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Examining Elementary School Teachers' Professional Proficiencies With Technology Integration And Their Impact On Students' Achievement

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Abstract

This study set out to answer the question, how well teachers in Karachi, Pakistan, integrate technology into their lessons and what influence this has on their students' academic Success. The study used a quantitative research strategy to collect data from a survey to accomplish its goals. Researcher employed SPSS and PLS-SEM to analyze the data. It was discovered that teachers' professional progress in subject-matter competence, pedagogical skills and technological integration positively affects student achievement. Furthermore, teachers scored highly on the model's foundational components, suggesting they possess the skills, knowledge, and understanding to carry out the vast majority of the tasks reflected in the survey's questions. Three fundamental TPACK structures were discovered to be dynamic, shedding light on the ever-evolving nature of teachers' TPACK. The findings show that teachers adapt their TPACK to the specifics of each teaching situation. Given this, it is necessary to place greater focus on context inside the TPACK framework and to situate the framework as a whole within the context. This study's intention is to bring academic focus to the reform of policy in teacher education and teacher preparation so that new technologies can be effectively incorporated into existing curricula and pedagogical frameworks.

Keywords: Teachers’ Proficiencies, Subject Matter Knowledge, Use of Technology, Pedagogical Strategies, and Students’ Achievement

Introduction

The goals of education are to have prepared, skilled teachers and quality students. It is widely believed that most instructors in Pakistan's commercial and governmental sectors are incompetent and unqualified due to a multitude of factors that have led to subpar and inadequate education quality. Students are not encouraged to apply their own discretion, critical thinking abilities, or fundamentals to grasp new concepts because of the methods used in the classroom. Educators and officials concur that the current state of education is unsatisfactory. Schools in Pakistan's public sector provide a subpar education because of outdated teaching methods and a scarcity of composite teaching knowledge, competent teaching abilities, and the incorporation of modern technology. According to the National Education Policy (2017), Pakistan has fallen short of its goals in terms of both educational opportunity and the quality of its graduates' education. Teachers in the modern digital age often lack the material, pedagogical, and technological knowledge that is crucial for addressing complex social and economic issues and building effective human capital in classrooms all throughout the world, National Educational Policy Framework (2018).

There is a severe lack of ongoing professional development, teacher development initiatives, technological knowledge, and awareness of digital tools for teaching and learning in despite improvements to the curriculum and the emergence of new technologies in the education system. However, teachers aren't equipped to implement and deliver lessons in accordance with the new and creative curriculum. There is a severe problem in our educational system due to a lack of training and professional development opportunities for teachers and administrators. Similarly, educators never take responsibility for their own professional development, opting instead to blame a lack of classroom tools and supplies. The actual issue, however, is that our educators lack the foundational knowledge of material, pedagogies, digital resources, and their integration into the classroom that is crucial to the success of today's digital natives. It is generally accepted that in order to properly integrate technology into the classroom, teachers need to gain "expert" understanding of technological pedagogical concepts (Abbitt, 2011a; Harris & Hofer, 2011). Because a teacher's pedagogical approaches influence the effectiveness of technology on students' academic progress.

Development of Teachers' capabilities

Education and training can have an impact in a number of different aspects of performance. Knowledge, attitudes, and beliefs of teachers, as well as classroom and school-wide practices and student outcomes. Teachers' knowledge and abilities are impacted by professional development in a variety of ways, including the acquisition of new competencies in areas such as subject, pedagogy, and assessment. However, enhancing teachers' knowledge and abilities involves more than just teaching them new facts and techniques; it also requires giving them opportunities to critically examine their own work and develop their own ideas about what they know and how they teach, as well as their students. In order to transform practice in important and worthwhile ways teachers must not only learn new subject matter and new teaching approaches, but they must shift their ideas and conceptions of practice, their theories of action. Teachers' ideas and attitudes towards Professional Development alter after they observe the impact that changes in practice have on student performance (Guskey, 2003; Guskey & Yoon, 2009).Finally, examining simply standardized test scores is an inadequate way to determine the effect of professional development on student achievement. Authentic assessment of student work, homework completion rates, and classroom behaviors are additional measures of student accomplishment in addition to teacher-made tests and quizzes, students' attendance, and students' participation in class sessions.

Technology Integration in Education

While technology has become increasingly important and pervasive in today's society, it remains ill-defined. Tools and methods developed for use in everyday life fall under McCrory's (2008) expansive definition of technology. "tools developed by human knowledge of how to combine resources to make desired products, to solve problems, fulfil requirements, or satisfy wants," as defined by Koehler and Mishra (2008). The instruments, including computers and the internet, and the skills, techniques, and knowledge necessary to complete an effective work are all included in the definition of technology, as agreed upon by Koehler and Mishra (2008). The term "technology" is broadly defined to include both new and old forms of equipment utilized in the classroom (Koehler & Mishra, 2009) and so includes traditional methods of instruction (McCrory, 2008).

Literature Review

Teachers' Proficiency, Teaching Resources and Student Achievement

Learning and growth in competence, understanding, and enthusiasm for further study are the hallmarks of a successful educational experience. The success of a student's academic career can be predicted most accurately by the quality of his or her teacher. Students' assessed achievement improves when they spend more time in the classroom with skilled teachers (Kaplan & Owings, 2004; Kaplan, Owings & Nunnery, 2005). The public school system can only be improved by investing in the training and professional development of its teachers. While teacher education can help prepare educators for some of the challenges they will face in the classroom, traditional methods of professional development have been shown to be unproductive (Schleicher, 2011). For decades, educators' access to professional development was limited to lecture-style courses that provided little time for actual implementation of new knowledge into classroom practice or follow-up from administrators to ensure success. Self-confidence can be significantly enhanced through these simulated situations. The best way to influence one's sense of self-efficacy is by a humbling experience of mastery, which is widely acknowledged (Bandura, 2006).

