Investigating Teachers' Educators and Prospective Teachers' Technological Padagogical Content Knowlegde and its Impact on their Learning at Bachelor Level in Education

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Abstract- The purpose of the study was to investigate the status of technological pedagogical content knowledge of Bachelor ofEducation teachers. This study critically examined the teachers' competency (competencies) that has a profound impact on learning process; the competencies were related to TPACK. It was an attempt to find probable reasons as to why teachers disengage with technology. Review of literature reported that technological integration with pedagogy played a crucial role in 21st century classroom practices. For this research, the data was collected adapting Denise A. Schmidt questionnaire. Mixed method research was applied to conduct this research and the population was the teacher educators and prospective teachers from private and public teacher education institutions of Karachi. Purposive and convenient sampling has been taken from teachers of government and private institutions for the reason of having diverse and rich opinions and feedbacks. Data was analyzed and it was found that teachers were of the view that teaching competencies have direct effect on the learning process.The results revealed that technological knowledge of both the teacher educators and prospective teachers has significant impact on learning process. The results also provided evidence that pedagogical knowledge promoted learning. Survey results also showed that proficiency in TPACK brings in a positive impact on teaching- learning process and caters skills for education in 21st century. This research recommended further research to design the instructional curriculum to broaden learning.

Keywords: TPACK, Teacher Educators, Prospective Teachers, Bachelor in Education, Pedagogy

I. INTRODUCTION

The purpose of knowledge is to develop oneself and the others through transferring it. The transferring of knowledge according to (Wallace, 2009)is a process which is known as education. This is why education is broadly viewed as the intellectual and moral training of individuals through which their potentialities are developed and the culture of the people is transmitted to the coming generations (Khalid, 1998). The essential purpose of education is to search the truth and develop the mental and physical abilities of man in such a manner that the prospects of the humans may be understood (Annick, Brennan, 2001).

Morrison, Ross and Kemp (2001) declared that education is a primary need as that "every nation attempts to educate its future generation, educational systems are framed and launched to attain educational objectives of the nations." It is education that is considered as a change agent; an instrument to change, develop and sustain the social, cultural, economic and political setup of a nation. The effectiveness of education, according to Rashid (1993), is based on careful selection of life experiences, essentially required for human resource development and their inculcation among the learners using appropriate instructional techniques, media, audio visual (AV) aids etc. by the teachers. Rather (2004), in this context, explains that instructional techniques, media and A.V aids used for effective teaching-learning process constitute instructional technology.

The instructional design holds much importance amongst the mechanisms and components of education system. Instructional design is described as the method concerned in planning of instruction at the basic stage (Magliaro, S.G., Shambaugh, N., 2006). It is also defined as the entire systematic and reflective process of analyzing the principles of learning and instruction into delivery plans for meeting needs (Smith, P. L., & Ragan, T. J., 1999).

It is apparent that the teaching learning process becomes more effective by using instructional technology in instructional design. Saettler, as cited in Samreen Akram et al. (2012), highlighted the terms instructional

material, instructional technology, instructional media, and audio-visual material as teaching aids. Consequently, a positive relationship is developed between students' academic performances and the instructional materials usage. Dahar and Faize (2011) quotes that availability of instructional materials accompanied with the teacher education results in quality learning in classrooms.

In the recent era, there is addition of internet and electronic devices in the instructional materials with the aim to promote individuals' learning along with saving time.The term 'educational technology' is introduced that refers usage of technology in classrooms to promote paced learning, helping teacher and learners (Singh. Y, Sharma. T, Upadhya. B, 2008). The technology integration in classrooms has become a hot issue (Chen, Y. H., & Jang, S. J., 2014) this is why preparing teachers to incorporate technology is the challenge of the day. Capper (2003) pinpoints the issue that the teachers despite of having access to technology will not be able to incorporate it in their classrooms due to lack technical knowledge. He suspects that these teachers find it technological incorporation difficult or lack sufficient time relying on their current teaching practices. Keeping it in view that the effective learning environment is created with the integration of both the teaching aids and methodology.

