



Policy Journal of Social Science Review



**Relationship between Teachers' Professional
Knowledge and their Teaching Effectiveness**

**Noreen Ghazala¹
Dr. Fahd Naveed Kausar^{2*}**

Relationship between Teachers' Professional Knowledge and their Teaching Effectiveness

Noreen Ghazala	Ph.D. Scholar, Affiliation: School of Education, Minhaj University Lahore, Punjab, Pakistan. Email: noreentahir@gmail.com
Dr. Fahd Naveed Kausar	Assistant Professor, Affiliation: School of Education, Minhaj University Lahore, Punjab, Pakistan. Corresponding Author Email: fahdnaveed1@hotmail.com

Abstract

Teachers' professional knowledge plays a pivotal role in shaping their teaching effectiveness, influencing their ability to design meaningful learning experiences and adapt to diverse student needs. A strong foundation in subject knowledge, pedagogy, and classroom management directly impacts student engagement and academic outcomes. The purpose of the study to find out the effect and relationship between teachers' professional knowledge and their teaching effectiveness at secondary level. The quantitative survey research design was used in this research. The philosophical paradigm of quantitative research was positivism. Population was comprised off all secondary schools of Province Punjab. The instrument of the study was questionnaire. Inferential statistics (Pearson r, regression analysis, and independent sample t-test) was used. SPSS was used to analyze the data. The findings of the study revealed that that there was strong positive significant relationship between Teachers' Professional Knowledge and their Teaching Effectiveness at secondary level. The p-value 0.000 and t-value 22.575 also shows that there was highly significant effect of Teachers' Professional Knowledge on their Teaching Effectiveness at secondary level.

Keywords: Teachers' Professional Knowledge, Teaching Effectiveness, secondary level

INTRODUCTION

The relationship between teachers' professional knowledge and their teaching effectiveness has been a central focus of educational research for decades, as effective teaching is often seen as the key determinant of student learning outcomes and academic success. Professional

knowledge encompasses teachers' content knowledge, pedagogical knowledge, and pedagogical content knowledge (Shulman, 1987). These dimensions together enable teachers to deliver subject matter in ways that are accessible, engaging, and meaningful to students. Content knowledge refers to a teacher's understanding of the subject they teach, while pedagogical knowledge involves general strategies and methods for managing classrooms and facilitating learning (Grossman, 1990; Ball, Thames, & Phelps, 2008). Pedagogical content knowledge (PCK), on the other hand, integrates subject-specific knowledge with pedagogical strategies, allowing teachers to anticipate and address students' misconceptions effectively (Shulman, 1986; Kind, 2009). The synergy of these knowledge types is crucial for promoting effective teaching and enhancing student achievement. Effective teaching relies on a solid foundation of professional knowledge that enables teachers to plan, implement, and evaluate instruction in ways that maximize learning opportunities for all students (Darling-Hammond, 2000). Teachers with strong content knowledge can explain concepts clearly, connect new material to students' prior knowledge, and offer multiple representations of ideas to cater to diverse learning needs (Magnusson, Krajcik, & Borko, 1999; Gess-Newsome, 2015). Pedagogical knowledge allows teachers to create productive learning environments, manage classroom dynamics, and employ instructional techniques that foster active participation and deep understanding (Kyriakides, Christoforou, & Charalambous, 2013). When combined with pedagogical content knowledge, these abilities enable teachers to transform subject matter into teachable content that aligns with students' cognitive abilities and interests, making learning more meaningful and effective (Van Driel, Verloop, & De Vos, 1998).

The significance of professional knowledge for teaching effectiveness is particularly evident in science education, where complex and abstract concepts often challenge students' understanding. For instance, studies have shown that teachers with a robust grasp of subject matter and pedagogical strategies are better able to explain challenging topics such as chemical reactions, biological systems, and physical laws in ways that promote student engagement and comprehension (Rollnick et al., 2008; Abell, 2008). Furthermore, teachers' professional knowledge enables them to identify and address common misconceptions that hinder student learning. For example, in chemistry, misconceptions about the particulate nature of matter or balancing chemical equations can be effectively tackled when teachers combine their deep subject knowledge with targeted instructional strategies (Taber, 2002; Kind & Chan, 2019). Research has consistently demonstrated a positive relationship between teachers' professional knowledge and their teaching effectiveness across various contexts and subjects (Baumert et al., 2010; Hattie, 2009). Teachers who possess high levels of content knowledge and PCK are more likely to design lessons that engage students in critical thinking, problem-solving, and inquiry-