Teachers' requirements have not been satisfied by the progression and delivery of professional development (Schleicher, 2011). The Teaching and Learning Global Survey was undertaken by the Organization for Economic Co-operation and Development in 2007-2008. More than 2 million educators from 23 nations participated in this research. Teachers who took part in the study said they still lacked the resources they needed to effectively educate diverse student populations and other complex subjects (Schleicher, 2011). Another study was carried out in Sindh, Pakistan, by Ali, Thomas, and Hamid (2020). The findings of this study revealed that teachers in public sector teacher education institutes were dissatisfied with the facilities and technological devices available to them. Additionally, these teachers were unable to improve their students' academic performance as a result of the lack of resources and professional development opportunities available to them. Finding creative approaches to educating educators about emerging technology and digital resources is essential if we want to improve the quality of public education and make it more efficient.

Teacher knowledge and skills development

Having access to professional development opportunities are crucial for success in today's competitive global market (Walker, et al., 2012). The field of education is not immune to the need for development. Legislation mandating professional development for both pre-service and in-service teachers has laid the groundwork for progress. Teachers and students alike can benefit from professional development opportunities that help them comply with regulations, increase their subject-matter expertise, craft more effective lesson plans, and promote effective management techniques in the classroom. High-quality educators create optimal learning environments, which in turn produce proficient young minds (Kaplan & Owings, 2004). It is also observed that increased teacher professional development has a greater impact on student outcomes than do increased teacher pay and lower student-teacher ratios. By influencing teachers to act differently in the classroom, professional development has the potential to have a profoundly positive impact on student outcomes (Walker, et al., 2012). To better education and student results, a wise leader will invest in teacher training and professional development (Linn, Gill, Sherman, Vaughn, & Mixon, 2010). In order to improve teaching methods, a system of rigorous evaluation that offered feedback to educators and was connected to professional development. One of the most frequently cited difficulties in teacher professional development is giving educators the chance to learn more about how people learn and then use that knowledge to refine and improve their teaching methods Beck & Adams, (2020).

Teacher efficacy in the classroom is predicated on the teacher's capacity to reach each individual student, to work effectively with other teachers, and to grow professionally. The continuing professional development of both general and special education teachers is crucial, and should focus on effective instruction and inclusive practices that will boost teachers' confidence in their ability to support students with special needs. By analyzing the practices of schools that have achieved distinguished status. The distinguished schools conducted professional development activities that analyzed teaching practices, made use of data, put an emphasis on cooperation, employed similar teaching strategies, and included opportunities for participant assessments. So that "attitudes, knowledge, and practice are truly integrated," it is imperative that schools and districts "push each teacher to develop, apply, and examine beliefs and information learned through professional development in the content of their own classrooms" (Weiner, 2003, p. 18). For the most part, teachers agree with the claims made by Ali et al., (2020) that the professional development courses they have taken have had a major influence on their growth as teachers.

Shulman's Framework of Teacher Knowledge

Over the course of teacher preparation, the body of information considered necessary for educators has evolved. According to Shulman (1986), the line between pedagogy and content used to be much clearer. It's possible that by the 1980s, content had been neglected while pedagogy was still an issue, or that the situation had worsened in the late 1800s. However, in 1986, Shulman developed a concept he called pedagogical content knowledge (PCK). In this context, Shulman suggests that instructors' content knowledge and pedagogical expertise are intertwined. According to him, the two aspects are interdependent, and the combination of the two is what constitutes a teacher's pedagogical content knowledge. In his studies, he covers a wide range of information, including but not limited to subject matter knowledge, pedagogical knowledge, and curriculum knowledge. Shulman (1986) argues that in order to be an effective teacher, one must not only be able to define the truths of a domain, but also to explain why this information is valuable and how it links to knowledge in other areas. The term "curriculum" refers to a school's comprehensive set of programs that are intended to teach a specific set of courses and topics at a specific grade level. Not only that, but it also has a wide range of resources for teaching these topics (Shulman, 1986). In addition, teachers have pedagogical content knowledge. Shulman's (1987) definition of PCK covers the most useful ways to describe and formulate the most often taught issues in one's subject area. Knowing how easy or challenging it is to learn a particular topic is an important part of pedagogical content knowledge as well. PCK is both a distinct pedagogical approach and a content area that falls under the exclusive purview of teachers (Shulman, 1987).

Teachers' Professional Knowledge Frameworks PCK and TPACK.

Teacher expertise, as defined by Shulman (1986) as "pedagogical subject knowledge" (PCK). Due to their superior command of both pedagogical and subject matter expertise, teachers are distinguished from subject matter experts by the PCK framework. The idea of PCK as outlined by Shulman (1986) has been implemented in a variety of classroom settings. To investigate how the proliferation of digital devices in classrooms can affect the growth of teachers' professional knowledge, Koehler and Mishra (2005) reexamined Shulman's PCK paradigm. Two questions were asked as a result of this action: How much do educators need to know about technology? Secondly, how can academics learn these skills? Mishra and Koehler (2006) added technological knowledge to the PCK framework in an effort to address their initial research issue (TK). Mishra and Koehler (2006) stated that effective use of technology in the classroom necessitates a TPACK (technological, pedagogical, and content knowledge). In their TPACK framework, Mishra and Koehler (2006) used a set of overlapping circles to symbolize the various facets of instructors' expertise. Based on this framework, seven distinct types of teachers' professional knowledge were identified, with the ideal TPACK serving as the framework's primary nexus. The setting in which educators learn and display their knowledge limits the range of available knowledge. Conceptually, this study builds on the work of Shulman (1987) with his notion of pedagogical content knowledge (PCK), and Mishra and Koehler (2006) with their idea of technological, pedagogical, and content knowledge, and previous empirical research.

