

377 teachers (189 Males & 188 Females) from 17 educational institutes (both public & private educational institutes) including 7 universities, 5 Colleges, 3 Schools and 2 Academies of 3 cities of Pakistan had joined our research study. Field survey & online survey were mixed and used for Data collection. Demographic attributes of this study can be viewed in Table 4.

Table 4: Demographic Aspects

Age	
	Frequency
20-30	125
30-40	127
40-50	72
50-60	30
Above 60	23
Total	377
Gender	
	Frequency
Male	189
Female	188
Total	377
Level of Teaching	
	Frequency
University Level	232
College Level	80
School Level	31
Academy Level	34
Total	377
Subject Type	
	Frequency
Theoretical Subject	216
Numerical Subject	161
Total	377
Type of Teacher	
	Frequency
Visiting Teacher	31
Permanent Teacher	346
Total	377
Teaching Experience	
	Frequency
Less Than 1 Year	154
1-5 Year	83
5-10 Years	36
10-15 Years	62
15-20 Years	12
20-25 Years	21
More than 25 Years	9
Total	377

5.4. Model Estimation

Multiple linear regression was conducted on SPSS by using Enter method through following steps. Table 5 estimated Regression model. The Regression model is moderately parsimonious with 52.7 % of the variance.

Table 5: Result of the Regressions

Hypothesis				
		R2	**Linearity Assumption**	**Power of Model**
TPACK-Framework → Resilience	H1	.527	Satisfied (R2>.02)	Moderately Parsimonious

The nature of relationship, dependency existence & direction between variables is demonstrated in Table 6. TPACK Framework on the whole have positive impact (β=.439) & have positive strong significant relationship (.702**) at the 0.002 level of significance with teacher resilience. H1 is accepted. Technology Knowledge has positive impact (β=.478) & have positive moderate significant relationship (.461**) at the 0.047 level of significance with teacher resilience. H1.1 is accepted. Pedagogy Knowledge has positive impact (β=.512) &

have positive moderate significant relationship (.573**) at the 0.012 level of significance with teacher resilience. H1.2 is accepted. Content Knowledge has positive impact (β=.412) & have positive moderate significant relationship (.398**) at the 0.000 level of significance with teacher resilience. H1.3 is accepted. Pedagogical Content Knowledge has positive impact (β=.401) & have positive moderate significant relationship (.429**) at the 0.000 level of significance with teacher resilience. H1.4 is accepted. Technological Pedagogical Knowledge has positive impact (β=.295) & have positive moderate significant relationship (.322**) at the 0.001 level of significance with teacher resilience. H1.5 is accepted. Technological Content Knowledge has positive impact (β=.478) & have positive moderate significant relationship (.418**) at the 0.015 level of significance with teacher resilience. H1.6 is accepted. Technological Pedagogical Content Knowledge has positive impact (β=.307) & have positive moderate significant relationship (.497**) at the 0.003 level of significance with teacher resilience. H1.7 is accepted. Context Knowledge has positive impact (β=.395) & have positive moderate significant relationship (.330**) at the 0.036 level of significance with teacher resilience. H1.8 is accepted.

Table 6: Results of Hypothesis

		P-Value	Unstandardized Coefficient Beta	Correlations	Significance of Relationship	Generalizability of Results	Results
Hypothesis			**(β)**		**(P-Value<.05)**		
TPACK-Framework → Resilience	H1	.002	.439	.702**	Positive Strong Significant	Generalizable (P-Value<.05)	Accepted
Technology Knowledge→ Resilience	H1.1	.047	.478	.461**	Positive Moderate Significant	Generalizable (P-Value<.05)	Accepted
Pedagogy Knowledge→ Resilience	H1.2	.012	.512	.573**	Positive Moderate Significant	Generalizable (P-Value<.05)	Accepted
Content Knowledge→ Resilience	H1.3	.000	.412	.398**	Positive Moderate Significant	Generalizable (P-Value<.05)	Accepted
Pedagogical Content Knowledge→ Resilience	H1.4	.000	.401	.429**	Positive Moderate Significant	Generalizable (P-Value<.05)	Accepted
Technological Pedagogical Knowledge → Resilience	H1.5	.001	.295	.322**	Positive Moderate Significant	Generalizable (P-Value<.05)	Accepted
Technological Content Knowledge → Resilience	H1.6	.015	.478	.418**	Positive Moderate Significant	Generalizable (P-Value<.05)	Accepted
Technological Pedagogical Content Knowledge → Resilience	H1.7	.003	.307	.497**	Positive Moderate Significant	Generalizable (P-Value<.05)	Accepted
Context Knowledge→ Resilience	H1.8	.036	.395	.330**	Positive Weak Significant	Generalizable (P-Value<.05)	Accepted

Correlation is significant at the 0.01 level (2-tailed). **
Correlation is significant at the 0.05 level (2-tailed).*

6. DISCUSSION, PRACTICAL IMPLICATIONS & CONCLUSION

The nature of dependency and relationships was examined between eight dimensions of TPACK Framework (Content Knowledge, Technology Knowledge, Pedagogy Knowledge, Pedagogical Content Knowledge, Technological Content Knowledge, Technological Pedagogical Knowledge, and Technological Pedagogical Content Knowledge & Context Knowledge) & Teacher Resilience in the educational institutes of Pakistan. It is found that TPACK has positive influence on Teacher Resilience .It directs that knowledge & use of information communication techno based pedagogical approaches by teachers helps to increase the self-confidence & ability to survive in difficult classroom setting or organizational settings. Resource provision increase the teacher engagement, teacher satisfaction, teacher commitment, teacher self-efficacy & reduces job stress and class room boredom. .A engaged, committed & resilient teacher eagerly and passionately work to not only teach but to create change in student's lives. Technology is considered as a key resource integrator to increase learning density of teachers & students. Well established technological systems, knowledge & willingness to use in educational institutes is Composite operant resource of teachers & helps them to provide excellent services to create value. A teacher is more resilient in educational setting provides him/her to grow & flourish.