based learning (Cochran, DeRuiter, & King, 1993; Loughran, Berry, & Mulhall, 2006). Such lessons not only enhance students' conceptual understanding but also foster their ability to apply knowledge in real-world contexts. Conversely, teachers with limited professional knowledge often rely on rote methods of instruction, such as lecturing and memorization, which fail to promote meaningful learning experiences (Shulman, 1987; Nilsson, 2008). This highlights the importance of equipping teachers with the necessary knowledge and skills to facilitate effective teaching and improve student learning outcomes (Zhi, & Wang, 2023).

Teachers' professional knowledge also influences their ability to use formative and summative assessments effectively to monitor student progress and inform instructional decisions (Black & Wiliam, 1998; Hattie & Timperley, 2007). For example, teachers with strong PCK can design diagnostic assessments that identify students' misconceptions and learning gaps, enabling them to adapt their instruction to address these challenges (Arslan, 2019). Similarly, teachers with well-developed content knowledge can provide accurate and timely feedback that helps students deepen their understanding and refine their thinking processes (Lee, 2017). Assessment practices that are grounded in professional knowledge not only support student learning but also contribute to teachers' ongoing professional growth, as they reflect on their teaching effectiveness and make necessary improvements (Park & Oliver, 2008). Professional knowledge is also critical for fostering inclusive and equitable learning environments that address the diverse needs of students. Teachers with strong pedagogical and content knowledge are better equipped to differentiate instruction, employ culturally responsive teaching strategies, and create a supportive classroom climate that values diversity and promotes student success (Gay, 2010; Banks, 2015). For instance, in multilingual and multicultural classrooms, teachers who possess the professional knowledge to adapt their instructional methods can ensure that all students, regardless of their backgrounds, have access to meaningful learning opportunities (Lucas & Villegas, 2013). This adaptability is essential for reducing achievement gaps and promoting equity in education (Qobilovna, 2023).

The development of teachers' professional knowledge is influenced by multiple factors, including pre-service training, professional development, teaching experience, and contextual variables (Darling-Hammond, 2006; Park, Jang, Chen, & Jung, 2011). Effective teacher education programs play a crucial role in equipping teachers with the necessary content knowledge, pedagogical knowledge, and PCK to meet the demands of 21st-century classrooms (Gess-Newsome & Lederman, 1999). Professional development opportunities that focus on subject-specific pedagogy, collaborative learning, and reflective practice have been shown to enhance teachers' professional knowledge and, consequently, their teaching effectiveness (Borko, 2004; Desimone, 2009). Additionally, teaching experience allows teachers to refine their professional

knowledge through ongoing reflection, experimentation, and adaptation to students' learning needs (Nilsson, 2008; Park & Oliver, 2008). While the relationship between professional knowledge and teaching effectiveness is well-established, it is important to recognize that contextual factors, such as access to resources, curricular standards, and school leadership, can influence how teachers apply their knowledge in practice (Shulman, 1987; Rollnick et al., 2008). For instance, teachers in resource-constrained settings may face challenges in implementing effective instructional strategies due to limited access to laboratory equipment, technology, and professional support (Mavhunga & Rollnick, 2013). However, teachers with strong professional knowledge often demonstrate resilience and creativity in overcoming such barriers, finding innovative ways to engage students and promote teach (Jin, 2019).

