

Empirical Paper

An Assessment of Pre-Service Teachers' Content Knowledge (CK) and Pedagogical Content Knowledge (PCK) in Economics in Lagos State University, Nigeria

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Abstract

Purpose: This study assesses teacher trainees' Content Knowledge (CK) and Pedagogical Content Knowledge (PCK) in Economics at Lagos State University. The study was conducted to improve the teacher-training programme.

Methodology: The study employs a descriptive research design to assess the impact of the teacher training programme on trainees' subject matter knowledge and pedagogical skills. It sampled 90 teacher-trainees using purposive sampling. Twenty-five test items were developed to measure the teacher trainees' content knowledge in Microeconomics, Macroeconomics, and mathematical representation in economics, as well as their pedagogical content knowledge in economics.

Result: Findings established a difference between male and female participants in Content Knowledge of economics and pedagogy. It also showed a strong positive relationship ($r = .68$) between teacher-trainees' content knowledge and mathematical representation. Teacher trainees must be trained to be balanced in both pedagogical and content knowledge, regardless of their gender.

Novelty and contribution: The study established that phobias and erroneous beliefs that certain knowledge is meant for a particular gender create a gap between teacher trainees' content and pedagogical knowledge.

Practical and social implications: Finally, based on the findings of this study, it is recommended that teaching practice students be oriented so that both content knowledge and pedagogical skills are acquired simultaneously. Additionally, the Government should emphasise the professional development of teachers. Teachers should not just attend training, but rather training relevant to their teaching subjects.

Keywords: Content knowledge, Gender difference, Pedagogical knowledge, Pre-service teacher, Teacher education

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1 Introduction

Teacher education is an essential endeavour globally. The teacher training programme is designed to prepare teachers to translate educational theories and policies into practice (Okonkwo & Chikwelu, 2017). In other words, the programme is meant to produce competent teachers for teaching activities at all levels (Federal Republic of Nigeria (FRN), 2013). Teaching is a process of imparting knowledge to a learner or group of learners. Fernanda and Antonio (2012) affirmed that teaching as a process is experiential; as such, it demands a holistic analysis of its theoretical foundations and the settings through which it evolves. Therefore, teachers cannot be assumed authentic unless they have a knowledge base of content and pedagogy. Studies conducted in recent decades have shown that teachers' knowledge influences students' learning outcomes. Darling-Hammond (2000) noted that students' success relies heavily on teachers.

Furthermore, teaching practice is embedded in teacher education and is purposively organised to prepare trainee teachers for both general and specific classroom situations. It provides teacher trainees with the opportunity to operationalise the education principles and theories they have learnt. According to Okonkwo and Chikwelu (2017), a teaching-practice student usually faces challenges ranging from mastery of subject matter to classroom management. It is therefore important for the supervisors of these interns to build confidence in them and provide assistance in the area of pedagogical competence (Onyebukwa-Nwanoro, 2017).

Similarly, among the subjects offered in secondary schools where teachers are posted is Economics. However, the economics curriculum changes from time to time in Nigeria as a result of policy instability. This inconsistency affects teacher trainees' ability to select appropriate methodologies for effective teaching and enhanced learner understanding. This change is necessary to address the holistic needs of a whole person (National Educational Research Centre (NERC), 2000). However, the knowledge base of economics teachers saddled with implementation must also be reckoned with. The individual must be well grounded both in content and pedagogical knowledge.

Teacher trainees' efforts and knowledge adequacy will be useful and significant if the desired result is to be produced. Teachers' knowledge is an all-encompassing concept, which, according to Rohaan et al. (2009), covers cognitive, beliefs, and knowledge domains. Being the pioneer researcher of teachers' knowledge, Shulman (1986) addressed teachers' knowledge from three angles, namely: content knowledge, curriculum knowledge, and pedagogical content knowledge. Rahmi (2018) found that teacher-trainees in teaching practice seem not to be taking cognisance of the link between the knowledge of the subject matter and pedagogical knowledge. According to the study, the outcome has greatly affected them in the field of teaching practice. Similarly, in Nigeria, the situation is worrisome among the teaching practice students, owing to their inability to form a relationship between subject matter competence and pedagogical prowess.