Analyzing the scenario, pre-service teachers though are regarded as digital natives, in most cases, they are not confident enough how to integrate ICT into teaching and learning. In their multiple case studies, (Tondeur, J., Roblin, N. P., van Braak, J., Fisser, P., & Voogt, J., 2013) specified that teacher education curriculum should have positive effect of instructional technology resulting in providing pre-service teachers to experience ICT usage across different domains. Thus, technological pedagogical content knowledge (TPACK) is a current teacher education framework that has a notching interest since 2010. In various contexts, several studies have been conducted to understand instructional design of teachers at B.Ed. level. However, there's little known about teachers' technological pedagogical content knowledge and its impact at B.Ed. level.

II. STATEMENT OF THE PROBLEM

The quality education is directly related to the quality of instruction in the classrooms. Though quality teaching matters for student learning outcomes. A teacher is considered as the most crucial factor in implementing all educational reforms at the grass root level meeting the expectations of students, the requirements of both today and for future.

The quality of education depends on the ability, hard work and dedication of the teacher. If a teacher fails to keep himself in touch with the rapid scientific and educational developments then he would become inefficient and ineffective as indicated (Govt., 1998) that the teacher is considered the most crucial factor in implementing all instructional reforms at the grassroots level. It is a fact that the academic qualifications, knowledge of the subject matter, competence and skills of teaching and the commitment of the teacher have effective impact on the teaching learning process. The report of Commission on National Education has similar statement as "we say it with force and without reservation that none of the reforms we are proposing will succeed unless we are able to recruit to the teaching profession at all levels men and woman of the highest abilities, and can train them" (Pakistan, 1959). Many factors are responsible for shaping the quality teaching. These include ideological and socio-economic needs, existing structure of education system, and well-defined theories and practices of teaching and learning.

III. PURPOSE OF THE STUDY

The teacher education system has quantitatively expanded to keep a reasonable equilibrium in the demand and supply situation. On the contrary, the qualitative dimension of teacher education programs has received only marginal attention resulting in mass production of teachers with shallow understanding of both the content and the methodology. With the revival in the course work of ADE and B.Ed. (Hons.), there's a shift in paradigm of the teacher education programs. There are now more opportunities to better comprehend prospective teachers' learning, curriculum resources and teaching, and content information that can enhance the performance of teachers and learners.

In view of the importance and potential utility of instructional technology in teaching-learning process, it has become an integral part of the curriculum for prospective teachers training. The difference between current and future elementary digital native students and their digital immigrant teachers (S.Bayne & Y. Ross, 2007) may be due to the incapacity of educators to capitalize on learners' funds of knowledge (N. Gonzalez, L.C. Moll, C. Amanti, 2005). Furthermore, (Efe, 2011) indicates that "teacher training is very important in the development of future teachers' knowledge and skills regarding educational technology." The purpose of the study is to investigate the effectiveness of teaching skills development and technological, pedagogical, content knowledge of both the prospective teachers and Teacher educators. It aims to survey

in-depth the impact of technological, pedagogical, content knowledge on teaching learning process. This study will help to find the perspective of the teachers about technology and will also lead to discovering an effective way of teaching at B.Ed. level.

IV. THE OBJECTIVE OF THE STUDY

In order to achieve the purpose of the research, following objectives have been developed;
• To determine importance and indicators of good teaching.
• To investigate the status of teacher education in Pakistan as reflected in educational policies.
• To analyze the status of teacher education in Sindh.
• To study the interaction of subject content, pedagogy, and technology in effective teaching learning process.
• To explore perception about 21st century prospective teachers and teacher educators.
• To inquire the TPACK proficiency level of 21st century teacher educators.
• To assess prospective teachers' advance in knowledge about TPACK during the B.Ed. (Hons.) coursework.
• To find out the reasons about the teachers' disengagement with technology.
• To explore the competency (competencies) of teacher educators that according to them has a profound impact on learning process.
• To propose the teachers with the new concept of TPACK (Technological, Pedagogical, Content Knowledge) framework.

