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Integrating Pedagogical Content Knowledge in Teaching Practicum: Insights from Prospective Teachers

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Abstract

Pedagogical Content Knowledge (PCK) is a core component of effective teaching and a key outcome of teacher education programs. This study examines the integration of PCK by prospective teachers during their teaching practicum. The research was conducted with B.Ed. (Hons.) students enrolled in selected universities in Lahore, Pakistan. Using a purposive sampling technique, data were collected from 330 prospective teachers through a structured questionnaire based on a five-point Likert scale. Participants were in their third to final semesters and were engaged in teaching internships. Descriptive statistical methods were employed for data analysis. The findings indicate that prospective teachers demonstrated a satisfactory level of PCK integration in instructional planning, content delivery, and classroom practices during the practicum. Additionally, the results show no significant gender-based differences in the application of PCK. The study highlights the role of teaching practicum in fostering the effective integration of pedagogical and content knowledge and provides empirical insights for strengthening practicum-based teacher education programs.

Keywords: Prospective teachers, knowledge of teaching methods, practical teaching experiences

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Introduction

Teacher training relies significantly on content knowledge (PCK), which plays a role in shaping the effectiveness of aspiring educators. When it comes to employing teaching methods and techniques that enhance student learning, PCK encompasses the expertise and insight teachers possess about the subjects they teach (Shulman, 1986). As indicated by Magnusson et al. (1999), this knowledge involves the ability to transform subject matter into formats that are comprehensible and accessible to students. It also involves implementing teaching approaches customized to meet the needs of learners. The vital importance of content knowledge (PCK) in promoting quality teaching and enhancing student achievements has been emphasized in studies conducted over the past decade (Hill et al., 2008; Koehler & Mishra, 2009). Furthermore, studies have highlighted the importance of providing aspiring educators with a foundation in Pedagogical Content Knowledge (PCK) during their teacher training programs. This foundational knowledge significantly impacts their classroom practices and instructional decision-making (Darling-Hammond, 2017; Niess, 2019).

Pedagogical content knowledge encompasses both pedagogical knowledge (PK) and content knowledge (CK) (Inoue, 2009). Understanding the subject matter or the content knowledge of the subjects that a teacher is going to teach. The teacher must also comprehend the reasons why something is true, in addition to just knowing that it is true. Therefore, the focus is on a thorough comprehension of the material covered in class (Seidel & Stürmer, 2014). PK includes how the teacher will teach in the classroom, teaching methodology, lesson planning, the way of assessment methods, instructional planning, and strategies. Pedagogical Content Knowledge (PCK) has evolved to stand for the awareness that teachers employ during the teaching process (Kind, 2009).

In this respect, being able to recognize PCK helps to improve knowledge of what it means to be a good teacher and promotes PCK formation in prospective teachers more deliberately and consistently. PCK applications are important from the perspective of teachers' teaching practice. Education and practice for teachers are necessary to increase their effectiveness, abilities, attitudes, teaching methodologies, competencies, and potential; various educational programs are being established and used throughout the world (Georgiou, 2020). Pedagogical skills and content knowledge are used to transform the traditional teaching and learning process. This research study might be utilized as a monitoring tool to assess and correct the knowledge application gap in prospective instructors' instructional strategies. The findings of this study can help prospective teachers improve their pedagogical material understanding and provide insightful advice for teachers looking to enhance their students' learning opportunities and instructional methods.

Review of Related Literature

According to Shulman (1986), research on teaching and subsequent policy initiatives to raise the quality of teaching tended to disregard the importance of content knowledge in efficient instruction till the mid-1980s. Shulman and his collaborators' research into knowledge growth in teaching aimed to overcome this gap in educational research. It was not the goal of this endeavor to minimize the value of pedagogical expertise as a part of effective teaching but rather to foster a greater awareness of the links among subject-matter expertise, pedagogical reasoning, and classroom activity. Knowledge of the subject matter is very important for teachers in the teaching and learning process. For the teacher educator to quickly get to grips with and better comprehend the impending teaching topic, it is vital to understand the instructor's subject matter knowledge. Pedagogical knowledge refers to a broad body of information about how to teach and learn. Understanding cognitive, social, and developmental perspectives of education is essential for PK. It necessitates the development and application of instructional strategies as well as the utilization of various forms of assessment. (Akhter et al., 2016).

An essential aspect of a teacher's education program is practicum practices, which enable prospective educators to put concepts into practice (Becker et al., 2015). Teachers with up-to-date subject knowledge are confident in their subject knowledge, skilled at using effective teaching techniques, aware of misconceptions and preconceptions among students, able to adapt their teaching style to different learner types, and capable of presenting the lesson in a variety of ways (Hume & Berry, 2011). Practicums range in duration, type, organization, and placement within the entire teacher preparation program (Aspden et al., 2022). The aim of designing teaching practice is to give a chance to prospective teachers to practice content knowledge and pedagogical knowledge in real-life classrooms, lesson planning, and their application in the classroom and to maintain students' portfolios. It also provides experience to the prospective teacher in applying theoretical concepts to practice. The teaching practice experience allows students to become familiar with classroom reality, individual child attention, classroom organization, and the transformation from prospective teachers to actual classroom teachers (Goh & Matthews, 2011; Mtika, 2011). The knowledge of pedagogy necessitates comprehension of cognitive, cultural, and developmental concepts of learning and how they apply to students in the classroom; classroom management, lesson plan development, and execution of student assessment methods or pedagogy; and knowledge of modifying strategies to meet the needs of students to assess their understanding (Akhter et al., 2016).

Research Objectives

The objectives of the study were to:

1. Examine the pedagogical content knowledge of prospective teachers during their teaching practicum.
2. Compare the difference in PCK between male and female prospective teachers.

Research questions

The following research questions are based on the above objectives:

1. What is the application of pedagogical content knowledge among prospective teachers during their teaching practicum?
2. Is there any significant difference in PCK varying between male and female perspective teachers?

Research Methodology

To check the application of PCK among prospective teachers in Lahore's public universities, a cross-sectional research design was utilized in this study. This type of research includes gathering data from a sample of participants at a specific moment in time.