Empirical studies have consistently shown that investments in teachers' professional knowledge yield significant benefits for both teaching effectiveness and student achievement. For example, Baumert et al. (2010) found that teachers' content knowledge and PCK were strong predictors of student performance in mathematics and science. Similarly, studies by Lee and Luft (2008) and Kind (2014) have demonstrated that teachers with well-developed professional knowledge are more effective in fostering students' scientific literacy, critical thinking, and problem-solving skills (König, et al., 2024). These findings underscore the need for policymakers, educators, and school leaders to prioritize the development of teachers' professional knowledge through targeted training, mentorship, and professional development initiatives. Teachers' professional knowledge is a cornerstone of effective teaching, encompassing content knowledge, pedagogical knowledge, and pedagogical content knowledge that collectively enable teachers to facilitate meaningful and impactful learning experiences (Zaragoza, Seidel, & Hiebert, 2024). The positive relationship between professional knowledge and teaching effectiveness highlights the importance of equipping teachers with the necessary skills and expertise to address the diverse needs of students and promote their academic success. By investing in teacher education, professional development, and supportive learning environments, education systems can empower teachers to harness their professional knowledge to enhance teaching practices, foster student engagement, and improve learning outcomes (Ghaemi-Amiri, Mirzapour, Gholinia, & Sistani, 2024). Ultimately, the development and application of teachers' professional knowledge are essential for achieving high-quality education and preparing students for the challenges of the future. So, the purpose of the study to find effect and relationship between teachers' professional knowledge and their teaching effectiveness at secondary level.

METHODOLOGY

The quantitative survey research design was used in this research. The philosophical paradigm of quantitative research was positivism. Population was comprised off all secondary schools of Province Punjab. The total schools are 8786 and chemistry teachers are 7951 in which 3704 are male teachers and 4247 are female chemistry teachers (School Information System, 2024). Simple random sampling techniques was used to select the sample among the population. 460 schools selected randomly. After that, the researcher selected 477 chemistry teachers in which 212 male and 265 female teachers selected randomly. The instrument of the study was questionnaire. The researcher self-developed five-point likert scale questionnaire. The validity of the questionnaire was found through experts’ opinions and reliability through pilot testing. The Cronbach’s Alpha value of pedagogical content knowledge of chemistry teachers are 0.821 and class practices are 0.830 which is adequate to proceed further. Inferential statistics (Pearson r, regression analysis, and independent sample t-test) was used. SPSS was used to analyze the data.

DATA ANALYSIS

Table 1: Relationship between Teachers' Professional Knowledge and their Teaching Effectiveness at Secondary Level

		Teachers' Professional Knowledge	Teaching Effectiveness
Teachers' Professional Knowledge	Pearson Correlation	1	.719**
	Sig. (2-tailed)		.000
	Sum of Squares and Cross-products	110.300	66.304
	Covariance	.232	.139
	N	477	477
Teaching Effectiveness	Pearson Correlation	.719**	1
	Sig. (2-tailed)	.000	
	Sum of Squares and Cross-products	66.304	77.006
	Covariance	.139	.162
	N	477	477

** . Correlation is significant at the 0.01 level (2-tailed).

The above table illustrates the relationship between Teachers' Professional Knowledge and their Teaching Effectiveness at secondary level. The Pearson r value 0.719 and p-value 0.000

shows that there was strong positive significant relationship between Teachers' Professional Knowledge and their Teaching Effectiveness at secondary level.

Table 2: Effect of Teachers' Professional Knowledge on their Teaching Effectiveness at Secondary Level

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.719 ^a	.518	.517	.27965

a. Predictors: (Constant), Teachers' Professional Knowledge

b. Dependent Variable: Teaching Effectiveness

The above table illustrates the effect of Teachers' Professional Knowledge on their Teaching Effectiveness at secondary level. The R-square 0.518 and standard error value 0.27 shows that the variability observed in the independent variable (Teachers' Professional Knowledge) has a significant effect on dependent variable (Teaching Effectiveness) is explained by the regression model.

Table 3: Effect of Teachers' Professional Knowledge on their Teaching Effectiveness at Secondary Level

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	39.858	1	39.858	509.643	.000 ^b
	Residual	37.148	475	.078		
	Total	77.006	476			