V. NULL HYPOTHESIS

Ho1:There is no significantimpact of Teacher educators'TechnologicalKnowledge in teaching learning process.
Ho2:There is no significantimpact of Teacher educators' PedagogicalKnowledge in teaching learning process.
Ho3:There is no significant impact of Teacher educators' TPACK proficiencylevel in teaching learning process.
Ho4: There is no significant impact of Prospective teachers' TechnologicalKnowledge in teaching learning process.
Ho5: There is no significant impact of Prospective teachers' PedagogicalKnowledge in teaching learning process.
Ho6:There is no significant impact of Prospective teachers' TPACK proficiencylevel in learning process.

VI. REVIEW OF LITERATURE

Research on the instructional uses of technology, however, has revealed that teachers often lack the knowledge to successfully integrate technology in their teaching and their attempts tend to be limited in scope, variety, and depth. Thus, technology is used more as "efficiency aids and extension devices" (R. McCormick & P. ScrimshaW., 2001) rather than as tools that can "transform the nature of a subject at the most fundamental level" (p. 47). One way in which researchers have tried to better understand how teachers may better use technology in their classrooms has focused on the kinds of knowledge that teachers require in order to use technology more effectively. Shulman (1986) proposed that effective teaching requires a special type of knowledge, pedagogical content knowledge (or PCK), that represents "the blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction" (p. 8). The central idea of PCK is that learning to teach a particular subject matter requires not only understanding the content itself but also developing appropriate instructional strategies and skills that are appropriate for learners.
Grossman (1990) considered PCK in view of the model of Shulman. Grossman isolated PCK into four distinct regions: (a) learning and convictions, (b) topic information, (c) curricular learning, and (d) pedagogical substance learning.
Grossman (1990) states that the first part that is alluded to learning and convictions about the reasons for showing a subject at distinctive evaluations. It incorporates educators' convictions about significance of subject for understudies, and instructors, reasons for showing the substance.
As expressed above, Shulman (1986, 1987), and Grossman (1990) did not examine innovation and its connections to teaching method and substance, since the field of instruction had not experienced the

current Personal Computer advancements until 1990s (Koehler M. and Mishra P., 2008). Mishra and Koehler's (2006) formulation of the technological, pedagogical, and content knowledge (TPACK) framework extended Shulman's (1986) characterization of teacher knowledge to explicitly consider the role that knowledge about technology can play in effective teaching. Specifically, three major knowledge components form the foundation of the TPACK framework as follows:

• Content knowledge (CK) refers to any subject-matter knowledge that a teacher is responsible for teaching.

• Pedagogical knowledge (PK) refers to teacher knowledge about a variety of instructional practices, strategies, and methods to promote students' learning.

• Technology knowledge (TK) refers to teacher knowledge about traditional and new technologies that can be integrated into curriculum.

It is accepted generally that teachers need to blend their classroom practices with technological knowledge for the bigger success of learners. TPACK is a knowledge construct that combines technology, pedagogy and content since the effectiveness of technology in teaching and learning relies heavily on teachers' pedagogical orientations.

VII. RESEARCH METHODOLOGY

"This study will use a Mixed Methods (Tiddlie, 2003) design, which is a procedure for collecting, analyzing and "mixing" both qualitative and quantitative data at same stage of research process within a single study, to understand a research problem more completely (Creswell, 2002).

In the present research, the population is limited and targets the teacher educators and prospective teachers of B.Ed. level. The researcher has selected "seven educational colleges and departments" of Karachi and the selection indicates the whole population. The results will be directly generalizable to all teacher educators and prospective teachers in Karachi.

The researcher constructed two mixed questionnaires; the first for teacher educators of B.Ed. (Hons.) level that had 25 close-ended and 3 open-ended questions. Whereas, the second questionnaire had 26 close-ended questions and 3 open-ended questions was filled by prospective teachers of B.Ed. (Hons.) level. The questionnaires were aimed to assess the technological pedagogical content knowledge and its impact on teaching learning process. The data collected by close-ended questions were analyzed as separate items using percentage method and calculated with tabulated and graphical representation followed by narration of the results achieved.

The qualitative data from open-ended questions were analyzed by the responses of the respondents by selecting themes and driven by the main idea. The null hypotheses were then tested using the chi- square and on the basis of this method the researcher came to know if the null hypotheses were rejected or accepted.