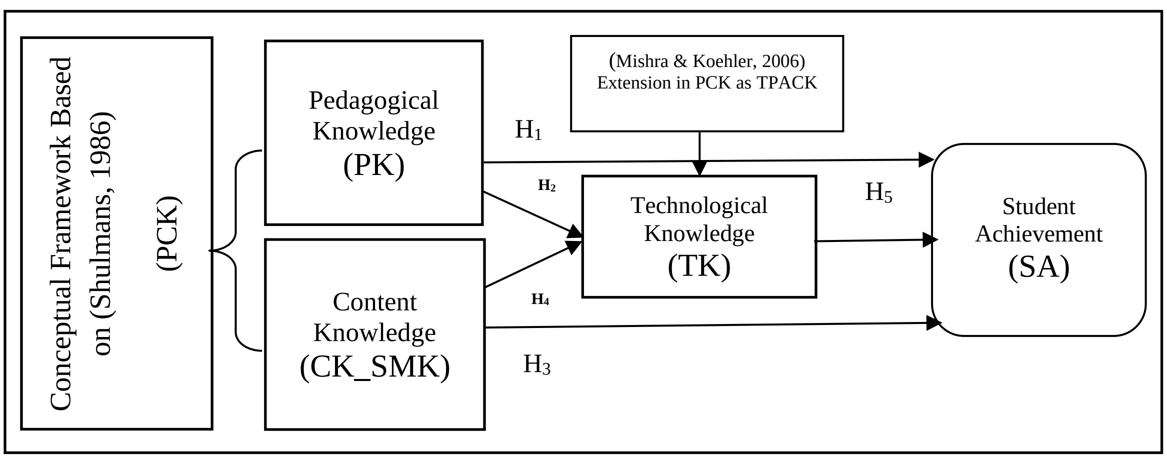


Figure: 1 Conceptual Framework

Methodology

This study made use of a questionnaire and was developed using the quantitative (Creswell, 2014) research paradigm. This research used a method called "purposive sampling" to collect data from similar demographic groupings. Male and female secondary school teachers currently employed in Karachi, Pakistan, were the subjects of this study. The "Survey of Pre-service Teachers' Knowledge of Teaching and Technology" (Schmidt et al., 2009) and the "Survey of In-Service Teachers' Attitudes toward Technology" (SITE) questionnaires used in this research were found suitable for collecting the necessary information (Akram and Zepeda, 2015). Quantitative information was gathered via a cross-sectional survey, and then analyzed with up-to-date versions of SPSS and Smart PLS.

Data analysis and Results

Information pertaining to the participants' demographics

This section provides specific information about the respondents, including their gender, age range, experience, educational background, and professional qualifications. The total number of participants in the study was 385. In order to get everyone's permission to participate, we sent out consent letters detailing the survey's questions and our overall goals. Secondary school educators in Karachi, Pakistan, both male and female, made up the population sample. The following is an in-depth demographic analysis and profile:

Gender

Table 1
Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	211	54.8	54.8	54.8
	Female	174	45.2	45.2	100.0
	Total	385	100.0	100.0	

Table 1 shows that 385 teachers participated in the survey. It was reported that there were 211 male teachers, 54.8% of the total, and 174 female teachers, 45.2% of the total.

Age range

Table 2
Age Range

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-30 years	18	4.7	4.7	4.7
	31-40 years	157	40.8	40.8	45.5
	41-50 years	189	49.1	49.1	94.5
	above 50 years	21	5.5	5.5	100.0
	Total	385	100.0	100.0	

Table 2 highlights the age distributions collected, broken down into 10-year intervals starting at age 20 and continuing all the way until age 50. Of the 385 total respondents, 18 (4.7%) were in the 20-29 age range, 157 (40.8%) were in the 30-39 age range, 189 (49.5%) were in the 40-49 age range, and 21 (5.5%) were beyond the age of 50.

Experience in Education

Table 3
Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 to 5 years	21	5.5	5.5	5.5
	6 to10 years	102	26.5	26.5	31.9
	11to15 years	170	44.2	44.2	76.1
	More than 15 years	92	23.9	23.9	100.0

Total	385	100.0	100.0	

As is evident from looking at table 3, the majority of the 170 lecturers have between 11 and 15 years of experience combined. This accounts for 44.2 percent of the total. Table shows, 92 of the teachers have been in the job for more than 15 years. , making up 23.9 percent of the total. This indicates that a good fraction of the teachers have a significant amount of experience teaching secondary school students. This meant that a significant number of experienced educators who possessed a high level of expertise participated in the study.

Academic Qualification

Table 4
Qualification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Graduation	178	46.2	46.2	46.2
	Masters	195	50.6	50.6	96.9
	MS/M.Phil.	9	2.3	2.3	99.2
	PhD	3	.8	.8	100.0
	Total	385	100.0	100.0	

The respondents' various levels of education are outlined in Table 4, which may be found below. As may be deduced from the findings, the respondents who held a Master's degree constituted the largest proportion (50.6% of the total). 46.2% of the 385 participants having completed their graduate studies, a very small number held an M.Phil. or MS, and an even smaller number held a Doctoral degree.

Professional Qualification

Table 5
Professional Qualification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	B.Ed.	189	49.1	49.1	49.1
	M.Ed.	196	50.9	50.9	100.0
	Total	385	100.0	100.0	

According to the information provided in table 5, all of the educators have professional qualifications, with the majority (50.9%) of them having received M.Ed. This resulted in a more mature survey in the sense that the vast majority of respondents held high levels of academic and professional qualification.