Content Knowledge is the teacher's knowledge of the topic or subject matter in any area of specialisation. The teachers' content knowledge is classified as conceptual knowledge and representational knowledge (Raimundo et al., 2014). Conceptual knowledge entails both general and specific knowledge in any area of specialisation, while representational knowledge (RK) is the teachers' knowledge that relates to concept representation from one form of representation to another (Raimundo et al., 2014). It entails teachers' ability to use representational competency to illustrate ideas from verbal representation to graphical representation or algebraic representation. Teachers' competency in concept representation promotes deep and reflective learning required for 21st-century learners. Despite the significance of content knowledge, several studies have claimed that a solid foundation in pedagogical content knowledge is required for the attainment of the status of an excellent teacher.

On the other hand, Pedagogical Content Knowledge (PCK) is a form of specialised or professional knowledge employed to impart the content of a certain branch of knowledge (Wilson et al., 2002). Pedagogical content knowledge is, therefore, categorised into the Knowledge of Teaching of Content (KTC) and the Knowledge of Students' Knowledge (KSK) (Raimundo et al., 2014). They argued further that the KTC entails teachers' perception of the total learning process, teachers' knowledge of curriculum content sequencing and organisation, and knowledge of learning theories, which influence the teacher's classroom practices. Meanwhile, KSK entails teachers' acknowledgement of the body of knowledge acquired by their learners and teachers' consciousness of students' prior knowledge, concept interpretation, students' areas of difficulty, and errors to resolve the classroom problem.

Teachers' content knowledge cannot be overemphasised as a fundamental requirement in the teaching profession. It means that the would-be teacher has a comprehensive knowledge about the subject he teaches (Shulman, 1986).

Sufficient knowledge of the content is a basic requirement for an effective teacher because it is the bedrock upon which pedagogical knowledge is built. Moreover, teachers' PCK is of interest because it emphasises the body of knowledge needed for teaching (Kruger, 2017). A well-trained teacher not only transfers the subject matter but moves a step further to fortify himself with pedagogical knowledge.

Buschang (2008) claimed that the CK and PCK are closely related but separate entities. Equally, Ball et al. (2008) argued that the selection and development of the object of learning, the use of the appropriate explanations and representations, the enablement of dynamic classroom discussions, the analysis and interpretation of learners' responses, the issue of learners' comprehension, and the interpretation of student areas of difficulty are all classified as elements of PCK. However, Park and Oliver (2008) suggested that PCK could be improved through planning, conducting, and evaluating classroom practice when the teacher reflects on the teaching process and students' misconceptions and misinterpretations of concepts taught. Krauss et al. (2008) opined that three dimensions of PCK are significant to classroom practice. These are teachers' knowledge of students' entry behaviour (misconceptions and difficulties), teachers' knowledge of subject assignments, and teachers' knowledge of multiple representations, analogies, and illustrations.

Statement of Problem

Despite the importance attributed to teachers' knowledge of subject matter, the understanding of how the learning opportunities available during teacher education and professional development affect the development of subject-specific knowledge remains limited (Darling-Hammond, 2000). This implies that teaching practice teachers are required not only to attend teachers' training institutions to be proficient alone; they must also know how to teach. Producing highly competent teachers requires sound preparation to flexibly face any hurdle in the field (Rahmi, 2018). Concerns persist in African countries generally and Nigeria in particular; some teachers still have difficulty marrying both CK and PCK, which results in the inability of students to understand the subject.

There are few studies on pre-service teachers' CK and PCK in economics. Yusminah et al. (2016) confirmed that previous studies had demonstrated that teacher training colleges and institutes do not equip teachers with ample learning experiences in the area of PCK. In the study of Hallim (1997), it was claimed that teachers' training colleges and institutes provide limited opportunities for teachers to grow to the full potential of their Pedagogical Content Knowledge (PCK) when compared to a wide range of pedagogical issues surrounding concept understanding, comprehension, and reproduction of knowledge by learners. The concept of PCK needs a more robust and deeper theoretical study and empirical support (Ball et al., 2008).

