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THE IMPACT OF PEDAGOGICAL KNOWLEDGE AND TEACHING PRACTICES OF TEACHERS ON STUDENTS' ACHIEVEMENT IN PUBLIC SCHOOLS OF PAKISTAN

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ABSTRACT
This study explores the impact of teachers' content knowledge, pedagogical knowledge, student-centered approach, and teacher-centered approach on student achievement perceptions. Data were collected from seven public secondary schools in Pakistan using an adapted self-report instrument of five Likert scales. Partial Least Square Structural Equation Modelling (PLS-SEM) was employed as an estimation technique by SMART PLS software. The results obtained from the testing model using structural equation modelling (SEM) were interpreted and discussed in tables. The study found that teachers' content knowledge, pedagogical knowledge, and teaching practices significantly predict student achievement. These findings highlight the crucial role of teachers' content knowledge, pedagogical knowledge, and teaching practices in achieving learning goals and outcomes.
Keywords: Pedagogical-Knowledge, Teaching-Practices, Teachers' perceptions, Teaching effects, Students' achievement

INTRODUCTION

In the modern world, competent teaching is a *sine qua non* for a robust educational system. Education aims to develop an individual's appropriate skills, physically and mentally, inspiring them to contribute positively to society (Boden, Zepeda & Malach, 2020). For decades, educational stakeholders worldwide have concentrated on and attempted to strengthen students' learning outcomes. Education should be given a critical place in the nation in general and individuals in particular (Sentürk, & Bas, 2020). The 21st Century demands a trend toward a vigorous society to meet the advanced challenges of education (Zin, Mohamed, Kashim, Jamsari, Kamaruzaman, & Rahman,2019). Unfortunately, In Pakistan today, education does not meet the expectation in achieving these goals and challenges. Several pieces of research shared evidence of the low academic performance of the overall system. Poor problem-solving, critical, and social skills can be seen in the Pakistani education system (Aziz, 2012). There is a gap in educational settings in Pakistan; public schools do not meet current norms. Improvement of teachers' pedagogical knowledge, teaching practices, and beliefs; these steps need to be applied in the classroom so that the student becomes able to achieve their goals (Thomas,2020).

Teachers' commitment, qualification, experience, knowledge, skills, command of the subject, and teaching method influence the education process. Consequently, without improvement in teacher education, the education system will never be of high-quality (Akibaa & Liang, 2016). Therefore, it is mandatory, professional development preparation, updated instructional policy, administration structure, and facilities for teachers to meet the criteria should be accessible teaching practices (Hammond,2000). Provision of professional development training on the subject matter and improvement in classroom instruction, giving advanced knowledge to the teachers, improves teaching effectiveness (Makovec, 2018). Teachers are the substantial reason for students' achievement; pedagogical knowledge and practices can bring positive learning outcomes (Bellibas, 2015). Achieving the learning goals is what a

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student is expected to do, and knowing the values and effects at the end of the study. The students' achievement does not mean getting good marks and grades; instead, to be well-known about every matter of life, and are skilful full and critical thinkers (Manyiraho, Atibuni, Olema,& Wamakote, 2020). Teachers play a significant role in student achievement; they must provide education to build critical learning (Gess-Newsome, Taylor, Carlson, Gardner, Wilson, & Stuhlsatz, 2019). The learning outcomes are measured and verified by gaining knowledge, skills, attitudes, and abilities (Archambault, Jonosz & Chouinard, 2012). Teachers provide knowledge, skills, and attitude throughout learning experiences in a classroom.

Learning outcomes are a specific assessment of what students will know due to the learning activity. Teachers with pedagogical expertise should plan, and prepare for a better learning outcome (Tondeur, Braak, Ertmer, & Leftwich, 2017). Content knowledge of the teacher offers a way that develops teachers in decision-making processes and teaching practices, according to (Swanson, McCulley, Osman, Lewis & Solis, 2019). Teachers with two categories of teaching, traditional teaching practices and constructivist teaching practice, play an essential part and help students in academic achievements. Bundara's social and cognitive theory has focused on teacher beliefs and the constructivism of teachers' self-efficacy, which relate to the student-centered learning approach and to be implemented in the learning process to bring changes and improvement in students' cognitive learning and achieve better outcomes (Robinson &Timperley, 2007). Moreover, the Student-centered approach educates the students to become critical thinkers, improve their creativity, and learn communicative skills. Teachers' teaching practices are reasons to ultimate orbiters of educational change (Engelbrech & Ankiewicz, 2016). Teachers who adopt new pedagogical methods devise well-organized teaching plans, strategies, knowledge, and skills throughout the circular activities and learning outcomes provide better achievements (Sang, 2009).