The Measurement Model

The researcher started the evaluation process by developing a measuring model. In this case, the researcher chose a PLS algorithm after giving serious thought to the study's methodology. Since the Path weighting scheme may be used with any path model, including a higher-order model, it was chosen as the PLS algorithm for this study. All three types of validity—content, convergent, and discriminant—were checked to make sure the research's measurement or outer model had enough construct validity and reliability. Table 7 shows that the factor loadings are above 0.6, which is sufficient for social science research and confirms the reliability of the results. Cronbach's alpha is a lower constraint on the internal consistency dependability of the research model, whereas the composite reliability (CR) is a higher bound, as stated by Hair, Risher, Sarstedt, and Ringle (2018). Table 6 displays a Cronbach's alpha and CR that are both more than the required minimum value of 0.7 and lower than the maximum value of 0.95. As a result, while internal consistency is maintained, there is no room for indicator redundancy. In the present study, two different metrics confirmed that the items were assessing the same notion or construct (Hair et al., 2013). Table 6 displays an AVE more than 0.05, while table 7 displays that all factor loadings were initially greater than 0.6. As reported by (Hair et al., 2018). To test the hypothesis that a certain item set can separate one variable from others, five results were analyzed. Table 8 shows that all items strongly loaded against their corresponding construct when cross loadings were compared; Table 9 shows that the square roots of the AVE values for each construct on the diagonal are larger than the AVE values in the rows and columns; and Table 10 shows that all (HTMT) ratios are 0.85 while emphasizing the values for HTMT ratios (Hair et al., 2018). Both the tables (11 and 12) tables exhibit the outcomes of the analysis of the VIF statistics for the outer and inner regions, respectively, and demonstrate that the VIF values are consistently lower than the threshold value of 5. Therefore, estimate of the model poses no problems due to collinearity because it does not reach critical levels in any of the constructs.

Table 6
Constructs Reliability and Validity

Constructs	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
PK	**0.793**	0.836	0.854	**0.540**
SA	**0.851**	0.859	0.893	**0.627**
SMK	**0.840**	0.870	0.882	**0.557**
TK	**0.865**	0.871	0.899	**0.598**

Table 7
Outer Loadings of the constructs

Constructs items	PK	SA	SMK	TK
PK_1	0.694			
PK_3	0.698			
PK_5	0.819			
PK_6	0.701			
PK_7	0.756			
SA_1		0.744		

SA_2		0.744		
SA_3		0.811		
SA_4		0.794		
SA_5		0.859		
SMK_1			0.811	
SMK_2			0.755	
SMK_3			0.835	
SMK_4			0.795	
SMK_5			0.625	
SMK_6			0.627	
TK_1				0.734
TK_2				0.712
TK_3				0.846
TK_4				0.829
TK_5				0.775
TK_6				0.734

Table 8
Cross loadings of the constructs

Construct Items	**PK**	**SA**	**SMK**	**TK**
PK_1	**0.694**	0.225	0.229	0.124
PK_3	**0.698**	0.239	0.187	0.057
PK_5	**0.819**	0.391	0.154	0.256
PK_6	**0.701**	0.261	0.192	0.070
PK_7	**0.756**	0.303	0.217	0.146
SA_1	0.270	**0.744**	0.297	0.475
SA_2	0.391	**0.744**	0.206	0.156

SA_3	0.266	**0.811**	0.314	0.201
SA_4	0.303	**0.794**	0.308	0.201
SA_5	0.356	**0.859**	0.334	0.347
SMK_1	0.204	0.319	**0.811**	0.405
SMK_2	0.129	0.231	**0.755**	0.241
SMK_3	0.196	0.368	**0.835**	0.445
SMK_4	0.142	0.237	**0.795**	0.272
SMK_5	0.252	0.254	**0.625**	0.291
SMK_6	0.227	0.191	**0.627**	0.246
TK_1	0.185	0.369	0.290	**0.734**
TK_2	0.203	0.229	0.377	**0.712**
TK_3	0.220	0.343	0.394	**0.846**
TK_4	0.082	0.261	0.327	**0.829**
TK_5	0.176	0.242	0.327	**0.775**
TK_6	0.024	0.223	0.337	**0.734**

Table 9
Correlation of Discriminant validity (Fornell-Larcker Criterion)

Constructs	**PK**	**SA**	**SMK**	**TK**
PK	**0.735**			
SA	0.401	**0.792**		
SMK	0.257	0.372	**0.746**	
TK	0.199	0.365	0.444	**0.773**

Table 10
Heterotrait- Monotrait Ratio (HTMT)