Previous studies (Danisman & Tanisli, 2017; Kruger, 2017) have revealed that when a teacher lacks basic knowledge, students will definitely be affected. Therefore, refining teachers' knowledge is of greater importance than just investing in physical facilities. This study attempts to deepen the knowledge of pre-service content and pedagogical knowledge in economics in the Nigerian educational context. Hence, the need to investigate pre-service teachers' CK and PCK in economics in Nigeria.

Research Objectives

Specifically, the objectives of this study were to:

- i. Determine the difference in the mean CK scores of teaching practice teachers based on their knowledge of microeconomics and macroeconomics.
- ii. Investigate the differences in teaching practice, teachers' subject-matter knowledge, and PCK based on gender.
- iii. Examine the difference in CK in pre-service teachers' mathematical representation based on gender.
- iv. Examine teachers' perception of the effect of their pedagogical skills on students' mathematical representation.

Research Questions

- i. This study sought to address the following research questions:
- ii. What is the level of teachers' trainee Pedagogical Content Knowledge in economics?

- iii. What is the mean score for PCK among student teachers in microeconomics and macroeconomics?
- iv. Is there a difference in pre-service teachers' CK and PCK based on gender?
- v. Is there a difference in pre-service teachers' Content Knowledge in mathematical representation based on gender?
- vi. What is the teachers' perception of the effect of their pedagogical skills on students' mathematical representation?

Research Hypotheses

- H01: There is no significant difference in preservice teachers' CK based on Microeconomics and Macroeconomics.
- H02: There is no significant difference in preservice teachers' CK and PCK based on gender.
- H03: There is no significant relationship between preservice teachers' CK and mathematical representation.

2 Methodology

The study adopted a descriptive research design using a cross-sectional approach to assess teacher trainees' CK and PCK in economics. The study employs this design because it tends to determine the impact of a teacher training programme on the trainee's knowledge of content or subject matter area, and pedagogical skills, and information gained from the study can be used to improve the teacher's training programme. Using purposive sampling, the study selected 90 final-year students out of 93 students enrolled in the Economics Education degree programme at Lagos State University, Lagos State, Nigeria. Twenty-five test items were developed to measure teacher trainees' CK and PCK in economics based on Rohaan et al.'s (2009) criteria for developing teachers' CK and PCK Multiple Choice Test. The first 15 test items were adopted from the Test of Economic Literacy developed by Walstad et al. (2013), with an overall reliability coefficient of .91 and standard error of measurement (SEM) of 2.99. The test items were used to measure pre-service CK in Microeconomics, Macroeconomics, and mathematical representation in economics. The teacher trainees' PCK was measured with 10 items that were self-developed by the researchers. The data collected were analysed with descriptive and inferential statistics such as mean, standard deviation, t-test, and Pearson correlation.

3 Results

Research Question 1: What is the level of teachers' trainee Pedagogical Content Knowledge in economics?

Table 1 Summary of Pre-service Economics Teachers' Pedagogical Content Knowledge

S/N	Teachers' Pedagogical Content Knowledge	Total	Mean	Decision
1	I often use graphs and other mathematical expressions to explain every economics concept defined in class.	350	3.88	Agreed
2	Students are always comfortable with a verbal explanation of economic concepts but become frustrated when mathematics and graphs are introduced for the same concepts.	375	4.16	Agreed
3	Students are usually motivated to learn economics topics that are devoid of mathematical representations, like the economic system, financial institutions, and industrialisation.	315	3.50	Agreed
4	Some topics in economics are so abstract that improvisation of instructional media for teaching such topics may not be possible.	316	3.51	Agreed
5	Most students have difficulties with topics like demand and supply, cost theory, market theory, statistics, and national income accounting due to the volume of mathematical and graphical representations involved.	358	3.97	Agreed
6	Using locally identifiable material in teaching economics content can increase	306	3.47	Agreed

	learners' motivation and interest.			
7	Effective use of questioning can stimulate learners' interest and spot students' areas of learning difficulties.	321	3.56	Agreed
8	Most economics students have the challenge of explaining economics concept with algebraic and mathematical representation.	364	4.04	Agreed
9	I am always eager and interested in interpreting the mathematical value of economics concepts in the classroom.	336	3.73	Agreed
10	I relate every economics concept in the classroom to the happenings in Nigeria's economy.	364	4.04	Agreed
Grand Mean			3.79	Agreed