Educators have asserted that the scrutiny in the classroom for students increases their interest in educational activities in achieving various learning goals (Alkharsusi, 2008). The effectiveness of schools and students' output is the primary tool for the development and achievement depending on the teachers. Academic engagement and classroom activities promote students' confidence and healthier learning (Ingvarson, Meiers,& Beavis,2005). Teachers play a vital role in involving students in academic activities; such activities value learning abilities and show positive achievement in results. At the school level, the provision of opportunities for the students to fulfil their personal and academic potentials and prepare them for success is the teacher's first duty. Therefore, teachers should be well trained in their profession dealing with students to achieve the needed goals in their career (Ozden,2008). It becomes the government's responsibility and educators to create facilities and provide recourses to the teachers for professional development and promote quality and practical teaching to improve students' learning. According to Chang, (2008), there is a great need to bring achievement in institutions through the change in teacher's instructions in the classroom by applying student-centred and teacher-centered learning and increasing skills and knowledge (Alkharusi et al., 2008). The Teacher is the primary source for bringing changes in the learning process and encouraging the learners to provide better outcomes (Engelbrecht, Piet Ankiewicz et al., 2016) This research investigates teachers' content knowledge, pedagogical knowledge, student-centred approach, and teacher-centered approach to know what are the factors that support students' achievement.

THEORETICAL FRAMEWORK

Constructivism learning theory signifies a big idea in education. It explains how to acquire knowledge and learn, and it has a direct educational application for all students to attain learning outcomes (Driscoll, 2000). Teachers improve and transform teaching practice and pedagogical knowledge, which helps to concentrate student-centered learning Teachers can make a big difference by incorporating constructivism theory into their teaching-learning processes (Bhroin, King, & Prunty, 2016). This theory enables teachers in engaging students in their teaching practices and pedagogical knowledge, allowing teachers to build and modify teaching practices and pedagogical knowledge for all students to succeed (Park, Oliver, 2007).

Keller, Neumann & Fischer, (2016), stated that constructivism offers students a variety of options for altering information and comparing new and old knowledge. It is important to be active classroom participants in the learning-teaching process to succeed (Hurk, Houtveen & Grift, 2017). Teachers can use constructivist theory and pedagogical knowledge to help students learn more actively and achieve their objectives. (Driel, Verloop & Vos, 1998). The concept of constructivism of learning

has a historical root in the work of Piaget,1980, Bednar, Cunningham, Duffy, Dewey (192 9), Bruner (1961), Vygotsky (1962), Perry (1992), have proposed numerous implications of constructivist theory for teaching-learning outcomes; and, these outcomes should focus on the content knowledge, pedagogical knowledge, constructivism learning process from authentic and specific objectives (Jonassen, 1994). Learning is a process that requires self-regulation and the construction of conceptual frameworks through reflection and abstraction rather than a stimulus-response phenomenon. The knowledge and teaching methods of instructors impact the overall teaching and learning process; teachers are the organizers of high-quality instruction and one of the most important factors influencing students' learning progress (Farnandez, 2014). Teachers' pedagogical knowledge, subject understanding, and advanced learning methodologies help improve the teaching-learning process (Hurk, Houtveen & Grift et al., 2017). Student-centred and teacher-centered learning are two important educational approaches for motivating students to meet their learning goals (Oder & Eisenschmidt, 2018). In the classroom, content knowledge and pedagogical expertise combine to provide effective instructions that help students learn more. Such specific knowledge might help teachers be aware of the best way of teaching the students and assist the students in achieving learning outcomes Constructivism Theory helps teachers integrate skills and understand how to implement them in the classroom (Chai, Koh & Te0, 2019).

Development of the Hypotheses

Teachers' Content Knowledge: Content knowledge of the Teacher means having the value of the profession and the importance of the subjects and understanding of what they teach (Hill, Ball & Schilling, 2008). Content Knowledge is acquired by the teacher on the specific topic and field to be learned. It allows the teachers to build the student's subject knowledge, the course content of ethical situations, and a deeper understanding of lifelong learning (Wiliam, Lee, Harrison & Black, 2004). The content knowledge of the Teacher is listed in five items to be measured.