Population

The study focuses on future teachers at public universities in Lahore, including students enrolled in the four-year B.Ed. (Honors) teacher education program. Up to 1,500 potential students are considered potential teachers, as they are currently pursuing certification but have not yet completed their education. This includes those who are currently enrolled in public universities but have not yet completed their teacher education program.

Sampling

The study used a convenience sampling technique. Based on their enrollment in the Department of Education and participation in teaching practicum practices, 330 students from two public universities in Lahore were chosen for this study using a sampling approach. The students were chosen based on how they applied their pedagogical content knowledge in their teaching practices, and their answers were gathered using a questionnaire.

Instrumentation

The research instrument used for data collection in this study included structured questionnaires. This tool was developed after studying sources and was approved by experts in the field. A survey was conducted using a five-point Likert scale to collect feedback on the pedagogical content knowledge (PCK) of teachers. The survey comprised

questions covering five aspects identified in the research: classroom management, teaching methods, subject expertise, lesson preparation, and evaluation. The number of questions varied across these areas, with classroom management having 8 questions, teaching methods having 7 questions, expertise having 12 questions, lesson preparation having 9 questions, and evaluation having 15 questions.

Data Analysis

The data were analyzed by descriptive and inferential statistics, and details are given below:

Demographic Descriptive Analysis

Table 1

Participants' characteristics

Gender	*N*	%
Male	286	13.3
Female	44	86.7

The table describes that 86.7% of the sample consisted of males and 13.3% of female prospective teachers of the public university.

Figure 1

Semester Distribution

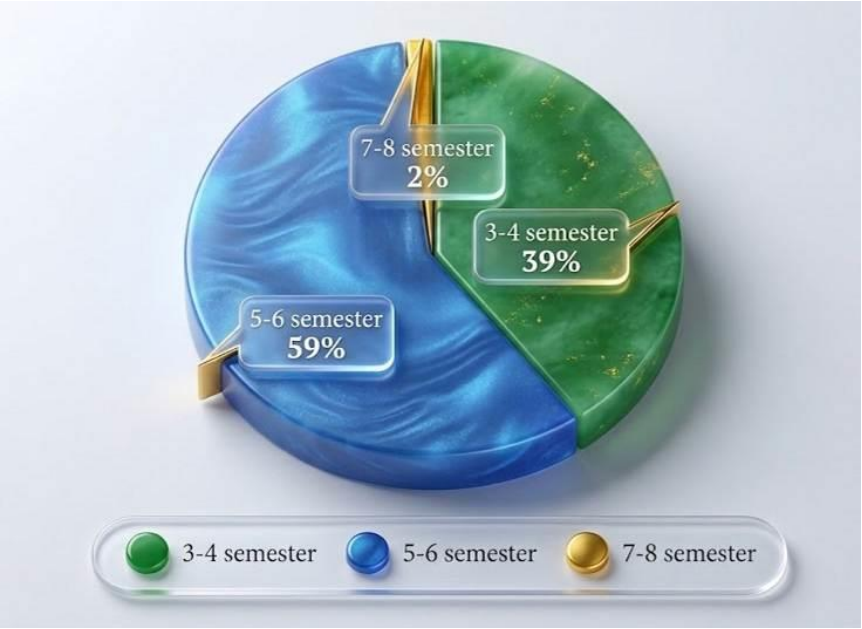

Figure 1 shows that 39% of the sample was from semesters 3-4, 59% from semesters 5-6, and 2% from semesters 7-8.

Descriptive Data Analysis

The quantitative information gathered through questionnaires was examined in this part. According to Albers (2017) and Treiman (2014), quantitative data analysis produces mathematical and statistical conclusions based on information gathered through a quantitative tool, such as surveys. Different statistical analysis techniques were used for the study's research areas. Quantitative data analysis is used in this study to address the findings of the two research objectives that led to the two research questions. It includes a detailed breakdown of the demographic data for the research participants' gender and a particular academic year. Descriptive statistics offer quantitative summaries and descriptions of a large amount of data (Arora, 2015). Using descriptive statistics and a t-test that took the mean and standard deviation into account, the responses of the prospective teachers about the integration of pedagogical topic knowledge into their teaching practices were analyzed.

Table 2

Frequency distribution of classroom management

Statements	*M*	*SD*
I engaged the students to make classroom rules and regulations.	3.71	1.29
I sent the student to the principal's office for misbehavior.	3.27	1.26
I scolded the improper behavior in a loud voice on the spot.	3.20	1.20
I used reinforcement techniques.	3.58	1.19
I confidently managed the classroom.	3.92	1.12
I observed the students' behavior in the classroom.	3.92	1.18
I taught the students according to their learning behavior in the classroom.	3.85	1.12
I utilized various seating arrangements (group, etc.) in the classroom.	3.89	1.18

Classroom management is the first part of PCK, and it has 8 statements. According to the first statement of classroom management, 9.7% of prospective teachers involve their students in creating rules and regulations. The majority of prospective teachers who supported students in determining rules were 36.1%. The second was that I reported the students for misbehavior to the principal's office. A total of 28.2% of prospective teachers

agreed that they would take misbehaving children to the principal's office. 11.9% of prospective teachers strongly disagreed with the statement that they didn't send students to the principal's office. The third statement was about the management of different behaviors in the classroom by the prospective teachers. I scolded the improper behavior in a loud voice on the spot. The highest frequency was 29.1% of prospective teachers who responded neutrally. They neither agree nor disagree with the statement. The lowest frequency was 8.5% of participants who strongly disagreed that they scolded improper behavior in a loud voice on the spot.

The statement "I used reinforcement techniques" was presented to a group of prospective teachers, and they were asked to indicate their level of agreement or disagreement with the statement. The results of the survey showed that the majority of the prospective teachers (36.4%) agreed that they used reinforcement techniques, indicating that they actively employed these techniques in their teaching practices. On the other hand, only 7.6% of the prospective teachers strongly disagreed with the statement, suggesting that they did not use any reinforcement techniques in the classroom. Encouraging students through reinforcement for their desired actions can help boost engagement and motivation for facing challenges in the classroom or dealing with behavioral issues. This approach has the potential to enhance performance and create a learning atmosphere.