a. Dependent Variable: Teaching Effectiveness

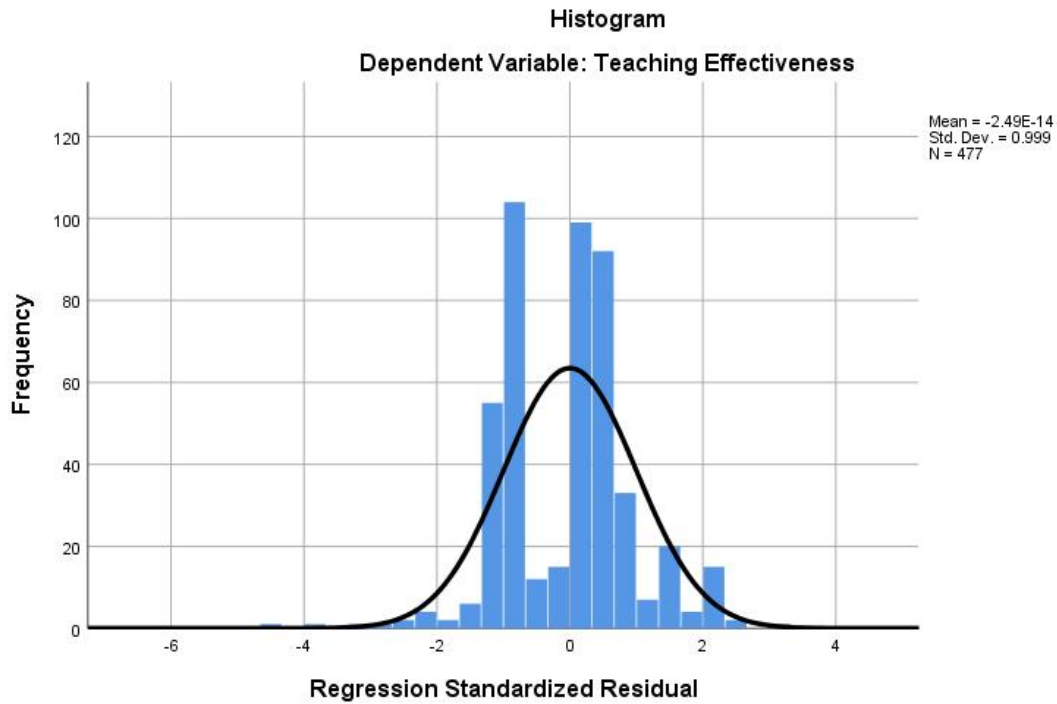
b. Predictors: (Constant), Teachers' Professional Knowledge

The above table illustrates the value of Mean square 0.78, F-value 509.64 and p-value 0.000 which shows that significant effect and Teachers' Professional Knowledge reliably predict teachers' Teaching Effectiveness at secondary level.

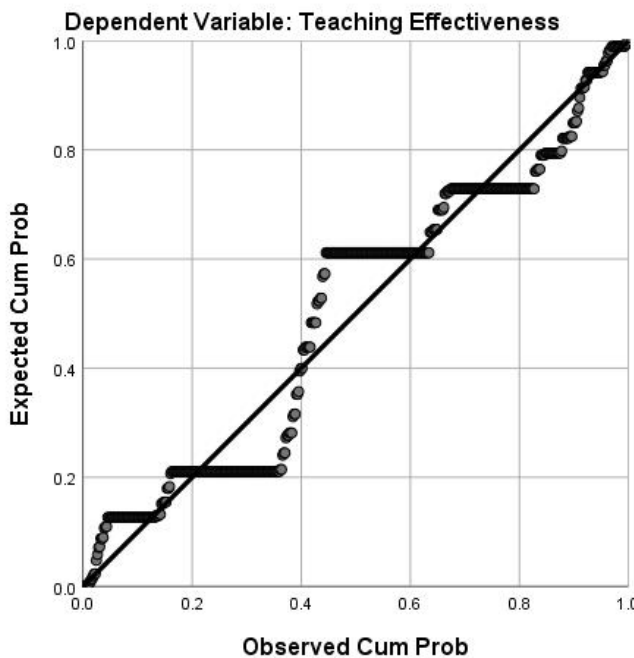
Table 4: Effect of Teachers' Professional Knowledge on their Teaching Effectiveness at Secondary Level

Coefficients ^a					
	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
Constant	1.670	.112		14.886	.000
Teachers' Professional Knowledge	.601	.027	.719	22.575	.000

a. Dependent Variable: Teaching Effectiveness



Normal P-P Plot of Regression Standardized Residual



The above table illustrates the effect of Teachers' Professional Knowledge on their Teaching Effectiveness at secondary level. The B-value 0.719, t-value 22.575 and p-value 0.000 which shows that there was highly significant effect of Teachers' Professional Knowledge on their Teaching Effectiveness at secondary level.