The decision rule is that any mean score of 3.0 and above is accepted, while a mean score of less than 3.0 is rejected. Table 1 shows that the respondents agreed with the 10 items because the mean score of each of the 10 items is greater than 3.0. Also, since the grand mean or mean of means is 3.786, we accept and agree that the pre-service teachers possess PCK in economics.

Research Question 2: What is the mean score for PCK among student teachers in micro and macroeconomics?

Table 2 Difference in the Mean Scores of Teaching Practice Teachers' PCK Based on Micro and Macroeconomics.

Variables	N	Mean	Std.Deviation	Mean Difference	Eta
Microeconomics	90	3.51	1.05	-0.13	0.02
Macroeconomics	90	3.64	1.30		

Table 2 shows that the mean score of teaching practice teachers' CK in macroeconomics (M= 3.64, SD= 1.30) is higher than that of microeconomics (M = 3. 51, SD = 1.05). The mean difference is -0.13, while the calculated eta score is 0.02, which implies that the difference is of small effect.

Research Question 3: Is there a difference in teaching practice, teachers' subject-matter knowledge, and PCK based on gender?

Table 3 Difference in Teaching Practice, Teachers' Subject-matter Knowledge, and PCK Based on Gender.

Variable	Gender	N	Mean	Std.Deviation	Mean Difference	Eta
CK	Male	51	10.235	2.2234	1.46	0.08
	Female	39	8.769	2.7189		
PCK	Male	51	37.490	5.1434	-0.48	0.002
	Female	39	37.974	3.5724		

Table 3 shows that the mean score of teaching practice teachers' subject matter knowledge of males is higher than that of females. The mean difference is 1.46; the paired t-test showed that the difference is not statistically significant, $t = 2.81$, $df = 88$, $p > 0.05$. The calculated eta's squared effect is 0.08, which indicates a moderate effect.

Similarly, the mean score of Pedagogical knowledge of male teachers is lower than that of female teachers. The mean difference is -0.48; however, the paired t-test showed that the difference is statistically significant, $t = 5.09$, $df = 375$, $p < 0.05$. The calculated eta's squared effect is 0.002, which is a moderate effect.

Research Question 4: Is there a difference in teaching practice teachers' content in Mathematical representation based on gender?

Table 4 Difference in teaching practice teachers' CK in mathematical representation based on gender.

	Gender	N	Mean	Std Deviation	Mean Diff	Eta
Mathematical Representation	Male	51	2.56	0.85	0.28	0.02
	Female	39	2.28	1.09		

Table 4 revealed the difference between the mean scores of male and female teaching practice teachers' content knowledge in mathematical representation. The mean score of males ($M = 2.56$) is higher than that of females ($M = 2.28$). The mean difference is 0.28, while the eta square is 0.02, which implies that the difference between male and female teaching practice teachers in mathematical knowledge is of a small effect.

Research Question 5: What is the pre-service teachers' perception of the effect of pedagogical skills on mathematical representation?

Table 5 Teachers' Perception of the Effect of Pedagogical Skills on Students' Mathematical Representation

Variables	SA(%)	A (%)	U (%)	D (%)	SD (%)
Use of TPK	37 (8.2)	38 (8.4)	67 (14.8)	194 (43.1)	114 (2.3)
Impact of TPK	25 (5.5)	26 (5.7)	55 (12.2)	229 (50.8)	115 (25.5)

Table 5 shows the perceptions of teaching practice teachers on the effects of their pedagogical skills on students. Only 37 (8.2) and 38 (8.4) strongly agreed and disagreed, respectively, to their use of pedagogical knowledge; those that were undecided were 67 (14.8); while the disagreed and strongly disagreed views were 194 (43.1) and 114 (2.3), respectively. This implies that the respondents attested to the fact that they rarely utilise their pedagogical skills to teach the mathematical aspect of economics. On the other hand, 25 (5.5) and 26 (5.7) strongly agreed and agreed, 55 (12.2) were undecided, while 229 (50.8) and 115 (25.5) disagreed and strongly disagreed, respectively. This implies that the majority of the respondents held the view that students have a phobia of mathematical representations in economics due to poor use of pedagogical skills by teachers.