In the study, the fifth point focused on how I handled classroom situations. Prospective teachers were asked to express their agreement with this statement using a Likert scale, which ranged from strongly agree to strongly disagree. Results revealed that most teachers, 36.7%, strongly agreed with the statement, showing their confidence in managing classrooms. Interestingly, a significant number of respondents had a view of their classroom management skills. However, 3.9% strongly disagreed with the statement, indicating a lack of confidence in classroom management. This suggests that while many future teachers feel assured about managing classrooms, self-assessment may not always reflect their abilities and highlights the need for training and support.

This statement is related to the aspect of Pedagogical Content Knowledge (PCK) concerning classroom management. It pertains to how prospective teachers observe and respond to student behavior in class. The results showed that a significant proportion of the prospective teachers (42.7%) strongly agreed that they had observed the behavior of students in the classroom. On the other hand, only 4.2% of the prospective teachers strongly disagreed with the statement, indicating that they did not feel that it was important to observe their students' behavior in the classroom. Efficient classroom management involves monitoring student behavior to identify potential issues early and address them, fostering a secure learning environment where students feel appreciated and engaged. The

seventh statement of classroom management was: I taught the students according to their learning behavior in the classroom.

According to the results, the highest value (38.5%) is the percentage of prospective teachers who agreed that they taught the students according to their learning behavior in the classroom. 5.5% is the lowest percentage of prospective teachers who didn't agree with the statement. The next statement is about the different seating arrangements used for students in the classroom: I utilized various seating arrangements (group, etc.) in the classroom. 40.3% of prospective teachers agreed that they utilize various seating arrangements in the classroom, and 5.5% was the lowest value of respondents who didn't agree with the statement. Two statements in the PCK classroom management component have high mean values. "I confidently managed the classroom." The first statement reveals teachers' confidence in managing and maintaining control over their students. The average confidence is 3.92, which is the mean value. In the second statement, "I observed the students' behavior in the classroom," teachers are asked to think about their capacity to keep an eye on and spot behavioral problems. The standard deviation, which is 1.18, shows that instructors' replies might vary.

Table 3

Frequency distribution of instructional planning and strategies

Statements	*M*	*SD*
I modified the instruction according to the need to facilitate student learning.	3.68	1.25
I was willing to practice new instructional technology.	3.70	1.17
I found it difficult to manage several problem-solving approaches.	3.19	1.17
I ensured the active participation of students in classroom activities.	3.76	1.20
I encouraged the students to ask questions.	3.95	1.14
I used different teaching methodologies for a better understanding of the students.	3.98	1.16
I try to make the connection between the instruction and the objectives.	3.82	1.11
I used engaging instructional strategies suitable for the learning styles and levels of students.	3.82	1.15
I chose a problem that was relevant to real-life events and let the students solve it.	3.80	1.17
I encouraged the students to contribute their knowledge and their point of view.	3.76	1.20
As a prospective teacher, I found that group projects were the best way to teach cooperative learning.	3.68	1.17

Learning was productive while students were working in groups because of inter- and intra-group discussions.	3.75	1.19

The second component of PCK is instructional planning and strategies, which consists of 12 statements. The first statement is about modifying the instruction according to the need to facilitate student learning. The result shows that most prospective teachers (35.8% marked as agree) modified the instruction according to the need to facilitate student learning, and the lowest value, 9.1%, strongly disagreed with those who don't modify the instruction according to the need to facilitate student learning. The second statement was "I was willing to practice new instructional technology." The highest percentage was 35.2%, who agreed with the statement; however, 6.4% was the lowest value of prospective teachers who strongly disagreed that they were willing to practice new instruction technology.

The third statement of instructional planning and strategies was about the perception of prospective teachers towards managing different problem-solving techniques; I found it difficult to manage several problem-solving approaches. Most of the responses of the prospective teachers were neutral (31.2%), and the lowest value was 8.8%, with the participants who strongly disagreed that it was difficult to manage several problem-solving approaches.

The fourth statement was that I ensured the active participation of students in classroom activities. According to the result, the highest percentage of the prospective teachers who strongly agreed with the statement was 33.6%, and the lowest percentage, 7.7%, strongly disagreed that they ensured the active participation of students in the classroom. The fifth statement of instructional planning and strategies is about the extent to which prospective teachers encourage their students to ask questions. The statement I made was about how I motivated the students to inquire, emphasizing the significance of fostering a setting where students feel at ease and are encouraged to seek clarification. In the research, participants were tasked with expressing their agreement or disagreement with this statement. The outcome revealed that a notable percentage of the individuals (39.4%) strongly endorsed the practice of encouraging students to ask questions. It seems like they are actively encouraging a culture of curiosity and inquiry in their classrooms, aiming to boost student engagement and learning. However, only a small percentage (5.2%) strongly disagreed with this approach, suggesting they may prefer a teaching style focused on lectures rather than student participation. Encouraging students to ask questions is crucial for teaching, as it helps teachers assess understanding and customize instruction for each student. By fostering curiosity and inquiry, teachers can help develop thinking and problem-solving skills in students for success in academic and professional settings.

The discussion revolves around how prospective teachers utilize teaching methods to comprehend their students during their teaching practice sessions. It emphasizes the significance of employing teaching techniques to cater to the learning needs of students.

During the survey the participants were requested to express their opinions regarding the statement. The findings indicate that a notable percentage of the participants (41.8%) firmly believed that they employed teaching approaches to gain insights into their students throughout their teaching practicum experience.