A sample of 158 respondents in which 50 were Teacher Educators and 108 were Prospective Teachers participated in the study. A self-administered closed ended Likert type (5 point scale) instrument was used to collect quantitative data, while qualitative data was collected from principals and curriculum developer via interviews. The data was analyzed using Statistical Package for Social Science (SPSS) version 19 and MS Excel. Further, qualitative data was analyzed through thematic analysis.

One tailed chi square goodness of fit method is used to determine the computed value by comparing frequency observed and frequency expected in order to test the hypothesis. Later, the computed chi square value is compared with the tabulated value. If computed value is greater than the tabulated value the null hypothesis gets rejected and research hypothesis gets accept.

VIII. ANALYSIS

8.1   Analysis of Quantitative Questions Collected from Teacher Educators and ProspectiveTeachers
8.1.1   Teacher Educator's Knowledge
Ho1:There is no significantimpact of Teacher educators'TechnologicalKnowledge in teaching learning process.

Options	Frequency Observed f_o	Frequency Expected f_e	Difference	Difference^2	Difference^2/ Expected
Strongly Disagree	2.08	10	-7.92	62.73	6.27

Disagree	4.08	10	-5.92	35.05	3.50
Undecided	3.54	10	-6.46	41.73	4.17
Agree	28.38	10	18.38	337.82	33.78
Strongly Agree	11.92	10	1.92	3.69	0.37
Total	**50**	**50**	**0**	**481.02**	**48.10**

Ho2:There is no significantimpact of Teacher educators' PedagogicalKnowledge in teaching learning process.

Options	Frequency Observed f_o	Frequency Expected f_e	Difference	Difference^2	Difference^2/ Expected
Strongly Disagree	1.89	10	-8.11	65.77	6.58
Disagree	0.11	10	-9.89	97.81	9.78
Undecided	2.11	10	-7.89	62.25	6.23
Agree	28.33	10	18.33	335.99	33.60
Strongly Agree	17.56	10	7.56	57.15	5.72
Total	**50**	**50**	**0**	**618.98**	**61.90**

Ho3:There is no significant impact of Teacher educators' TPACK proficiencylevel in learning process.

Options	Frequency Observed f_o	Frequency Expected f_e	Difference	Difference^2	Difference^2/ Expected
Strongly Disagree	8	10	-2	4.00	0.40
Disagree	4	10	-6	36.00	3.60
Undecided	3	10	-7	49.00	4.90
Agree	23	10	13	169.00	16.90
Strongly Agree	12	10	2	4.00	0.40
Total	**50**	**50**	**0**	**262.00**	**26.20**

Combined Result

Hypothesis #	**Computed Value**	**Tabulated value**
Ho$_1$	48.10	9.488
Ho$_2$	61.90	9.488
Ho$_3$	26.20	9.488
Total	**136.20**	**28.464**

Since the calculated value falls in the rejected region i.e. the tabulated value is less than the computed value in both the tables, therefore, the null hypothesis is rejected and it is concluded that there is a significant impact of Teacher educators' Technological, Pedagogical Knowledge and all combined TPACK proficiency level in teachinglearning process.

8.1.2   Prospective Teacher's Knowledge

Ho4: There is no significant impact of Prospective teachers' TechnologicalKnowledge in teaching learning process.

Options	Frequency Observed f_o	Frequency Expected f_e	Difference	Difference^2	Difference^2/Expected
Strongly Disagree	3.15	21.6	-18.45	340.40	15.76
Disagree	4.62	21.6	-16.98	288.32	13.35
Undecided	11.85	21.6	-9.75	95.06	4.40
Agree	70.69	21.6	49.09	2409.83	111.57
Strongly Agree	17.69	21.6	-3.91	15.29	0.71
Total	108	108	0	3148.90	145.78

Ho5: There is no significant impact of Prospective teachers' PedagogicalKnowledge in teaching learning process.