Constructs	**PK**	**SA**	**SMK**	**TK**
PK				

SA	**0.467**		
SMK	0.327	**0.421**	
TK	0.229	0.400	**0.497**

Table 11
Collinearity Statistics (VIF) Outer VIF Values

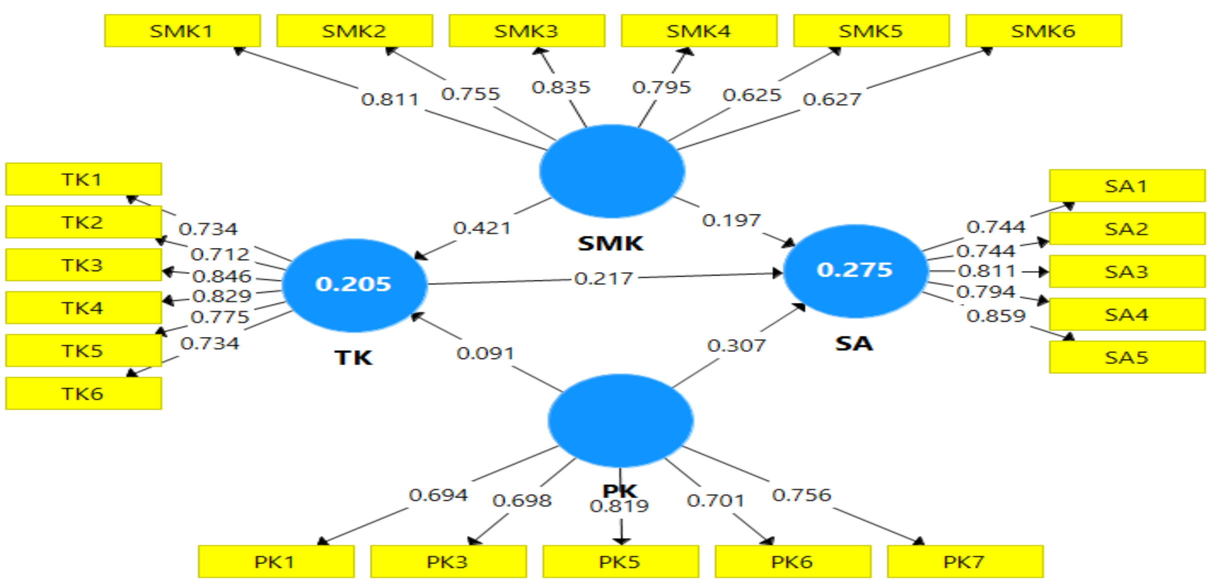
Items of the Constructs	**VIF**
PK1	1.679
PK3	1.706
PK5	1.555
PK6	1.483
PK7	1.530
SA1	1.644
SA2	1.685
SA3	2.058
SA4	2.235
SA5	2.361
SMK1	2.068
SMK2	1.926
SMK3	2.247
SMK4	2.182
SMK5	1.363
SMK6	1.617
TK1	1.705
TK2	1.718
TK3	2.416

TK4	2.508
TK5	2.241
TK6	1.993

Table 12
Inner VIF values

Constructs	PK	SA	SMK	TK
PK		**1.081**		**1.070**
SA				
SMK		**1.293**		**1.070**
TK		**1.258**		

Figure 2 Algorithm



Structural Modelling

PLS-SEM in Smart PLS was used to test the hypotheses of the study once it had first been determined that the construct being studied was both valid and reliable. PLS-SEM is more accurate than covariance-based techniques (Hair et al., 2013). The research findings support all five hypotheses showed in table 13.

Table 13
Hypothesis Testing (Total Effect)

Hypothesis	Sample (O)	Mean (M)	(STDEV)	T Statistics	P Values	Decision
H_1:PK -> SA	0.307	0.316	0.060	5.160	**0.000**	**Supported**
H_2:PK -> TK	0.091	0.093	0.044	2.089	**0.037**	**Supported**
H_3:SMK -> SA	0.197	0.198	0.091	2.161	**0.031**	**Supported**
H_4:SMK -> TK	0.421	0.428	0.058	7.295	**0.000**	**Supported**
H_5:TK -> SA	0.217	0.213	0.074	2.916	**0.004**	**Supported**

The data presented in the table above demonstrates that each of the hypotheses has a significant effect on the student's achievement.