This indicates that they accept diverse teaching methods to stimulate learners so they can incorporate their learning style and preference. Conversely, only 5.8% of the participants strongly disagreed with the statement, meaning that decision-making protean teachers do not accept varied teaching methodologies to know students better. Teachers may be rigid in their teaching methods, but they should understand the diversity of teaching. They allow for a sound learning atmosphere, cater to the aspirations, promote thinking, and create a desire to learn among students. The seventh statement of the survey addresses the extent to which prospective teachers attempt to draw a connection between their methods and instructional goals. The statement is that I try to make the connection between instruction and objectives, and it touches on the key importance of matching teaching strategies with learning goals for the sake of promoting students' academic learning and performance. The participants were asked to express their agreement or disagreement with the statement. A high percentage of the participants agreed with the statement and claimed that I try to make the connection between instruction and objectives.

On the contrary, the statement yielded the smallest amount of 5.5%, being the portion of those respondents who strongly disagreed with the statement. The teachers' teaching strategy can be conventional or non-student-centered—the material is more important than the learners in this case. However, effective teaching should connect the material to the goals, which will contribute to the fulfillment of the goals of both the learners and teachers. Using the appropriate teaching strategies for the goals will ensure higher engagement and motivation of the students. Statement 8. Prospective teachers use engaging instructional strategies that are appropriate for their students' learning styles and levels. Participants were expected to agree or disagree with the statement. The results indicate that a sizable percentage of the participants strongly agreed with the statement; 35.8% seem to believe that they apply engaging instructional strategies that are appropriate to the students' learning styles and levels. On the other hand, only 4.5% of the participants strongly disagreed with the statement; hence, engaging instructional strategies are necessary for diverse learning needs. This indicates that traditional instruction, less student-centered, prioritizes the delivery of material for quality learning. A dynamic learning environment, the development of students' critical thinking and problem-solving abilities,

and the love of learning may be developed by instructors by utilizing various teaching strategies. The ninth survey's statement is a question about using real-life problem-solving activities in the classroom. The statement is that I chose a problem that was relevant to real-life events and let the students solve it. The purpose of the statement is to enable students to establish links between classroom learning and real-life situations to stimulate their engagement and comprehension.

The participants were to choose their extent of agreement or disagreement with the above-stated statement. The results are shown in the above table; 35.5% of the participants agreed to having chosen a problem centering on real-life events and let the students solve it. A large percentage of the participants agree with the fact that real-life scenarios are ideal when it comes to engaging and enabling students to understand the concept better. However, as seen, only 6.5% of the participants strongly disagreed with the data above, meaning that it may be because they do not believe in using real-life scenarios in problem-centered activities. That may indicate that they have a less student-focused, more conventional instructional style in which material delivery is more important than the greater role of interaction in getting students to bridge their learning in the classroom with real-world scenarios. Classroom problem-solving tasks that compel students to address real-life situations are a highly effective method to get students engaged in their learning and promote deeper learning. They can demonstrate that what is being learned is pertinent and important, as well as help students apply their learning to applicable real-world circumstances. Choosing problems related to real-life occurrences makes this learning space one that is meaningful, demanding, and connected. The tenth point of the questionnaire implies the extent to which potential instructors are going to be open to suggestions sent to the class. I stated that I encourage the students to portray their knowledge and their personal point of view, which stresses the importance of creating a friendly and inclusive learning space that allows students to feel free to describe their ideas and opinions. The study participants had to identify if they agreed or disagreed with this statement. As shown by the results, 33.0% of the participants strongly agreed to the statement that implied they encouraged their students to share knowledge and points of view. A large proportion of the total participants realize the significance of inclusivity and collaboration in their learning. Just 7.7% strongly disagreed with the statement, indicating that participants do not have the expectation to be inclusive and collaborative during learning.

This may indicate that their teaching style is more conventional or less student-centered, with an emphasis on imparting knowledge rather than encouraging engagement and cooperation. The survey shows that while a significant number of participants value student input in the classroom, there is still room for improvement. Teachers can foster an

inclusive, engaging, and deeper learning environment by prioritizing student involvement and collaboration.

The 11th statement was, "As a prospective teacher, I find that group projects are the best way to teach cooperative learning." Most of the participants responded that they agreed that, as a prospective teacher, I find that group projects are the best way to teach cooperative learning, which was 36.1 percent. The lowest percentage of respondents marked "strongly disagreed" with 6.7%. According to the responses against the statement, learning was productive while students were working in groups because of inter- and intra-group discussions. The highest percentage was 36.1%, who agreed with the statement, and 6.7% was the lowest value of prospective teachers who strongly disagreed that their learning was productive while students were working in groups because of inter- and intragroup discussions. Planning and implementing lessons were the second part of PCK. In the statement of instructional planning and strategies, I used different teaching methodologies for a better understanding of the students. Designing and organizing lessons, activities, and aids to support student learning are part of instructional planning and strategy. According to the statement, the teacher employed several teaching strategies to guarantee that the students had a better knowledge of the material. According to the respondents to the survey, instructional planning and methods are very successful in promoting student learning, as indicated by the mean value of 3.98. Although there was significant variation in the replies, most of the respondents felt that the teacher's employment of various teaching philosophies improved student learning, as indicated by the standard deviation of 1.16.

Table 4

Frequency distribution of content knowledge

Statements	*M*	*SD*
I used the subject matter effectively.	3.70	1.12
I have a command of pedagogical knowledge.	3.59	1.15
I use appropriate teaching methods based on lesson content.	3.79	1.15
I was prepared with my content knowledge and cleared my concept.	3.92	1.11
I related the subject to real-life examples.	3.88	1.15
I presented the content with clarity.	3.88	1.15
I am competent in my subject area.	3.82	1.14

I used suitable terminology for the content in practice.	3.96	1.13
I was able to gain a better comprehension of my teaching subject's material.	3.85	1.08
As a teacher, I keep my content knowledge up to date.	3.92	1.09
I understand the key principles of the subjects I teach.	3.85	1.14
I relate specific examples to the topic.	3.94	1.08