Options	Frequency Observed f_o	Frequency Expected f_e	Difference	Difference^2	Difference^2/Expected
Strongly Disagree	0	21.6	-21.6	466.56	21.60
Disagree	0.44	21.6	-21.16	447.75	20.73
Undecided	17.56	21.6	-4.04	16.32	0.76
Agree	73	21.6	51.4	2641.96	122.31
Strongly Agree	17	21.6	-4.6	21.16	0.98
Total	108	108	0	3593.75	166.38

Ho6:There is no significant impact of Prospective teachers' TPACK proficiencylevel in learning process.

Options	Frequency Observed f_o	Frequency Expected f_e	Difference	Difference^2	Difference^2/Expected
Strongly Disagree	1	21.6	-20.6	424.36	19.65
Disagree	2	21.6	-19.6	384.16	17.79
Undecided	13	21.6	-8.6	73.96	3.42
Agree	76	21.6	54.4	2959.36	137.01
Strongly Agree	16	21.6	-5.6	31.36	1.45
Total	108	108	0	3873.20	179.31

Combined Result

Hypothesis #	Computed Value	Tabulated value
Ho4	145.78	9.488
Ho5	166.38	9.488
Ho6	179.31	9.488
Total	491.47	28.464

Since the calculated value falls in the rejected region i.e. the tabulated value is less than the computed value in both the tables, therefore, the null hypothesis is rejected and it is concluded that there is a significant impact of Prospective Teachers' Technological, Pedagogical Knowledge and all combined TPACK

proficiency level in teaching learning process.

8.2   Analysis of Qualitative Questions Collected from Teacher Educators and ProspectiveTeachers

With analysis of the qualitative questions that were conducted via questionnaires from teacher educators and prospective teachers of both public and private education colleges was concluded through the Inductive approach of thematic analysis.

In order to get accustomed with the in-depth visualization and anticipation of teacher educators and prospective teachers about the technological pedagogical content knowledge at B.Ed. level, few qualitative questions were asked. These questions were as follows:

1.   Which competencies (Content Knowledge, Technology and Pedagogy) of Teachers, according to you have a profound impact on the learning process of learners?

2.   Is technology an opportunity or hindrance? What challenges do the teachers face in using technology?

3.   Do you agree with the statement, "TPACK is an effective and potential framework for teachers in 21st century"? Comment.

These were 3 open ended questions in the questionnaire. The codes were induced from the research questions before the collection of data following themes were formulated.
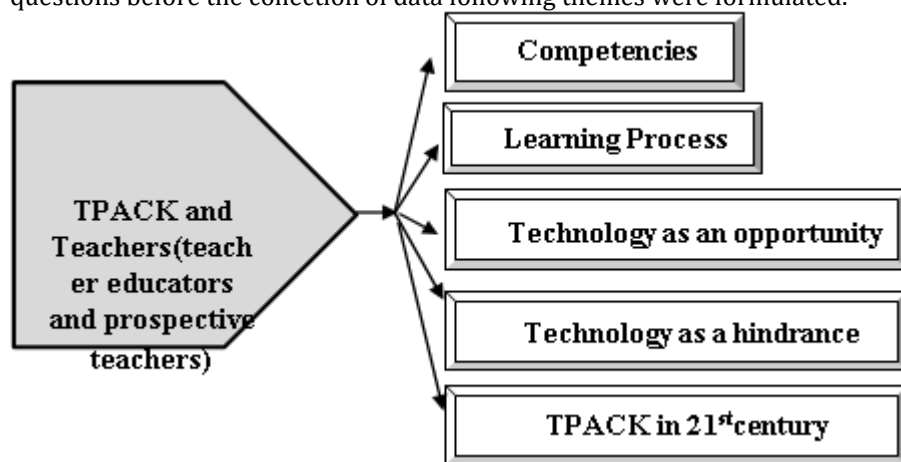
Theme 1: Competencies

Responses of Teacher Educators

The teacher educators hold more responsibility than just teaching. Almost all the teacher educators had the identical answers that the competencies of the teacher educators had influence on learners' learning. Though there were differences too as some of teacher educators gave ranking among competencies. Their responses were;

"The teacher educators must have sufficient basic subject knowledge. They must know how to teach" (Teacher 8).