Hypotheses

H01: There is no significant difference in teaching practice teachers' knowledge based on microeconomics and macroeconomics

Table 6 Difference in Teaching Practice Teachers' Knowledge Based on Microeconomics and Macroeconomics.

	N	Mean	MD	Std. D	t	df	Sig.	eta	Remark
Micro econs	90	3.51		1.05					
			-.13		-1.00	89	.317	0.02	Accepted
Macroecons.	90	3.64		1.30					

Significant level $p < 0.05$

Table 6 revealed the result of a paired-samples t-test that was conducted to evaluate teaching practice teachers' CK based on micro and macro-economics. There was a statistically significant decrease in scores from microeconomics ($M = 3.51$, $SD = 1.05$) to macroeconomics ($M = 3.64$, $SD = 1.30$), $t(89) = -1.007$, $p < .317$ (two-tailed). The calculated eta's eta-squared effect is 0.02, which indicates a low effect. Hence, the null hypothesis that there is no significant difference in teaching practice teachers' knowledge based on microeconomics and macroeconomics is upheld.

H02: There is no significant difference in teaching practice, teachers' subject matter knowledge, and PCK based on gender.

Table 7 Difference in Teaching Practice, Teachers' Subject-Matter Knowledge, and PCK Based on Gender.

Variable	Gender	N	Mean	t	df	Sig.	Mean Diff	eta	Remark
CK	Male	51	10.23						
				2.81	88	.006	1.466	0.08	Accepted
	Female	39	8.76						
PCK	Male	51	37.49						
				-.502	88	.617	-0.4841	0.002	Accepted
	Female	39	37.97						

Significant level $p < 0.05$

Table 7 shows that the mean score of teaching practice teachers' subject matter knowledge of male teachers is higher than that of female teachers. The mean difference is 1.46; the paired t-test showed that the difference is not statistically significant, $t = 2.81$, $df = 88$, $p > 0.05$. The calculated eta's eta-squared effect is 0.08, which indicates a moderate effect. Furthermore, the mean score of Pedagogical knowledge of male teachers is lower than that of female teachers. The mean difference is 3.70; however, the paired t-test showed that the difference is not statistically significant, $t = 5.02$, $df = 88$, $p > 0.05$. The calculated eta's squared effect is 0.002, which is a small effect.

H03: There is no significant relationship between teaching practice and teachers' content knowledge and mathematical representation

Table 8 Relationship between Teaching Practice, Teachers' CK, and Mathematical Representation.

Variable	N	Df	Cal r	P-value	Remark
CK	90	88			
			686	.000	Ho Rejected
Mathematical question	90	88			

Significant level $p < 0.05$

Table 8 shows the result of Pearson product-moment correlation statistics on the relationship between teaching practice, teachers' content knowledge, and mathematical representation. The Cal r was 0.68 while the level of significance was .000. Since the level of significance was less than 0.05, the null hypothesis that there is no significant relationship between teaching practice, teachers' CK, and mathematical representation is therefore rejected. This implies that there was a strong positive correlation between the two variables, $r = .68$, $n = 90$, $p < .005$, with a high level of teachers' CK associated with mathematical representation.