H1. Teachers' Content Knowledge has a significant impact on the Teacher-centered approach.

H2. Teachers' Content Knowledge has a significant impact on the Student-centered approach.

Teachers' Pedagogical Knowledge: Teachers' pedagogical knowledge refers to the teaching method, which integrates all the subjects in a classroom for the learning process. Applying different techniques in pedagogy, class instructions, class activities, student enrolment at the school, teaching the class with varying teaching styles, and through pedagogical methods developing students to learn every aspect of the learning process (Ahmad, Sultana,& Jamil,2020). Teachers' experience brings an effective change in students learning. Teachers' knowledge has always concentrated on teaching skills, and pedagogical knowledge, and hold to apply the teaching-learning process developing students learning effectively towards achievement. Pedagogical knowledge creates an effective and flexible learning environment for students and makes learning effective with positive outcomes (Hume, Cooper, & Borowski, 2019). Five items for this factor are given to be measured.

H3. Teachers' Pedagogical Knowledge has a significant impact on the Teacher-centered approach.

H4. Teachers' Pedagogical Knowledge has a significant impact on the Student-centred approach.

The student-centred Approach: Teacher beliefs in teaching practices, teacher education, class instructions, responsibility, attitudes, and learning process inside the classroom are involved in this approach. This approach involves students not only what they are learning from the Teacher but also the importance of learning why it is being taught and how it should be implemented in their learning (Wood, 2007). Teachers in this approach have a platform for the students to bring changes in roles and responsibilities, create interest in education, involve them in creative activities, and build new teaching-learning strategies. The student-centred approach increases students' learning and understanding and achieves their outcomes (Piasta, Connor, Fishman & Morrison, 2009). The student-centred approach is focused on being measured on five items.

H5. The student-centred approach has a significant impact on Teacher cantered approach.

H6. The student-centred approach has a significant impact on Teachers' perceptions of students' achievement.

Teacher-centered Approach: Teachers are always trying their best to give something good to the students through motivation and a learning environment. This approach is for the teachers to teach the students and understand. It is one of the significant sources for providing information and letting the students know about it (Kim, 2005). Teachers with the best control in classroom instruction involve students with better learning opportunities. This approach improves students' involvement in active

learning to be passive and listen to the teacher. It improves the teaching-learning process for students to receive the knowledge carefully to understand clearly everything and open a way towards achieving the students' learning goal (McCutchen, Abbott, Green, Beretvas, Cox, Potter & Gray, 2002). This approach assesses the outcomes of the students that focused on being measured on five items.

H7. The teacher-centered approach has a significant impact on Teachers' perceptions of students' achievement.

Perception Of Teachers on Students' Achievement: For a better learning outcome, Teacher uses different methods to influence the educational performance of schoolchildren towards positive learning achievement (Boden, Zepeda, & Nokes-Malach, et al., 2020). Teacher perceptions of the practical teaching practices in the teaching and learning context, Teacher's effectiveness, knowledge, experience, and methods strongly affect student achievement. Teachers' perceptions of students' achievement are listened to in five items to be measured.