Table 5: Difference between Male & Female Teachers Regarding Teachers' Professional Knowledge and their Teaching Effectiveness at Secondary Level

Variables	Gender	Levene's Test for Equality of Variances		t-test for Equality of Means			Mean	S.D.
		F	Sig.	T	df	Sig. (2-tailed)		
Teachers' Professional Knowledge	Male	.290	.591	-5.506	475	.000	.41028	.02772
	Female			-5.604	473.623	.000	.51054	.03178
Teaching Effectiveness	Male	8.410	.004	-11.962	475	.000	.39625	.02678
	Female			-11.733	410.877	.000	.31158	.01940

The above table illustrates the difference between male & female regarding Teachers' Professional Knowledge and their Teaching Effectiveness at secondary level. The male Teachers'

Professional Knowledge ($M=0.410$; $SD=0.27$) while female teachers' ($M=0.510$; $SD=0.31$), t -value 5.506, and p -value 0.000 shows highly significant difference among the groups. While on the other hand, the male teachers' Teaching Effectiveness ($M=0.39$; $SD=0.26$), while female teachers' ($M=0.311$; $SD=0.19$), t -value 11.96, p -value 0.000 also shows highly significant difference among the groups. The results shows that there was highly significant difference between male & female teachers regarding Teachers' Professional Knowledge and their Teaching Effectiveness at secondary level.

DISCUSSION

The relationship between teachers' professional knowledge and their teaching effectiveness at the secondary level is crucial for enhancing student outcomes. Teachers with deep subject matter expertise and strong pedagogical knowledge are better equipped to create engaging and effective learning environments (Xu, Gao, Ge, & Lu, 2024). Research has shown that professional knowledge allows teachers to make informed instructional decisions, adapt to diverse student needs, and apply effective teaching strategies (Hattie, 2009). Moreover, a teacher's ability to integrate their knowledge with practical skills positively impacts student achievement and classroom dynamics (Darling-Hammond, 2000).

The effect of teachers' professional knowledge on their teaching effectiveness at the secondary level is significant, as it directly influences the quality of instruction and student learning outcomes. Teachers with comprehensive professional knowledge, including content knowledge and pedagogical strategies, can better assess students' needs, plan effective lessons, and foster critical thinking (Huber, Reinhold, Obersteiner, & Reiss, 2024). Additionally, teachers' expertise in both their subject area and teaching methodologies contributes to improved classroom management and student engagement (Hattie, 2009). Research consistently shows that well-informed teachers are more likely to implement evidence-based practices that enhance student performance and motivation (Cochran-Smith & Villegas, 2015).

Research on gender differences in teachers' professional knowledge and teaching effectiveness at the secondary level has yielded mixed findings. Some studies suggest that female teachers often exhibit higher levels of emotional intelligence, communication skills, and classroom management, which can contribute to greater teaching effectiveness (Baker & Grant, 2008). However, male teachers are sometimes found to demonstrate stronger content knowledge in specific subject areas (Sibomana, & Ndayambaje, 2024). Overall, while gender may influence certain aspects of teaching, the quality of teaching is more strongly linked to individual teacher preparation and experience rather than gender alone (Arifin, Suryaningsih, & Arifudin, 2024). Therefore, the differences in teaching effectiveness between male and female

teachers may be more reflective of personal attributes and professional development rather than inherent gender-based factors.

CONCLUSION

In conclusion, teachers' professional knowledge plays a crucial role in shaping their teaching effectiveness at the secondary level. Research consistently highlights that teachers with strong subject knowledge and pedagogical skills are better able to create engaging and effective learning environments, leading to improved student outcomes. While gender differences in teaching effectiveness have been explored, studies indicate that individual attributes, such as emotional intelligence, communication skills, and content expertise, are more influential than gender itself. Both male and female teachers bring valuable strengths to the classroom, but it is their professional knowledge, experience, and continued professional development that truly determine their effectiveness. Overall, fostering high levels of professional knowledge among all teachers, regardless of gender, is key to enhancing the quality of secondary education.