"Teacher educators are role model to them. There are two folded responsibilities upon every teacher educator; one being content, other the pedagogy" (Teacher 3).

"Technology and pedagogy have hybrideffect. For effective learning the teacher educators have to realize the importance of all competencies in 21st century" (Teacher25).

Another teacher opined:

"Firstly, the most important is pedagogy, and then comes content later technology."

While some others responded that they followed the same "teaching methods" as earlier, they "combine content and pedagogy" but "technology", "the digital way" of teaching makes content tough and weakens the teacher-learner bond.

"I believe in traditional methods i.e. content and pedagogy. I could make interactivelessons without using technological tools" (Respondent 48).

Responses of Prospective Teachers

Since prospective teachers are digital natives. They believe in more interactive learning as the B.Ed. (Hons.) course moves in the same combination of all three competencies. "Subject Knowledge is not enough while teaching. There needs to be the method and technology too."

Another viewed as; "To enhance learning, a teacher shouldknow delivering, classroommanagement, assessment, conceptual learning. S/he must aim at all round acquisition of the concept."

16% of the respondents indicated that technology plays one of the important roles in teaching learning process. Technological competency was highlighted by teachers in the words of "internet", "media",

"multimedia,and "e-learning" as the most important skill. One of the teachers stated:

"Today content can be learnt with technology. It makes lessons interesting, making teaching easier."

Although the ratio was comparatively less towards these but the teachers exclaimed that being grown-up learner, they enjoyed learning the most where there was a combinationof all three main competencies of technology, pedagogy and content knowledge.As one other prospective teacher opined:

"There are no three competencies, but a number of them that teacher combine for profound learning."

Theme 2: Learning Process

Responses of Teacher Educators

The teacher educators held differentiated response regarding the impact of the competencies on learning process of learners. One of the teacher educator exclaimed; "Teachers having pedagogical knowledge have everlasting impact on students"(Teacher 7).

Another teacher was of the opinion; "The teacher that has efficient content knowledgecan make learning everlasting"(Teacher 29).

Teacher educators termed learning process was as "effective learning", "constructivelearning", "ideological change" and "appropriate teaching and technology" (Teacher 43).

Teacher competency refers to all teacher-related characteristics that produce favorable educational outcomes (Cochran-Smith & Fries, 2005) such as student performance on standardized tests (Agostino & Powers, 2009)

Some of the teacher educators responded;

"The learning process goes on whether the teacher has competencies or not"(Teacher 4).

"Learning process is not restricted to any of the competencies" (Teacher 42).

Thus the way teacher educators deliver the content, there's an inscription upon the learners affecting the learning process.

Responses of Prospective Teachers

Prospective teachers nearly had the same responses. Their responses could be classified in three categories. 16% were those who limited their responses by replying about the level or rate of change in response to selection of competencies while 45% of the teachers highlighted some of the dynamics of learning process in 21st century. To the researcher's amazement, 39% of the answers were those among which some didn't reply, a few answers were not appropriate, while some did not have any idea about it which can be concluded that those were unable to anticipate the impact of competencies over learning process.

Among the 16% respondents, one of the prospective teachers stated:

"There's huge impact on learning process."

Another claimed "There will be seen difference not in progress report but as a persontoo."

One more teacher viewed as; "Teaching way can bring life changing influence uponlearners."

Some of the respondents predicted that major changes are expected due to technological advancement. Three of the prospective teachers envisaged that in 21st century more competencies will evolved. "Earlier teaching was confined to classrooms. Now there'reonline teaching sessions."

Hence, it was concluded that competencies had direct relationship with the learning process.

Theme 3: Technology as an Opportunity

Responses of Teacher Educators

Many of the teacher educators were of the view that "technology is an opportunity". 52% of the respondents positively commented in words as; "technology makes learningeffective, brings change, makes teaching interactive and effective"(Teacher, 12).

One of the teacher educators opined;

"Using technology is the requirement of the day"(Teacher, 34).

18% of the teacher educators stated that; "With technology, the requirements of the dayare fulfilled, it's easy to maintain records, it provides updated knowledge."