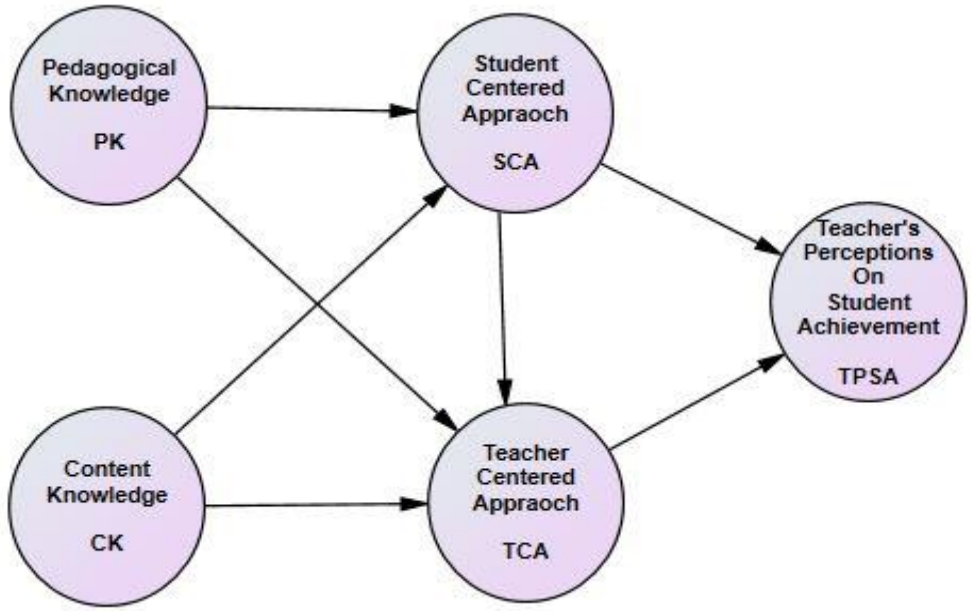

Fig. 1 The proposed Theoretical Model (Adapted from (Keller, Naumann 7 Fischer (2016). The impact of teachers' pedagogical knowledge & student achievement. Journal of Research & Science Teaching)

Four predictors are used to predict the one outcome of Teachers' Perceptions of students' achievement. The details of the instrument source 5 of each item (which are 25 items) are given in Table 1.

Table 1. Instruments adaptation Source.

Variables	Items
Content Knowledge (CK)	5
Pedagogical Knowledge (PK)	5
Student Centered Appraoch (SCA)	5
Teacher Centered Appraoch (TCA)	5
Teacher Perception on Student Achievement (TPSA)	5

METHODOLOGY

It grounds the study on the quantitative research method and examines teachers' perceptions of students' achievement. The study focuses on teachers' content knowledge, pedagogical knowledge, student-centred approach, and teacher-centred approach and explains these factors' validity by completing an adapted source self-report instrument of five Likert scales. The testing model using structural equation melding (SEM) presented the results where all the findings are discussed and interpreted by giving in tables. Data were collected from seven (07) public secondary schools in Pakistan. A questionnaire with

a survey instrument to know the Perceptions of the teachers on students' achievement on a five-point Likert-type scale varied from "Strongly Disagree (1) to Strongly Agree (5) with a total of 25 items.

Table 2 Descriptive Statistics (*N* = 228)

Demographics		Frequency	Percent
Gender	Female	106	46.5
	Male	122	53.5
Age	20-30	98	43.2
	31-40	88	38.3
	41-50	33	14.5
	51-60	9	4
Qualification	Graduated	74	32.5
	Masters	88	38.6
	M.Phil	66	28.9
Profession	Teachers		
	SST	82	35.4
	JET	146	64.6

Which was adopted from the previous researchers for further measurement of the study. All the Participants were teachers who were currently enrolled in teaching. Dillman's Total Method (2001) reached 228 teachers from seven public secondary schools in Pakistan. The data were collected through google forms, the link to the survey instrument was sent individually to each participant and, the participants were informed to provide the data voluntarily. The researcher selected the participant as per the perspective objectives. The eliminated and outliers were excluded, and the final data was comprised of a total of 228 respondents. The demographic detail of the respondents is provided in Table 2.

FINDINGS AND RESULTS

The study has applied Partial Least Square Structural Equation Modeling (PLS-SEM), an estimation technique by SMART PLS software. This technique is recommended to explain more variance among data when the complex Model. The two stages of evaluation of the measurement and structural models have been adopted by Hair, Sarstedt, Ringle,& Gudergan (2017) and discussed in the research study.

Measurement of the Model

The Convergent validity and Discriminant Model calculation were included in the measurement model for further estimation. According to Hair, Sarstedt, Ringle,& Gudergan et al. (2017), Convergent Validity is supposed to be attained when the measurement of the items is constructed and proposed to be covered with the other items of the same construct. Three measures can assess Coverage Validity. Factor Loading, which is supposed to be more than 0.7, Composite Reliability (CR) should be greater than 0.7, and Average Variance Extracted (AVE) assumed to be greater than 0.5. The composite reliability (CR) and average variance extracted (AVE) results are shown in Table 3.