Figure 3 Bootstrapping

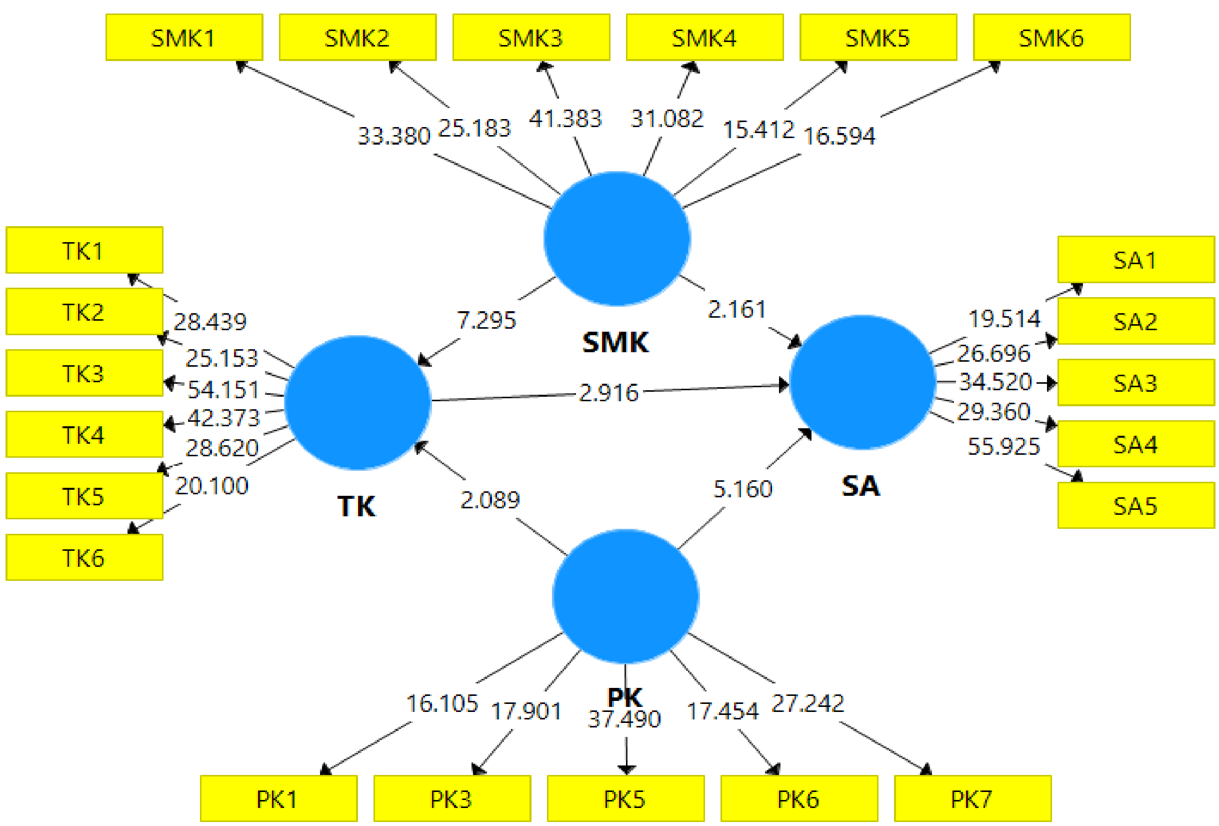
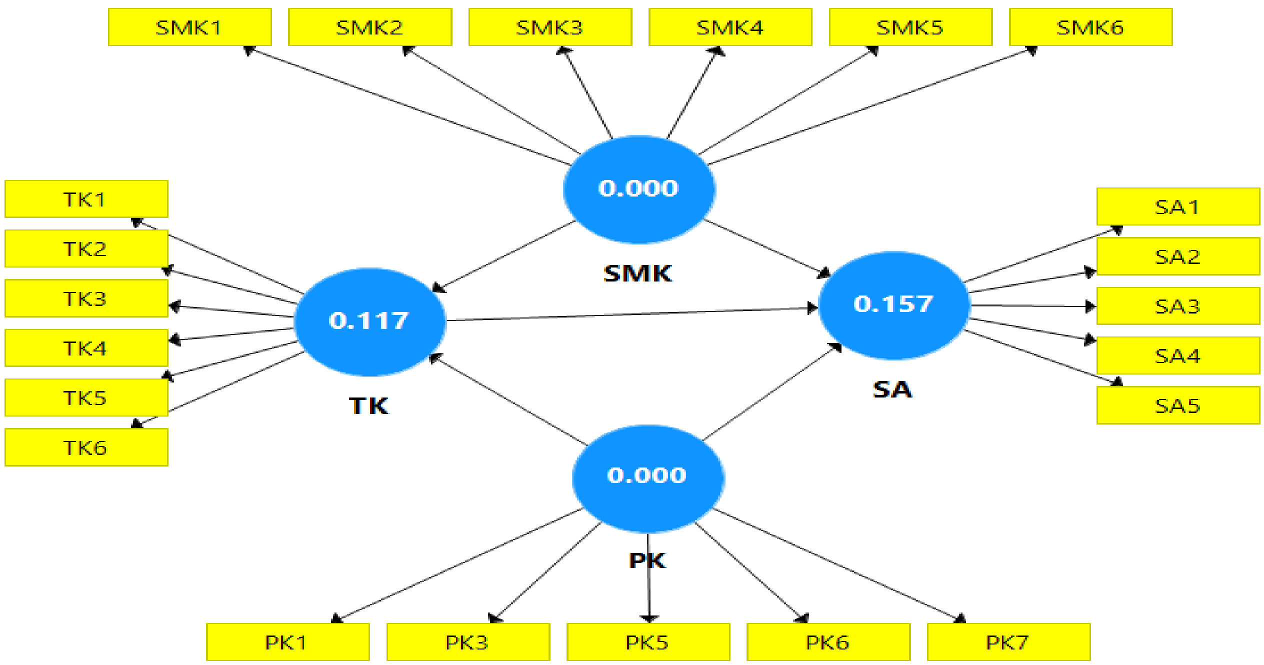


Table 14

R Square

Constructs	R Square	Q Square
SA	0.275	0.157

Figure 4 Blind Folding



Discussion

The current research examined five hypotheses (H1, H2, H3, H4, and H5) using Smart PLS, all of which concerned the direct influence of endogenous variables on exogenous variables. The hypotheses (1) teachers' pedagogical knowledge affects student achievement, (2) pedagogical knowledge affects teachers' technological knowledge, (3) teachers' subject matter knowledge affects student achievement, (4) teachers' subject matter knowledge affects teachers' technological knowledge, and (5) teachers' technological knowledge has a significant positive effect on students' achievement. This study's conclusions are consistent with those of numerous others from different parts of the world and with different methodologies. Previous research (Mishra & Koehler, 2006; Koehler & Mishra, 2009; Schmidt et al., 2009; Bruce & Chiu, 2015; Harris & Hofer, 2017; Kirikcilar & Yildiz, 2018; Patria, 2019; Hill & UribeFlorez, 2020) has found that teachers' technological, pedagogical, and content knowledge all have significant effects on their students' academic performance. The present investigation has also made important contributions to the existing research literature. The t-statistics also show that teachers' subject matter knowledge has the largest significant positive effect ($t = 7.295$, $p = .000$) on their technological knowledge, while teachers' pedagogical knowledge has the least ($t = 2.089$, $p = .037$) effect. There is a statistically significant positive relationship between teachers' levels of pedagogical knowledge and student achievement (t = 5.160, p =.000), a moderately significant positive relationship between teachers' levels of subject matter knowledge and student achievement (t = 2.161, p =.031), and a sufficient positive relationship between teachers' levels of technological knowledge and student achievement (t = 2.916, p =.004). This finding is in line with that of Kirikcilar and Yildiz (2018), who discovered that in constructing learning activities for student achievement, all three forms of knowledge (PK, SMK, and TK) were utilized. Specifically at public sector institutes, Ali et al. (2020) discovered that teachers' use of technology was correlated with aspects including easy access to equipment and a supportive environment, as well as the applicability and usefulness of the technology itself.