Another teacher educator added, "Technology facilitates teaching from planning toexecution."(Teacher 22)

To the researcher's amazement, 14% of the answers were those among which some didn't reply, and a few answers were not appropriate.

Responses of Prospective Teachers

Among the prospective teachers, most of the prospective teachers were in the favor of technology claiming it as an opportunity. 32% of the prospective teachers agreed to its usage and effectiveness in teaching learning process. Two of the respondents claimed;

"Technology has made teaching way beyond expectation. It has made the work of prospective teachers easier."

While one of the prospective teacher replied as;

"Technology has brought life in my lessons."

Another opined; "It is technology that has made teacher-student relationship stronger." Thus technology is an opportunity to some of the teacher educators and prospective teachers. But they all faced some of the challenges that they mentioned as;

"One has to be upgraded", another teacher shared that "the technology gets obsolete earlier."

16% of the respondents opined that technological courses were expensive and beingdigitally outdated they faced difficulty. They also faced language competency issues too.

Theme 4: Technology as a Hindrance

Responses of Teacher Educators

The qualitative data is evident that there were 22% of the teacher educators who considered technology as a hindrance. Technology as a hindrance was highlighted byteachers in the words of "no awareness", "no training", "no tech awareness", "digitalimmigrants", and "difficulty in handling". One of the teachers indicated;

"There is not all such equipment available at home to be familiar with."(Teacher 46) Another teacher opined;

"There are software and hardware and viruses. It is not easy to handle all."(Teacher 11)

8% of the teacher educators claimed; "Training even does not benefit, till there is properpractice, guidance and supervision."

"I am too old to adapt the new teaching styles and I am happy with my own teaching period"(Respondent, 7).

Responses of Prospective Teachers

Most of the prospective teachers were against the statement. They found it an opportunity though they agreed to the challenges they faced using technology. A few of the prospective teachers shared;

"Technology has made teaching complicated at times."

Another teacher opined; "The use of technology in lesson makes the class interactive. Butthere is less content coverage in time."

Though less number of prospective teachers found technology as a hindrance, there were challenges that both the teacher educators and prospective teachers faced using technology.

They enlisted the challenges as "power failure", "no training", "no internetconnection", "less experience", "updated devices", and "technical maintenance".

6% of the teachers indicated that;

"There is no support provided at the organization."

One of the respondents claimed; "There needs to be a plan B of every lesson due to noreliance on power, equipment and internet connection."

In the nutshell, technology is both hindrance as well as an opportunity to both the teacher educators and the prospective teachers. It depends upon the exposure, experience, and support provided to the teachers.

Theme 5: TPACK in 21st Century

Responses of Teacher Educators

The answers of the respondents could be classified into 3 categories. 38% were those who limited their responses by replying positively while 26% of the teachers disagreed with the statement with supporting details. To the researcher's amazement, 36% of the answers were those among which some didn't reply, a few answers were not appropriate, while some did not have any idea about it which can be concluded that these were unaware of the present technological scenario and were unable to anticipate the impact of TPACK technology in 21st century.

Among 38% of the respondents, one of the teacher educators opined;

"It is a modern concept. In the era of technology, there's ICT to make learningconduciv"(Teachers 19, 34).

Another teacher educator stated; "It brings the teachers and learners closer and helpfulin integrating all competencies together bringing innovative ideas"(Teacher, 11).

While 2 of the respondents who disagreed claimed;

"I am not aware of this framework." While the other one said, "There's more theory and less implementation. It is a complex framework and is not practiced in Pakistan."

Responses of Prospective Teachers

Prospective teachers mentioned that learning to develop a product having the TPACK as a guideline was an important asset that they could carry on to their future professional lives as teachers – even to teach other teachers.

A prospective teacher affirmed: "With TPACK framework in B.Ed. course, I am nowconfident enough to deliver presentations for my class anytime." Such notion ofleadership is also prevalent among the surveyed prospective teachers. Most respondents agreed that they could make effective lessons and deliver it appropriately with the help of it, meting the 21st century requirements.