4 Discussions

The study evaluated the pedagogical practice of pre-service teachers concerning their Content Knowledge (CK) and Pedagogical Content Knowledge (PCK) in the field of economics at Lagos State University. The findings of the initial research query revealed a difference in the CK of future educators based on microeconomics and macroeconomics. Additionally, the results indicated that this disparity had a minimal impact. This observation is consistent with the conclusions drawn in Guerriero's (2010) investigation on educators' knowledge influencing their instructional choices. It was ascertained that the ability to make effective instructional decisions is contingent upon the quality of PCK possessed by the educator. Rahmi (2018) highlighted the variability in the level of Pedagogical Content Knowledge (PCK) among aspiring economics educators. Studies suggest that individuals training to become economics educators generally demonstrate proficiency falling within the 'satisfactory' and 'commendable' categories, thereby implying the potential for enhancements in their PCK.

The findings of research question two revealed a disparity in pre-service teachers' Content Knowledge (CK) and Pedagogical Content Knowledge (PCK) based on gender. An observation was made that male pre-service students exhibit a higher level of subject matter expertise compared to their female counterparts. Furthermore, it was noted that female teachers demonstrate superior pedagogical skills in comparison to male teachers. This suggests that each gender possesses its own areas of strengths and weaknesses. These findings are consistent with the research conducted by Leong et al. (2015), which emphasised in their study that female teachers were significantly more preferred than male pre-service teachers. The superior performance of female teachers in content knowledge achievement compared to male teachers was highlighted. It was suggested that this difference could be attributed to the higher representation of women in pre-service teacher training. Moreover, Nousheen et al. (2022) identified disparities in pedagogical knowledge based on gender. Additionally, Buma and Sibanda (2022) emphasised notable differences in the implementation of Pedagogical Content Knowledge (PCK) between male and female pre-service teachers, with females incorporating more PCK components during the planning phase. However, these results contradict the findings of Isah (2011) regarding the positive correlation between male and female teachers in both CK and PCK within integrated science.

Additionally, the third research question uncovered a slight discrepancy between male and female pre-service educators concerning their understanding of mathematical representation. This finding contrasts with the study by Odumosu et al. (2018), which indicated that gender does not influence academic performance. Eminer et al. (2022) study aligns with these previous findings, showing that there are no significant gender-based variations in pre-service teachers' grasp of mathematical representation. Akyildiz (2023) observed that while gender did not affect pre-service teachers' apprehension towards teaching mathematics or their pedagogical content knowledge in technology, gender stereotypes manifested in the way pre-service teachers associated men with teaching complex algebra and women with teaching basic arithmetic. Moreover, a study on math-gender stereotypes and misconceptions among student teachers revealed that overall, pre-service educators did not strongly uphold gender-biased misconceptions in mathematics, suggesting a lack of inherent gender-related disparities in knowledge of mathematical representation (Dersch et al., 2022). It is essential to continue efforts to enhance teachers' mathematical content knowledge universally, irrespective of gender, as it holds paramount importance.

Furthermore, research question four delineated the perceptions of participants regarding the impact of their Pedagogical Content Knowledge (PCK) on students' mathematical representations. The findings revealed a scarcity in the utilisation of concrete examples by educators for the purpose of imparting mathematical ideas, thereby resulting in challenges for students in grasping mathematical representations. This observation is consistent with the assertion made by Anamuah-Mensah et al. (2008), as referenced in the work of Pinamang and Penrose (2017), suggesting a tendency in Ghanaian educational settings to swiftly transition from one subject matter to another, indicating a

superficial level of instruction where students struggle to grasp specific topics. Dersch et al. (2022) conducted a study that critically examined the choices and utilisation of representations by student teachers in demanding contexts, highlighting teachers' recognition of the significance of their pedagogical abilities in improving students' mathematical representations. They further emphasised the importance of selecting and employing diverse representations in the instruction of mathematics, particularly in challenging educational environments (Novianti & Retnavanti, 2019). Conversely, Mehmet et al. (2010) echoed similar sentiments to the research findings of Pinamang and Penrose (2017), pointing out that students' comprehension of mathematical concepts is hindered by educators' challenges in applying pedagogical strategies effectively in practice, often due to various constraints.