Content knowledge, which focuses on how successfully prospective teachers utilize their subject matter knowledge in their teaching practices, is the third part of PCK (Pedagogical Content Knowledge). "I utilized the topic matter well" is the first of the 12 statements that make up this component. The participants were asked to rate how much they agreed or disagreed with the statement in question. The results show that the highest percentage of prospective teachers who marked "agree" with the statement was 35.5%. This may indicate that a sizable majority of the participants think they effectively apply their subject-matter expertise to their teaching practices. Effective teaching requires efficient use of subject-matter expertise. Teachers who are well-versed in their subject matter are better able to explain it to students straightforwardly and efficiently. It may also boost the students' learning outcomes and class involvement. Furthermore, a teacher may develop more authority and credibility in the class by effectively utilizing subject-area knowledge. On the other hand, 7.6% of potential teachers believed they used this statement badly, which was the smallest percentage. This means that only a small fraction of the participants believe they do not use their subject matter knowledge properly in class. The results show that 35.5% of future teachers expressed their agreement with that statement. This could imply that a large majority of participants view it as a success by successfully integrating their subject-matter expertise into teaching styles. A teacher's subject matter expertise is critical to successful teaching. Teachers well-versed in their subjects are better suited to articulate those subjects in student-friendly ways. This could also improve student classroom participation and learning outcomes. A teacher who successfully integrates their subject-area knowledge may also see an increase in their authority and credibility in the classroom. The smallest percentage of potential teachers rated this statement as unfavorable, at 7.6%. I use suitable teaching techniques depending on the lesson topic—this statement is related to the third component of PCK, which is knowing ways to teach. This component describes the ways, methods, or techniques that the teacher knows to convey their subject knowledge to the learner. According to the results, the statement agrees with 35.2% of the future teachers. This means that a large proportion of participants consider that they use suitable techniques for their lessons and relate them to the subject they are teaching.

This aspect is vital for education since it ensures that the teaching methods are suitable for the educational material, making the process more engaging and productive for learners. On the other hand, the smallest percentage of respondents who strongly disagreed with the statement peaked at 5.8%. As a result, only a small number of potential teachers might not integrate proper teaching methods depending on the class material, leading to student disengagement, poor understanding, or both. There are many ways that teachers must be aware of to ensure that they can effectively convey the subject to their students. The third sub-component of PCK is related to the phrase "I use suitable teaching strategies for the course topic." Knowing teaching methods concerns the variety of possible teaching strategies and tools a teacher determines are needed to better convey his or her own subject matter in a specific situation. The results indicate that 35.2 percent of future teachers had highly positive attitudes. In other words, the vast majority of respondents thought they used suitable teaching tools that were relevant to the course's topic.

This is a key element of education because it ensures that the teaching methods are appropriate for the topic being taught, which helps students learn more effectively and with greater enthusiasm. 5.8% of participants strongly disagreed with the statement, which indicates that a small portion of prospective teachers may not be using effective teaching strategies based on the course material, which may result in student disengagement and poor comprehension. Teachers need to be knowledgeable about various ways to ensure that they can properly communicate the subject to their students.

In response to the statement, I was prepared with my content knowledge and cleared my concept. The prospective teachers who were prepared with content knowledge and had a clearer understanding of these concepts (37.0%) were marked as strongly agreeing, and 4.5% was the lowest value of the respondents who strongly disagreed about the preparation of content knowledge and concepts. However, in the next statement, I related the subject to real-life examples. The results show that 36.5% is the highest percentage of respondents who strongly agree, and 5.8% is the lowest percentage of respondents who strongly disagree; they didn't relate the subject to a real-life example.

The third table's statement relates to how potential teachers convey subject matter knowledge in a way that students may easily understand. In other words, it's a question of how well the professors can explain their subject matter to the students. The table displays the percentage of respondents who strongly agree that the prospective instructors explained the content simply (36.4%). This shows that more than a third of the respondents strongly agreed that the lecturers could explain the material in a way that was both clear and understandable. The lowest number in the table, 6.1%, is the proportion of respondents who strongly disagreed with how the potential teachers presented the subject. This is a rather low percentage, indicating that most respondents either agreed with the statement or

disapproved of it. Most survey participants highly agreed with this statement, which indicates that the potential teachers did a fantastic job overall of making the material understandable and obvious to the audience.

Notably, the small percentage of respondents who strongly disagreed with the statement indicates that room for development still exists. The second statement in the table is related to the competency of prospective teachers in their subject area. In other words, it is about how well the prospective teachers were perceived to know and understand their subject matter. According to the table, the highest percentage of respondents who strongly agree with this statement is 37.6%.

It means that more than one-third of respondents strongly agreed with the statement about prospective teachers' competency in the subject area. Conversely, the lowest percentage in the table is 6.4%, or the smallest percentage of respondents who strongly disagreed with the statement. Most respondents either agreed with the statement in question or had no opinion on it. A significant portion of respondents agreed, which means that those who strongly agreed clearly know the subject. A small fraction disagreed, which means that it is possible to improve due to insufficient knowledge or some weaknesses in pedagogical skills. It means that a teacher can teach a subject to the children only when he or she fully understands it. The eighth statement from the table means the appropriate terminology that prospective teachers use in their practice. Or, more precisely, how the teachers managed to use it. The statement is formulated as "Content teachers use suitable terminology." The table represents a big number of respondents, and the most significant one is 39.7% who strongly disagree with the statement. It suggests that they think prospective teachers couldn't use suitable terminology in their content.

Conversely, the lowest percentage in the table is 5.2%, which is the percentage of respondents who strongly disagreed with the statement. That means that they felt the teachers did, in an actual sense, use the suitable terminology for the content. This percentage is low, and thus only a few respondents felt the teachers used suitable language when teaching. The results, therefore, indicate that the prospective teachers may need to modify their use of suitable terminology in the content they teach.

In order to assist teachers in improving their use of acceptable language when teaching, there may be a need for further training and support, as seen by the large number of respondents who strongly disagreed with this statement. The fact that some respondents still firmly agreed with the statement should be noted since it shows that some teachers were successful in choosing the right vocabulary. In the next statement of the table, I was able to gain a better comprehension of my teaching subject's material. According to the results, most of the prospective teachers (32.7%) agree that they were able to gain a better

comprehension of their teaching subject's material, and the majority (32.7%) of prospective teachers believe that they have improved their understanding of the subject they will be teaching. The lowest value was 3.6%, which shows the percentage of respondents who strongly disagree.