One more prospective teacher commented;

"TPACK is time saving and makes the teaching learning process meaningful."
On the other hand, 8% of the prospective teachers negated TPACK as an effective framework as;
They believed "It is time and effort taking, weakens teacher- learner bond and evolvestechnical issues causing it hindrance."
The researcher could conclude that TPACK framework was to the most extent favored among teacher educators and prospective teachers. There needed to be trainings and support programs to empower the teachers thus enlivening teaching-learning process.

IX. CONCLUSION

The study was conducted to investigate the technological, pedagogical content knowledge of the teacher educators and the prospective teachers and the impact of these competencies in learning process. The objectives of the study were; to determine importance and indicators of good teaching, to investigate the status of teacher education in Pakistan as reflected in educational policies, to analyze the status of teacher education in Sindh, to study the interaction of subject content, pedagogy, and technology in effective teaching learning process, to explore perception about 21st century prospective teachers and teacher educators, to inquire the TPACK proficiency level of 21st century teacher educators, to assess prospective teachers' advance in knowledge about TPACK during the B.Ed. (Hons.) coursework, to find out the reasons about the teachers' disengagement with technology, to explore the competency (competencies) of teacher educators that according to them has a profound impact on learning process, to propose the teachers with the new concept of TPACK (Technological, Pedagogical, Content Knowledge) framework. It is therefore concluded that;
1. There is a significant impact of Technological Knowledge in teaching learning process. Their roles explored in the study were of the facilitator, motivator, and encourager. The teacher educators and the prospective teachers would then implement the knowledge in their teachings without any fear.
2. There is a significant impact of teachers' pedagogical selection with learners' learning and academic achievement. The teachers in the selection of pedagogy actually make the students habitual of the learning approach he/she would adopt in the field while teacher. Thus the pedagogy selection and execution play an immense role in the teaching learning process of learners.
3. There is a significant impact of Teachers' TPACK proficiency level in learning process. TPACK represents integrated knowledge of the content specific learning goals, effective pedagogy to actualize these goals and appropriate technology support this pedagogy. The significance of the teacher's TPACK is true for all teachers, regardless of the age of the students or the content taught. All teachers must learn to reflect on their experiences in order to generate personal knowledge about how to teach with technology.

X. SUGGESTIONS

1. Nowadays Technology is rapidly growing, so it is the need and demand of time that proper training workshops and refresher courses should be arranged for the technical and professional development of the teacher educators and prospective teachers.
2. Professional preparation programs should concentrate not only on enhancing prospective teachers' technology integration skills, but also enrich them with the skills to operate modern technologies.
3. The latest technological instruments should be available in teachers training institute e.g. interactive white boards, touch screens and other audio visual equipment's etc.
4. The use of technology in classroom and in teaching practices should be increased by the teachers so that the proper guidance towards the right use of technology could be possible.
5. Teacher educators must keep themselves constantly upgrade about latest trending technologies coming in the world and learn or enhance their skills related to them.
6. Teacher educators must motivate prospective teachers to enhance their technological awareness, literacy and skills which are required in the 21st century to achieve a successful career.
7. Orientation and weekly sessions should be arranged to enable prospective teachers for accessing digital libraries and online open-courseware.
8. Modern computer laboratories should be provided for teaching and learning of B.Ed. (Hons.) courses.
9. By recognizing the need of Technology in education Higher Education Commission of Pakistan should start under-graduate and post-graduate degree programs specific to the Educational technology.
10. Teacher educators must help prospective teachers in channelizing their technological skills in the right direction.

XI. RECOMMENDATIONS:

This study has demonstrated that there is a huge potential for further researches on technological pedagogical content to bring effective learning. There are few recommendations by the researcher for future work which are as follows:

1. It is recommended that separate in depth studies should be conducted on teacher educators of B.Ed. (Hons.) and other levels.

2. The action research could be done in order to help teacher educators overcome the same traditional strategies of teaching.

3. Further studies should be conducted to examine the same awareness at different public and private level separately to investigate who are more aware and which sector is playing prominent role in this context.

4. The impact of the TPACK framework on effective learning process.

5. Further studies should be conducted to explore whether the prospective teachers are prepared for 21st century educational demands.

6. Further impact studies should be done to find out the impact of teacher educators' awareness on the prospective teachers' teaching career.

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