Table No. 3

Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
CK_	0.788	0.771	0.787	0.650
PK_	0.787	0.788	0.765	0.620
SCA	0.772	0.690	0.825	0.704
TCA	0.687	0.658	0.816	0.597
TPSA	0.753	0.754	0.796	0.571

The Table chart explains whether the data from 228 observations is considered reliable or not. According to the show results, Cronbach's Alpha should be greater than 0.7, and the current result of (Ck-0.785, PK-0.787, SCA-0.772, and TPSA-0.753) all stand greater than the 0.7 PL-EM standard just

TCA with a lower value of 0.687, which is near to threshold therefore, retaining for further analysis. Rho-Ration should be greater than 0.7. The present result shows (CK-0.771, Pk-0.788, TPSA-0.754 are greater than 0.7, but two factors show less than 0.7 SCA-0.690 and TSA- 0.658 Composite reliability of all the factors showing greater than 0.7, which stands to be significant. (CK-0.787, PK-0.765, SCA-0.825, TSA-0.816 and TPSA-0.769) are the significant indicators. And Average Variance Extracted (AVE) should be greater than 0.5, and according to the result, all the factors show a greater value than 0.5. (CK-0.650, PK-0.620, SCA- 0.704, TCA-0.597) and TPSA with 0.671 which are considered to be significant.

Correlation of Discriminant Validity

According to Gefen & Straub (2005), discriminant validity can be measured in 3 degrees, Cross loadings, Fornell and Larker criteria, and Hetrotrait Manotrail Ratio (HTMT). The difference of 0.10 between the factor loading of the item within the construct and the loadings should be within the other constructs. Fornell & Larker (1981), stated that discriminant is said to be achieved when the square root of a construct AVE exceeds the pair-wise correlation values of the construct with the other constructs. The detailed result is shown in Table 5. And Hetrotrait Manotrail Ratio (HTMT) measures discriminant validity 0.85 below value supports discriminant validity.

Table No. 4 Factor Loading

	CK_	PK_	SCA	TCA	TPSA
CK3	**0.770**	0.113	0.079	0.271	0.183
CK4	**0.840**	0.172	0.240	0.218	0.208
PK2	0.119	**0.801**	0.153	0.158	0.193
PK3	0.165	**0.773**	0.206	0.040	0.093
SCA4	0.126	0.193	**0.771**	0.178	0.130
SCA5	0.207	0.192	**0.902**	0.321	0.171
TCA3	0.254	0.130	0.276	**0.744**	0.210
TCA4	0.207	0.085	0.156	**0.769**	0.296
TCA5	0.234	0.085	0.274	**0.804**	0.380
TPSA1	0.202	0.139	0.204	0.394	**0.869**
TPSA2	0.216	0.167	0.111	0.263	**0.766**
TPSA3	0.120	0.118	0.036	0.154	**0.608**

The values in Table 4 are shown to meet the loading value criteria above 0.7. However, just one value of the TPSA factor is 0.608, which is less than 0.7 and close to the threshold criteria, so the item is included for further calculation.

Table No. 5

Fornell-Larcker Criterion

	PK_	SCA	TCA	TPSA
CK_				
PK_	**0.787**			
SCA	0.227	**0.839**		
TCA	0.128	0.310	**0.773**	
TPSA	0.183	0.182	0.390	**0.755**

The values in above table 5 support the criteria (Fornell and Larker,1981). The highest values in the table (CK-0.806, PK-0.787, SCA-0.839, TCA-0.773, and TPSA-0.755) represent the square root of AVE, and off-diagonal signify pair-wise correlation values.

Table No. 6. **HTML**

Heterotrait-Monotrait Ratio (HTMT)

	CK_	PK_	SCA	TCA	TPSA
CK_					
PK_	0.419				
SCA	0.363	0.480			
TCA	0.543	0.250	0.462		
TPSA	0.424	0.361	0.242	0.520	

Hetrotrait- Monotrail Ratio(HTMT) was also used in the present study to measure the discriminant validity, and its value below 0.85 supports the endurance of the discriminant validity. The value of HTMT (CK-0.419, PK-0.480, SCA-0.462, TCA-0.520) justifies the existence of discriminant validity of the data, which is shown above in Table 6.

Table No. 7. R-Square

R Square

	R Square
SCA	0.259
TCA	0.235
TPSA	0.339

The Predictor relevance is assessed to know the strength of the current prediction of the model. At the present, R^2 is used for measuring. As Hair, Ringle & Sarstedt (2011), stated that to the discipline, like Teachers' perceptions of student achievement, the value of R^2 should be between 0 to 1. And the closer to 1, the fitter the Model will be. In the shown table 7 result, the current value of R^2 of SCA= 0.259, TCA= 235, and TPSA = 0.339, which indicates and predicts the Model's fitness.