The statement, "As a teacher, I keep my content knowledge up-to-date," elicited a diverse range of responses from prospective teachers. The percentage of respondents who strongly agreed with the statement was at its greatest point (36.1%) and its lowest point (4.2%). This finding shows that the vast majority of aspiring teachers value maintaining current subject knowledge. This is crucial to effective teaching because it enables instructors to adjust to shifting educational objectives and standards while also giving students accurate, up-to-date information. The fact that 4.2% of prospective teachers strongly disagreed with the assertion, however, implies that some people might not place the same value on maintaining their topic knowledge. This can make it more difficult for them to serve the needs of their students and successfully teach their topic. The eleventh statement of the table, I understand, the key principles of the subjects I teach elicited responses from the prospective teachers about their understanding of their teaching subjects.

Most prospective teachers think they have a solid understanding of the fundamental concepts of their teaching subject, as evidenced by the highest value, 33.9%, among those who agreed with the statement. On the other side, the lowest percentage of prospective teachers, 4.8%, disagreed with the statement. This outcome emphasizes how crucial it is to comprehend the fundamental ideas being taught. A teacher can successfully teach the subject matter, answer student inquiries, and develop interesting and pertinent lesson plans by having a solid grasp of the fundamental ideas.

The capacity of the prospective instructors to relate and explain particular instances to their teaching subject was the topic of discussion in the table's twelfth statement. The biggest percentage, 36.7%, came from those who strongly agreed with the statement, showing that most aspiring educators are confident in their ability to connect real-world examples to the subjects they are teaching. The lowest percentage of respondents who described themselves as strongly disagreeing with the statement was 3.2%, which represents potential instructors. The teacher's comprehension of the subject area they are teaching is referred to as topic knowledge, the third component of PCK. I employed appropriate terminology for the material in practice, which was the claim with the highest mean value in this case's content knowledge component.

This claim indicates the subject topic was taught using proper language and vocabulary. The students were better able to understand the material since the teacher was

able to properly convey the concepts and ideas to them. The respondents in the survey assessed the teacher's use of appropriate vocabulary as extremely helpful in supporting student learning, as indicated by the mean score of 3.96. The replies varied somewhat, as indicated by the standard deviation of 1.13, but overall, the respondents agreed that the teachers' use of suitable language and terminology improved student learning.

Table 5

Frequency distribution of lesson planning

Statements	*M*	*SD*
I planned lessons before going to class.	3.90	1.21
I make lesson plans by considering different learning styles.	3.88	1.12
I checked the students' previous knowledge.	3.87	1.11
I plan activities based on their learning level.	3.88	1.15
I organized activities into logical stages to fulfill the objectives of the lesson.	3.86	1.14
I used appropriate teaching aids that were suitable for the topic.	3.82	1.15
I monitored every student’s work.	3.90	1.15
I provided proper time to every student.	3.95	1.11
I encouraged the students to think critically.	3.98	1.19

Lesson planning is the fourth part of Pedagogical Content Knowledge (PCK), and it consists of nine statements. One of these claims is that I prepare lessons in advance of classes. The findings revealed that 41.8% of potential instructors strongly agreed with this statement, demonstrating that they place a priority on lesson planning before instruction. 6.4% of respondents, on the other hand, strongly disagreed with this assertion, indicating a distinct strategy for lesson planning. Another statement in this component is that I make lesson plans by considering different learning styles. The highest percentage of respondents, 35.8%, marked as strongly agreeing with this statement, indicating that they try to cater to diverse learning styles in their lesson planning. However, 4.8% of respondents strongly disagree, indicating that they do not consider different learning styles in their lesson planning.

The 3rd statement in the table was about the practice of checking the previous knowledge of students. The data demonstrated that 37.3% of the prospective teachers, which was marked as "strongly agree," would check the previous knowledge of their

students before starting a new lesson. The given percentage represented the highest one among the available options in this table. The second option. I did not check the previous knowledge of students, who represented 6.1% of the prospective teachers in this survey. This percentage demonstrated the lowest percentage among the options in the table. The fourth statement on the table regarded the organization of activities based on the students' levels of understanding. The findings established that 37.0% of the prospective teachers strongly agreed with the statement. That is the highest % of all other options in the table. Concerning the potential instructors, 4.7% indicated that they strongly disagreed with the statement. It is, thus, the lowest % of all the other options on the table. Finally, the results reveal that most prospective teachers understand that it is crucial to assess students' prior knowledge and organize the lessons according to the level of understanding.

The fifth statement in Table 5 focused on breaking the activities down into logical steps to attain the goals of the lesson. Based on the results, many of the potential teachers, 33.0%, agreed with the statement. From the investigation, this implied that a large proportion of future teachers identified the importance of planning the activities in a logical order to attain the objectives of a class. Some 7.0% of potential instructors, though, strongly disagreed with the explanation. This signified that a small proportion of prospective teachers failed to break down the activities into logical steps to attain the goals of the lesson. The sixth statement on the table addressed the use of appropriate teaching tools depending on the subject. Of the possible teachers, 36.7% used topic-appropriate teaching materials in the findings of the survey. This indicates that a large percentage of the probable teachers were knowledgeable about the necessity of using instructional materials that were relevant to the subject being taught. However, 5.2% of those who wanted to become teachers strongly disagreed with the opinion statement. This means that a small percentage of the prospective teachers did not use the topic-appropriate instructional materials.