Conclusions

This study shows that instructors' professional competencies and how well they integrate technology influence student progress. Most teachers were positive about their knowledge, skills, and classroom technology implementation. The teachers in this study scored very high, indicating they could do, understand, or be familiar with most of the survey's tasks on five points likert scale, because all of the current study's hypotheses were accepted. Students would benefit from teachers who were well-versed in technology, pedagogy, and content knowledge. These findings are consistent with other global research. (Mishra and Koehler, 2006) (Schmidt et al., 2009). Multiple studies have linked TPACK to teacher effectiveness and student achievement (Carpenter et al., 2017; Bruce & Chiu, 2015; Graham et al., 2009; Harris & Hofer, 2017; Kirikcilar & Yildiz 2018; Patria 2019; Ali et al., 2020a; Ali et al., 2020b; Ali, Thomas & Hamid, 2020). This study's literature evaluation finds a diversity of previous research on the relationship between teachers' TPACK and student achievement in a variety of contexts, educational settings and educational levels. This study examines teachers' technological, pedagogical, and subject expertise on students' performance in Karachi, Pakistan. According to the results, teachers have enough TPACK abilities and knowledge. The research indicated that teacher professionalism and classroom technology use positively affected student achievement. Combining technical, pedagogical, and subject-matter expertise in education has been well-studied. It validates earlier studies suggesting that upgrading TPACK should require considering all of its core aspects together (Harris et al., 2009; Koehler & Mishra, 2005; Ali et al., 2020a; Ali et al., 2020b; Ali, Thomas & Hamid, 2020).

Recommendations for teachers

Teachers at all levels should use TPACK because it allows them to focus on engaging courses through technology and provides a framework for identifying skill gaps. Teachers' TPACK should be built utilizing an integrated strategy that emphasizes integrating technology know-how, pedagogical knowledge, and content area expertise. Teacher training programs should highlight integrating technology into classrooms. To address the requirements of "digital natives," teachers must combine professional and digital resources into their teaching.

Suggestions for Future Research

There is a prevalent idea that teachers have access to a body of information known as TPACK, but no research has been done in Pakistan to determine whether or not TPACK is actually correlated with student achievement. The researcher of this study set out to fill this gap in our understanding and discovered that the three pillars of TPACK do, in fact, have a positive, substantial effect on students' performance. However, in-depth research is required since it is insufficient to examine and investigate the phenomenon of inadequate quality of education, which has ultimately led to students' poor academic achievement, by depending just on quantitative research or analyzing only the opinions of teachers. As a result, it is not adequate to rely exclusively on quantitative studies or to analyze merely the perspectives of teachers. There needs to be more study done in this area. Despite teachers' high levels of certification, professional development, and the increasing use of technology in the classroom, the quality of education in public schools remains dismal. Student underachievement in the classroom is to blame. So, if educators have adequate preparation in pedagogy and technology and can adapt effectively, what is the root cause of education's subpar quality? This, too, requires significant study. Research on the root causes of subpar education is so crucial. This means that every teacher should make the betterment of their students' educations their primary focus. The effects of the contributing components or constructs on TPACK and the variations in practice still need more investigation, as do other related concerns such as the learning environment in the classroom and the unavailability of digital resources. Therefore, mixed-methods techniques must form an integral part of any subsequent research on the topic. This is crucial if researchers are to make any headway on the problem of inadequate education.

References

1. Abbitt, J. T. (2011a). An investigation of the relationship between self-efficacy beliefs about technology integration and technological pedagogical content knowledge (TPACK) among preservice teachers. Journal of Digital Learning in Teacher Education, 27(4), 134-143.

2. Abanobi, C. C. & Abanobi, C. H. (2017). Teacher Education in Nigeria; Challenges and Way Forward in the Global community. International Journal for Social Studies, 3(8), 39 – 46.

3. Akram, M. & Zepeda, S. J. (2015). Development and Validation of a Teacher Self-assessment Instrument. Journal of Research & Reflections in Education (JRRE), 9(2).

4. Ali, Z., Thomas, M., Ahmed, N., Ahmed, I., & Ahmed, I. Assessment of Pre Service Teacher's Perceptions on Technological Pedagogical and Content Knowledge (TPACK) in Karachi Pakistan. International Journal of Scientific & Engineering Research Volume 11, Issue 3, March-2020 1402 ISSN 2229-5518.

5. Ali, Z., Busch, M., Qaisrani, M. N., & Rehman, H. U. (2020). The influence of teachers' professional competencies on student's achievement: A quantitative research study. American Research Journal of Humanities & Social Science, 3(6), 45-54.

6. Ali, Z., Thomas, M., & Hamid, S. (2020). Teacher Educators' perception of Technological Pedagogical and Content Knowledge on Their Classroom Teaching. New Horizons (1992-4399), 14(2).

7. Bandura, A. (2006). Guide for constructing self-efficacy scales. Self-efficacy beliefs of adolescents, 5(1), 307-337.

8. Beck, A., & Adams, P. (2020). The Donaldson Report, partnership and teacher education. In Teacher Preparation in Scotland. Emerald Publishing Limited.

9. Bruce, D. L. & Chiu, M. M. (2015). Composing with new technology: Teacher reflections on learning digital video. Journal of Teacher Education,

66(3), 272-287. Carpenter, J. P., & Justice, J. E. (2017). Evaluating the roles of technology in the Global Read Aloud project. Computers in the Schools, 34(4), 284-303.