The present study employed the estimation technique to examine the hypotheses using the PLS-SEM.5000 subsample. Bootstrapping was performed as proposed by Hair, Ringle & Sarstedt, et al. (2011) and the hypotheses constructed on path coefficient are recapitulated in Table 8.

Table 8. Hypotheses testing

Hypotheses	*T* Statistics	*P* Values	Remarks
CK_ -> SCA	2.399	0.017	Supported
CK_ -> TCA	3.391	0.001	Supported
PK_ -> SCA	2.752	0.006	Supported
PK_ -> TCA	0.308	0.758	Not Supported
SCA -> TCA	3.789	0.000	Supported
SCA -> TPSA	0.940	0.347	Not Supported
TCA -> TPSA	5.510	0.000	Supported

The result in Table 8 of thevariables shows the overall decision of the hypotheses received after testing. Content Knowledge has a substantial positive influence on the student-centred approach *($p = 0.017 < 0.05$)*, increasing content knowledge. Content Knowledge also has a positive and significant impact on the Teacher-centered approach (*$p=0.001 < 0.05$*), so the Teacher's content knowledge will have an effective impact on student-centred learning and teacher-centred learning, which can increase the positive effect on the student's achievement. Pedagogical knowledge has a positive and significant impact on the student-centred approach (*$p=0.006 < 0.05$*). Pedagogical Knowledge has an insignificant impact on the Teacher-centered approach (*$p= 0.758 > 0.05$*). The student-centred approach has a positive and significant impact on the teacher-centred approach (*$p=0.000 < 0.05$*); it shows that the Student-Centered Approach can increase the effectiveness of the Teacher-Centered Approach and increase this approach toward effective outcomes and improvement in the teaching and learning process. The student-centred approach has an insignificant impact on Teachers' perception of student achievement (*$p=0.347 > 0.05$*); the result shows the insignificant effect means teacher perceptions of this effort show less achievement in student outcomes, and the Teacher-centered approach has a significant impact on teachers' perception on student achievement (*$p=0.000 < 0.05$*) which supported the hypothesis. This means these teacher-centred approaches impact students to achieve their outcomes. The finding and the result could bring better understanding and positive achievement in learning. According to the results, teachers should apply these approaches to change teaching practices and implement the knowledge and approaches to better learners' outcomes and activities.

CONCLUSION

The quality of education that students receive largely depends on the quality of teachers. Effective teaching methods can have an immediate impact on student achievement. Content and pedagogical knowledge are critical sources for increasing learners' knowledge in specific subject areas and developing creativity, which are necessary for achieving learning goals. The present study examines the

impact of advanced pedagogical skills, 21st-century skills, and teaching practices on student learning. The results reveal that teachers' teaching practices, content knowledge, and pedagogical knowledge significantly impact student achievement. Moreover, the study demonstrates that a student-centered approach, supported by teachers' knowledge of this approach, can be effective in improving learners' achievement. On the other hand, a teacher-centered approach has a significant impact on teachers' perceptions of students' achievement, proving that both approaches are effective ways for students to learn and understand the learning process. However, the study also shows that the student-centered approach has an insignificant impact on teachers' perceptions of students' achievement. Thus, if implemented incorrectly, this approach may not be practical in achieving the learning goals of the students. Additionally, the study suggests that pedagogical knowledge has an insignificant impact on the teacher-centered approach, which may not bring about effective outcomes in teaching and learning. Teachers may believe that pedagogical knowledge on the teacher-centered approach will not be effective in improving learning outcomes.

The findings of this study are useful for teachers to enhance their teaching practices and gain an understanding of the importance of content knowledge and pedagogical knowledge. Teachers' use of both the student-centered and teacher-centered approaches can improve their teaching practices and enhance students' achievement.

Recommendation and Future Research

This study aims to gather teachers' perceptions on the critical factors that need to be applied in teaching practices to achieve better outcomes and results for learners. However, the study also recommends investigating additional factors that could further improve student achievement. To enhance the education landscape in Pakistan, this research must be conducted in rural areas to better understand the teaching-learning process.

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