The seventh statement in the table dealt with the monitoring of each student's work. According to the statistics, the greatest percentage of all the options in the table was 39.1%, which strongly suggests that prospective instructors saw every student's work. Therefore, it can be assumed that many prospective teachers perceive the need to observe each student's work and help if necessary and criticize if necessary. But 4% of people agreed that the assertion was strongly disagreed with. The item in list number seven was that not all students' progress was tracked. The sixth question was asked, and 47.8% of prospective instructors strongly agreed with this statement. This showed that most prospective instructors are less concerned with individualized care and support for every learner in the class, while lectures offer no opportunities as advertised. It also seemed from the data that only a small fraction of potential instructors did not evaluate their students relative to their progress. The eighth item on the list asked about giving each student enough time. The fifth item on the questionnaire was giving each student enough time;

40.6 % of potential instructors strongly agreed. This point revealed that some potential teachers did not spend as much time with their students, implying that students would suffer from a lack of care and help. On the list's ninth, it was also included that more than half, or 43.9% of potential teachers, agreed or strongly agreed with the comment.

This showed that a sizeable percentage of prospective teachers are aware of the value of encouraging critical thinking in their students. However, 6.4% of those who were considering becoming teachers were noted as strongly disagreeing with the statement. This showed that a tiny fraction of potential teachers did not promote critical thinking in their students, which could have limited their capacity to acquire critical thinking abilities.

Lesson planning, the fourth element of PCK, is the act of creating and organizing lessons to efficiently impart a certain subject matter. I urged the students to think critically, and that statement had the highest mean value in this case's lesson preparation component. The statement claims that the teacher's lesson plans were created to promote critical thinking among the class. The teacher was able to encourage higher-level thinking and a better comprehension of the subject matter by doing this. The study's respondents appear to have found the teacher's promotion of critical thinking to be quite effective in promoting student learning, as indicated by the mean value of 3.98. Although there was considerable variation in the replies, the majority of the respondents felt that the teacher's promotion of critical thinking had a positive impact on the students' learning, as indicated by the standard deviation of 1.19.

Table 6

Frequency distribution of assessment

Statements	*M*	*SD*
I applied multiple assessment strategies.	3.71	1.14
I assess the students without biases.	3.64	1.13
I designed the test with the course content in mind, rather than the learning objectives.	3.42	1.20
I preferred to share results with students.	3.87	1.14
Observing students' performance resulted in ongoing development.	3.93	1.11
Feedback to the students based on the assessment was useful.	3.87	1.18
Frequent testing guided instruction for achieving goals.	3.81	1.17
Students take their failure as a learning experience for future success.	3.84	1.14

If assessment results are shared with students, they take direction.	3.89	1.13
Students should be given the right to appeal/recheck papers.	3.89	1.18
Female students should be favored for extra time on tests.	3.57	1.32
Students always like to see their assessment details for both success and failure.	3.77	1.12
There is no use of assessment in multiple ways.	3.48	1.31
Feedback to the students based on the assessment is useful.	3.85	1.12
Assessment results give directions for teaching.	3.95	1.13

The use of various assessment procedures was mentioned in the first statement under the PCK (Pedagogical Content Knowledge) section on assessment. According to the findings, 31.8% of those considering becoming teachers strongly agreed with the statement. This showed that a sizeable percentage of prospective teachers are aware of the value of utilizing a range of assessment techniques to gauge student learning. The statement was identified as strongly disagreed with by 9.4% of prospective teachers, which indicates that they did not use multiple assessment techniques.

As a result, there might not be a wide variety in assessment strategies, making it more complicated, for instance, to acquire an extensive picture of students' learning and development. The second statement was about the fact that "He or she should be able to evaluate students objectively"; the findings revealed that 36.4% of prospective teachers strongly agreed with the statement, which means that a big part of prospective teachers understood the necessity, meaning, and importance of being without bias while evaluating. Nevertheless, 5.2% of prospective teachers strongly disagreed with the statement, illustrating that a tiny portion of potential teachers did not evaluate students objectively. Such an approach can lead to the existence of unequal treatment and perceptions on the part of students. The third claim was based on the idea that the exam was created based on the course, not the lesson objectives. According to the results, 30.6% of the respondents fully agreed with the statement. It means that a considerable part of the participants understands the importance of linking the assessment and the course material.

The exam was not created with the course topic in mind by a tiny percentage of prospective teachers, as shown by the 7.9% of replies that were categorized as strongly disagreeing with the assertion. This may result in exams that aren't correctly connected with learning objectives for students. Statement 4 specifically states that a sizable majority of prospective instructors (36.1%) wanted to discuss findings with learners. This is based on survey findings from prospective teachers who were asked to rate how much they agreed

or disagreed with the statement. 5.2% of respondents characterized their opinion as strongly disagreeing, compared to a total of 36.1% of respondents who indicated strong agreement. The findings of a questionnaire in which prospective teachers were questioned about their opinions on whether monitoring students' performance results in continual improvement are referenced in statement number 5. The percentage of respondents who said they strongly agreed with the statement was 33.9%, the highest of all the response possibilities, according to the statistics. The least number of responders (5.2%), out of all the response possibilities, chose to strongly disagree with the statement.

The sixth statement reveals the attitude of prospective teachers to the need to give students feedback based on the results of tests. In this regard, 38.4% of the participants in the survey chose “strongly agree” to express their opinion. The smallest percentage of agreement with the statement was also expressed by 4.8% of the participants in the survey who chose “strongly disagree." Statement seven reveals the views of future teachers on the need for regular testing to guide instruction to reach goals.

The results of the research indicated that 38.5% of people who took part in the survey strongly agreed. On the contrary, 5.5% of the respondents said that they strongly disagreed. In the eighth statement, it is discussed whether future instructors think that students view failure as a lesson that will help them succeed in the future. The results showed that the percentage of those who strongly agreed was 34.5%, which was the highest percentage among all possible answers. The next highest result was 5.2%, which represents the percentage of people who disagreed strongly. Statement number nine touches on the student’s direction-taking impact on the assessment results’ opinion among expectancy teachers. According to the outcomes, 37.6% of the people showed their support, as they agreed strongly.

A total of 5.5% of the participants had the least agreement with this claim, with which they strongly disagreed. The tenth statement was the ability for students to ask for work to be rechecked. A total of 38.8% of potential instructors either agreed or strongly agreed with this claim, making it the highest proportion. However, only 6.7% of potential teachers scored from strongly disagree to disagree, meaning that they didn’t agree to give students a chance to appeal or recheck their work. The eleventh statement in the table is about female students' preferences for more time during exams. It can be defined as the prospective teacher’s view of whether female students should get more time on a test or not. With a percentage share of 31.5%, the potential instructors agreed that female students should be awarded more time on the test.