The study examined the model in the context of only 3 cities of Pakistan by using cross sectional research design. Academic scholars can conduct longitudinal time series research to dig deep in the area of research. More over this study was conducted on overall teachers. Comparative study can also be conducted to sightsee it in broader term. This study beautifully explains the Teacher's need of TPACK to become resilient. Teachers can utilize this study to formulate their cut throat teaching strategies by mixing content, context, and technology and pedagogy knowledge. Educational Policy makers may found this study significant in educational policy making (System development & resource provision).Higher Education Commission may find it interesting in term of continuous improvement in educational institutes as fraud and fake degree mafia is becoming a zombie for educational system of Pakistan.

7. REFERENCES

[1] Bilici, S. C., Yamak, H., Kavak, N., & Guzey, S. S. (2013). Technological Pedagogical Content Knowledge Self-Efficacy Scale (TPACK-SeS) for Pre-Service Science Teachers: Construction, Validation, and Reliability. Eurasian Journal of Educational Research, 52, 37-60.

[2] Carlos, R. C. (2007). ICT for education and development. info, 9(4), 3-9. doi:doi:10.1108/14636690710762093

[3] Cox, M. J., & Marshall, G. (2007). Effects of ICT: do we know what we should know? Education and Information Technologies, 12(2), 59-70.

[4] Day, C., & Kington, A. (2008). Identity, well-being and effectiveness: The emotional contexts of teaching. Pedagogy, culture & society, 16(1), 7-23.

[5] Goldstein, S., & Brooks, R. B. (2005). Resilience in children: Springer.

[6] Graham, R. (2016). Techno-resiliency in education: Springer.

[7] Gudmundsdottir, S., & Shulman, L. (1987). Pedagogical content knowledge in social studies. Scandinavian Journal of Educationl Research, 31(2), 59-70.

[8] Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2013). Multivariate Data Analysis: Pearson Education Limited.

[9] Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (1998). Multivariate data analysis (Vol. 5): Prentice hall Upper Saddle River, NJ.

[10] Jang, S.-J., & Chen, K.-C. (2010). From PCK to TPACK: Developing a transformative model for pre-service science teachers. Journal of Science Education and Technology, 19(6), 553-564.

[11] Jennings, P. A., Snowberg, K. E., Coccia, M. A., & Greenberg, M. T. (2011). Improving classroom learning environments by cultivating awareness and resilience in education (CARE): Results of two pilot studies. The Journal of Classroom Interaction, 37-48.

[12] Klimov, B. F. (2012). ICT versus traditional approaches to teaching. Procedia-Social and Behavioral Sciences, 47, 196-200.

[13] Lyublinskaya, I., & Tournaki, N. (2011). The effects of teacher content authoring on TPACK and on student achievement in algebra: Research on instruction with the TI-Nspire handheld. Paper presented at the Society for Information Technology & Teacher Education International Conference.

[14] Mark, G., & Semaan, B. (2008). Resilience in collaboration: Technology as a resource for new patterns of action. Paper presented at the Proceedings of the 2008 ACM conference on Computer supported cooperative work.

[15] Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. Teachers college record, 108(6), 1017.

[16] Patterson, J. H., Collins, L., & Abbott, G. (2004). A study of teacher resilience in urban schools. Journal of Instructional Psychology, 31(1), 3.

[17] Pierson, M. E. (2001). Technology integration practice as a function of pedagogical expertise. Journal of research on computing in education, 33(4), 413-430.

[18] Pretsch, J., Flunger, B., & Schmitt, M. (2012). Resilience predicts well-being in teachers, but not in

non-teaching employees. Social Psychology of Education, 15(3), 321-336.
[19] Psillos, D., & Paraskevas, A. (2017). Teachers' Views of Technological Pedagogical Content KnowledgeTechnological Pedagogical Content Knowledge (TPACK): The Case of Compulsory Education Science in-Service Teachers. In Research on e-Learning and ICT in Education (pp. 231-240): Springer.
[20] Rienties, B., & Townsend, D. (2012). Integrating ICT in business education: using TPACK to reflect on two course redesigns. In Learning at the Crossroads of Theory and Practice (pp. 141-156): Springer.
[21] Rodriguez Casal, C. (2007). ICT for education and development. info, 9(4), 3-9.
[22] Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: assessing the ability to bounce back. International journal of behavioral medicine, 15(3), 194-200.
[23] Urbina, A., Urbina, A., Polly, D., & Polly, D. (2017). Examining elementary school teachers' integration of technology and enactment of TPACK in mathematics. The International Journal of Information and Learning Technology, 34(5), 439-451.
[24] Wankel, C., & Blessinger, P. (2013). Increasing student engagement and retention in e-learning environments: Web 2.0 and blended learning technologies: Emerald Group Publishing Limited.
[25] Wu, T. T., Gennari, R., Huang, Y. M., Xie, H., & Cao, Y. (2017). Emerging Technologies for Education: First International Symposium, SETE 2016, Held in Conjunction with ICWL 2016, Rome, Italy, October 26-29, 2016, Revised Selected Papers: Springer International Publishing.
[26] Yuen, A. H., Law, N., & Wong, K. (2003). ICT implementation and school leadership: Case studies of ICT integration in teaching and learning. Journal of Educational Administration, 41(2), 158-170.