Hypothesis one posited the presence of a significant distinction in pre-service educators' comprehension rooted in microeconomics and macroeconomics. This assertion corresponds with the discovery by Ozden (2008) that the content knowledge of student teachers positively impacted Pedagogical Content Knowledge (PCK) and efficient teaching. Siswanto et al. (2022) highlighted the absence of a substantial variance in the preparedness level for teaching among pre-service teachers across various educational programmes, encompassing Economics Education, Accounting Education, and Office Administration Education. The engagement of pre-service teachers in reflection-on-action proves advantageous in enhancing their content knowledge specific to their academic discipline. Furthermore, a study by Yaw et al. (2023) on pre-service economics teachers revealed a high level of self-efficacy in teaching economics, with male teachers exhibiting stronger self-efficacy beliefs compared to their female counterparts.

Moreover, the findings of hypothesis two demonstrated a significant disparity in the Content Knowledge (CK) and Pedagogical Content Knowledge (PCK) of pre-service teachers based on gender. Conversely, Isah (2011) contradicted this notion and asserted that PCK is more specialised than the subject content being taught, evolving gradually through teaching experiences. This underscores the importance of instilling a passion for teaching in educators. The misconception that the teaching profession serves merely as a pathway to more lucrative careers should be dispelled from the minds of pre-service teachers, regardless of gender. Concerning Technological Pedagogical Content Knowledge (TPACK), male pre-service teachers exhibited higher scores in CK in comparison to their female counterparts, with no observable gender discrepancies in other TPACK domains (Bwalya & Rutegwa, 2023). Schiering et al. (2022) emphasised that these findings underscore the influence of gender on shaping the CK and PCK of pre-service teachers, underscoring the necessity for gender-sensitive support systems in teacher education to bolster knowledge acquisition and retention.

Hypothesis three disclosed a significant correlation between the content knowledge of teaching practice teachers and mathematical representation. This aligns with the research by Vistro-yu (2000), which noted the limited pedagogical skills of teachers in mathematics due to inadequate lesson preparation. Similarly, Suripah et al. (2021) and Pinamang and Penrose (2017) established a noteworthy link between the Content Knowledge (CK) and Pedagogical Content Knowledge (PCK) of teaching practice students in mathematics. This suggests a heightened focus on practical teaching and necessitates diligent monitoring by professional teacher trainers for constructive feedback. Novikasari (2020) also supported these findings, emphasising the significance of Mathematical Knowledge for Teaching (MKT), comprising Mathematics Content Knowledge (MCK) and Mathematics Pedagogy Content Knowledge (MPCK), for pre-service teachers. This highlights a strong association between CK and effective teaching methodologies, emphasising a profound comprehension of mathematical content and its diverse representations for pre-service educators to effectively impart mathematical concepts in educational settings.

5 Conclusion and Recommendations

The research findings have given empirical evidence that content knowledge and pedagogical skills are significantly related. This, therefore, implies that a would-be teacher of any discipline must be proficient in the two areas. It revealed that there is a vital need to combine CK and PCK to enhance the teaching and learning of economics, especially in secondary schools. Furthermore, teachers need to develop more mathematical knowledge because of its significant relationship with CK. Teachers must therefore possess all-round knowledge and put it into use.

Based on the findings of this study, the following recommendations were made:

- i. Teaching practice students must be given the orientation that both content knowledge and pedagogical skills must be acquired simultaneously. Failure in one will have a negative effect on the other.

- ii. The government should emphasise the professional development of teachers. Teachers should not just attend training, but rather those relevant to their teaching subjects.
- iii. The Faculty of Education should regularly organise practical micro-teaching exercises every year. This will enable the lecturers to identify the grey areas and provide a lasting solution.
- iv. Since this study has empirically proved that female teachers are pedagogically sounder than their male counterparts, effort should be made to retrain the male gender in this regard.
- v. Similarly, this study has empirically proved that male teachers are more proficient in the subject matter than their female counterparts; effort should be made to retrain the female gender in the rudiments of economics.

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Data Availability Statement

Data will be made available on request.

Conflict of Interest

The authors declare no conflicts of interest.

Declaration of Use of Generative AI

AI tools were used only for grammar and formatting. No part of the study's methods, analysis, or results was generated by AI. The authors take full responsibility for the work.

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