This is a relatively high percentage, indicating that many respondents thought female students needed more time to finish assessments. However, 10.6% of the candidates

for teaching strongly disagreed with this assertion, indicating that they do not think female students should be given more time on examinations. Given the low proportion, it is likely that the great majority of respondents either agreed with the statement or had an unfavorable opinion of it.

Regarding the preference of students to view their evaluation information, the 12th item elicited a response from 37.9% of potential teachers. 6.4% was the smallest percentage of disagreement. This indicates that a sizable portion of prospective teachers think that students enjoy seeing the specifics of their evaluations, both for success and failure. The use of various assessment methods was discussed in the thirteenth statement. The lowest percentage of prospective teachers who strongly disagreed with the statement was 11.2%, while 27.9% of the prospective teachers were identified as strongly agreeing that there is no reason for evaluation in numerous methods. This shows that a sizable portion of prospective teachers think assessments should only be used in one way.

The fourteenth statement talked about providing students with feedback based on test results. The majority of respondents, 39.1%, strongly agreed that providing students with feedback based on assessment is beneficial. 4.8% of respondents, the lowest number, indicated that they strongly disagreed with the assertion. This implies that a sizable portion of prospective teachers think it's beneficial to provide students with feedback based on exams. The final sentence talked about how test results affect classroom instruction. The majority of prospective teachers (37.9%) agreed with the assertion that assessment results inform instruction. 5.2% of respondents, the lowest number, indicated that they strongly disagreed with the assertion.

The final element of PCK is assessment, which is the procedure for gauging student progress and giving both teachers and students feedback. The assessment component's statement that had the greatest mean value in this instance was "Assessment results give directions to the teaching." It is implied by this remark that the instructor based their instruction on the outcomes of the assessments. The teacher was able to pinpoint areas of strength and weakness in student learning by analyzing assessment data, and they then modified their teaching methods appropriately. The study's respondents may have assessed the use of assessment findings to direct instruction as very helpful in promoting student learning, if the mean value of 3.95 is any indication. Although there was considerable variation in the replies, most of the respondents felt that the teacher's use of assessment findings was successful in improving student learning, as indicated by the standard deviation of 1.13.

Inferential Statistics

Inferential statistics were used to see the effect of variables.

Table 7

Independent samples t-test based on gender

Factors	*Male*		*Female*		*t*	*df*	*p*
	M	*SD*	*M*	*SD*			
Classroom management	3.79	.792	3.64	.798	-1.143	330	.695
Instructional planning & strategies	3.76	.880	3.73	.827	-.202	330	.402
Content knowledge	3.83	.754	3.83	.885	-.198	330	.346
Lesson planning	3.96	.880	3.88	.951	-.528	330	.340
Assessment	3.79	.761	3.76	.838	-.232	330	.583

According to the findings, there is no significant distinction between male and female instructors' evaluations of lesson design, assessment, topic understanding, and classroom management. The p-values are all more than 0.05, suggesting that these differences are not statistically significant. The t-values are all negative for all variables, indicating that the means for men are slightly lower than the overall averages.

Conclusion

It is concluded from the results that prospective teachers exhibited pedagogical content knowledge (PCK) during their teaching practicum practices. The findings revealed that the extent to which prospective teachers exhibit PCK varies, and classroom management is a critical component of PCK. Most prospective teachers exhibit strong PCK in prioritizing lesson planning, checking students' previous knowledge, planning activities based on the students' learning level, and using appropriate teaching aids. However, there is still a need for teacher training programs to emphasize the importance of some practices, such as engaging students in rulemaking and using reinforcement techniques to manage and engage them. The study found no significant differences in the PCK exhibited by male and female prospective teachers. Still, there may be slight differences in specific practices related to classroom management and student engagement. The findings also revealed that female prospective teachers were more likely to send students to the principal's office for misbehavior and use a loud voice or scold students in the classroom to manage improper behavior compared to male prospective teachers. Overall, the study provides valuable information for teacher training programs to help develop PCK among prospective teachers and promote effective teaching practices.

Discussion

The findings of the present study were examined in relation to previous research on various dimensions of prospective teachers' pedagogical content knowledge (PCK). Pedagogical content knowledge, originally conceptualized by Shulman (1986), emphasizes the integration of subject matter knowledge with pedagogy and knowledge of learners. A substantial body of literature has explored gender-related differences among prospective teachers and their implications for teacher education programs (TEPs). Prior research has also highlighted the importance of gender-inclusive approaches within teacher preparation programs to promote equitable learning experiences and professional growth (Loughran et al., 2012). Much of the existing literature has primarily focused on in-service teachers, particularly examining their use of instructional technologies, integration of pedagogical strategies, and alignment with learning objectives in the development of PCK (Darling-Hammond et al., 2017; Mishra & Koehler, 2006). Comparatively fewer studies have explicitly investigated the development of PCK among prospective teachers during initial teacher preparation (Latip et al., 2023; Ghazala & Kausar, 2024). Against this backdrop, the results of the current investigation demonstrate a generally positive trajectory in prospective teachers' PCK, aligning with and extending earlier findings that emphasize the formative role of teacher education in shaping pedagogical competence.

Recommendations

This study aims to encourage the positive trend in the development of PCK by supporting and encouraging those prospective teachers who, when teaching, modify instruction to reach the learner, use new instructional technology, ask students questions, use different teaching methods, and align their instructional strategies with their objectives. The small percentage of prospective teachers who have a confidence gap in their ability to use various teaching methods and strategies should also get additional support and training. All the prospective teachers should be encouraged to develop their knowledge of effective lesson planning, which includes varying learning styles, previous knowledge of students, appropriate activities, and teaching aids. All prospective teachers should be supported and trained in the area of classroom management, including strategies for involving students in the development of rules and the use of reinforcement techniques to manage and engage students.

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