10. Carpenter, J. P., & Justice, J. E. (2017). Evaluating the roles of technology in the Global Read Aloud project. Computers in the Schools, 34(4), 284-303.
11. Corry, M. & Stella, J. (2018). 'Teacher self-efficacy in online education: A review of the litera ture', Research in Learning Technology, 26, 1-12.
12. Creswell, J. W. (2014). Research design qualitative, quantitative, and mixed methods approaches. (4th Ed.). Thousand Oaks, CA: Sage.
13. Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39-50.
14. Government-of-Pakistan. (2017). National Education Policy 2017-2025 Islamabad: Ministry of Federal Education and Professional Training Government of Pakistan.
15. Government-of-Pakistan. (2018). National Education Policy Framework, 2018. Islamabad: Ministry of Federal Education and Professional Training Government of Pakistan.
16. Günüç, S., & Kuzu, A. (2014). Factors influencing student engagement and the role of technology in student engagement in higher education: campus-class-technology theory. Turkish Online Journal of Qualitative Inquiry, 5(4), 86-113.
17. Guskey, T. R. (2003). What makes professional development effective? Phi delta kappan, 84(10), 748-750.
18. Guskey, T. R., & Yoon, K. S. (2009). What works in professional development? Phi delta kappan, 90(7), 495-500.
19. Hair, J. F., Rishe, J. J., Sarsted, M., & Ringle, C. M. (2018). When to use and how to report the results of PLS-SEM. European Business Review, 31(1), 2-24.
20. Hair, J. F., Hult, Ringle, C. M., & Sarstedt, M. (2013). Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. Long Range Planning, 46(1-2), 1-12.
21. Harris, J. B., & Hofer, M. J. (2011). Technological pedagogical content knowledge (TPACK) in action: A descriptive study of secondary teachers' curriculum-based, technology-related instructional planning. Journal of Research on Technology in Education, 43(3), 211-229.
22. Harris, J. B., & Hofer, M. J. (2017). "TPACK stories": Schools and school districts repurposing a theoretical construct for technologyrelated professional development. Journal of Research on Technology in Education, 49(1-2), 1-15.
23. Hill, J. E., & Uribe-Florez, L. (2020). Understanding Secondary School Teachers' TPACK and Technology Implementation in Mathematics Classrooms. International Journal of Technology in Education, 3(1), 1-13.
24. Kaplan, L. S., & Owings, W. A. (2004). Introduction to special issue: Teacher effectiveness.
25. Owings, W. A., Kaplan, L. S., & Nunnery, J. (2005). Principal quality, ISLLC standards, and student achievement: A Virginia study. Journal of School Leadership, 15(1), 99-119.

26. Kirikçilar, R. G., & Yildiz, A. (2018). Technological Pedagogical Content Knowledge (TPACK) Craft: Utilization of the TPACK When Designing the GeoGebra Activities. Acta Didactica Napocensia, 11(1), 101-116.
27. Koehler, M. J. & Mishra, P. (2009). What is technological pedagogical content knowledge? Contemporary Issues in Technology and Teacher Education, 9(1), 60-70.
28. Koehler, M. J., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge (TPACK)? Journal of Education, 193(3), 13–19.
29. Koehler, M. J., & Mishra, P. (2005). Teachers learning technology by design. Journal of Computing in Teacher Education, 21(3), 94-102.
30. Koehler, M. J., & Mishra, P. (2005). What happens when teachers design educational technology? The development of technological pedagogical content knowledge. Journal of educational computing research, 32(2), 131-152.
31. Koehler, M. J., & Mishra, P. (2008). Introducing TPCK. In J. A. Colbert, K. E. Boyd, K. A. Clark, S. Guan, J. B. Harris, M. A. Kelly & A. D. Thompson (Eds.), Handbook of Technological Pedagogical Content Knowledge (TPCK) for Educators (pp. 3-30). New York: Routledge.
32. Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? Contemporary Issues in Technology and Teacher Education, 9(1), 60-70
33. Koehler, M. J., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge (TPACK)? Journal of Education, 193(3), 13–19.
34. Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)?. Contemporary issues in technology and teacher education, 9(1), 60-70.
35. Linn, G. B., Gill, P., Sherman, R., Vaughn, V., & Mixon, J. (2010). Evaluating the long-term impact of professional development. Professional Development in Education, 36(4), 679-682.
36. McCrory, R. (2008). Science, technology, and teaching: The topic-specific challenges of TPCK in science. In J. A. Colbert, K. E. Boyd, K. A. Clark, S. Guan, J. B. Harris, M. A. Kelly & A. D. Thompson (Eds.), Handbook of Technological Pedagogical Content Knowledge (TPCK) for educators (pp. 193-206). NewYork: Routledge.
37. Mishra, P. & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. Teachers College Record, 108(6), 10-17.
38. Patria, A. J. M. (2019). Enhancing English language teaching and learning through pedagogy. In ACLL2019 Conference Proceedings.
39. Ringle, C. M., Wende, S., & Becker, J. M. (2015). SmartPLS 3 [computer software]. http://www. smartpls.com
40. Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M. J., & Shin, T. S. (2009). Technological pedagogical content knowledge (TPACK) the

development and validation of an assessment instrument for preservice teachers. Journal of Research on Technology in Education, 42(2), 123-149.

41. Schleicher, A. (2011). Lessons from the world on effective teaching and learning environments. Journal of Teacher Education, 62(2), 202-221.
42. Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. Educational Researcher, 15(2), 4-14.
43. Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. Harvard educational review, 57(1), 1-23.

44. Voogt, J., & Fisser, P. (2015). Computer-assisted instruction. International Encyclopedia of the Social & Behavioral Sciences, 4(2), 493-497.

45. Voogt, J., & van den Akker, J. (2002). Computer assisted instruction. International Encyclopedia for the Social and Behavioral Sciences, 4-2473.

46. Voogt, J., Fisser, P., N., Pareja R., Tondeur, J., & van Braak, J. (2013). Technological pedagogical content knowledge – a review of the literature. Journal of Computer Assisted Learning, 29(2), 109-121.

47. Walker, A., Recker, M., Ye, L., Robertshaw, M. B., Sellers, L., & Leary, H. (2012). Comparing technology-related teacher professional development designs: A multilevel study of teacher and student impacts. Educational technology research and development, 60(3), 421-444.

48. Weiner, H. M. (2003). Effective inclusion: Professional development in the context of the classroom. Teaching Exceptional Children, 35(6), 12-18.