REFERENCES

- Abell, S. K. (2008). Twenty years later: Does pedagogical content knowledge remain a useful idea? *International Journal of Science Education*, 30(10), 1405–1416.
- Arifin, A., Suryaningsih, S. S., & Arifudin, O. (2024). The Relationship Between Classroom Environment, Teacher Professional Development, and Student Academic Performance in Secondary Education. *International Education Trend Issues*, 2(2), 151-159.
- Arslan, H. O. (2019). Formative assessment in science education: Implications for teachers and students. *Journal of Educational Science and Practice*, 5(2), 45–60.
- Baker, C. D., & Grant, D. S. (2008). Gender differences in teacher effectiveness: A research review. *International Journal of Educational Research*, 47(2), 83-92.
- Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of Teacher Education*, 59(5), 389–407.
- Banks, J. A. (2015). *Cultural diversity and education: Foundations, curriculum, and teaching* (5th ed.). Routledge.
- Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education*, 5(1), 7–74.
- Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher*, 33(8), 3–15.
- Buchanan, J., & Kline, J. A. (2012). Teacher effectiveness and gender: A review of research. *Teaching and Teacher Education*, 28(2), 211-219.
- Darling-Hammond, L. (2000). Teacher quality and student achievement: A review of state policy evidence. *Educational Policy Analysis Archives*, 8(1).

- Darling-Hammond, L. (2006). Constructing 21st-century teacher education. *Journal of Teacher Education*, 57(3), 300–314.
- Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher*, 38(3), 181–199.
- Gay, G. (2010). *Culturally responsive teaching: Theory, research, and practice*. Teachers College Press.
- Gess-Newsome, J. (2015). A model of teacher professional knowledge and skill including PCK: Results of the thinking from the PCK summit. In A. Berry, P. Friedrichsen, & J. Loughran (Eds.), *Re-examining Pedagogical Content Knowledge in Science Education* (pp. 28–42). Routledge.
- Gess-Newsome, J., & Lederman, N. G. (1999). *Examining pedagogical content knowledge*. Springer.
- Ghaemi-Amiri, M., Mirzapour, A., Gholinia, H., & Sistani, M. M. N. (2024). Self-assessment of professional competence and influential factors among dental students. *Journal of Dental Education*.
- Grossman, P. L. (1990). *The making of a teacher: Teacher knowledge and teacher education*. Teachers College Press.
- Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.
- Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, 77(1), 81–112.
- Huber, S., Reinhold, F., Obersteiner, A., & Reiss, K. (2024). Teaching statistics with positive orientations but little knowledge? teachers' professional competence in statistics. *Statistics Education Research Journal*, 23(1), 2-2.
- Jin, H. (2019). Innovative teaching approaches in science education: Bridging theory and practice. *International Journal of Science Education*, 41(8), 985–1004.
- Kind, V. (2009). Pedagogical content knowledge in science education: Perspectives and potential for progress. *Studies in Science Education*, 45(2), 169–204.
- Kind, V., & Chan, K. K. H. (2019). Challenges and opportunities for the development of pedagogical content knowledge in science teacher education. In A. M. Peters (Ed.), *Handbook of Teacher Education Research* (pp. 147–163). Routledge.
- Kocak, R. (2016). Teacher effectiveness: A study of gender-based differences in classroom practices. *Journal of Education and Practice*, 7(4), 59-67.
- König, J., Heine, S., Kramer, C., Weyers, J., Becker-Mrotzek, M., Großschedl, J., ... & Strauß, S. (2024). Teacher education effectiveness as an emerging research paradigm: a synthesis of

- reviews of empirical studies published over three decades (1993–2023). *Journal of Curriculum Studies*, 56(4), 371-391.
- Kyriakides, L., Christoforou, C., & Charalambous, C. Y. (2013). What matters for student learning outcomes: A meta-analysis of studies exploring factors of effective teaching. *Teaching and Teacher Education*, 36, 143–152.
- Lee, O. (2017). Common core state standards for science and English language learners: A review of resources. *Journal of Science Teacher Education*, 28(1), 1–10.
- Loughran, J., Berry, A., & Mulhall, P. (2006). *Understanding and developing science teachers' pedagogical content knowledge*. Sense Publishers.
- Lucas, T., & Villegas, A. M. (2013). Preparing linguistically responsive teachers: Laying the foundation in preservice teacher education. *Theory Into Practice*, 52(2), 98–109.
- Magnusson, S., Krajcik, J., & Borko, H. (1999). Nature, sources, and development of pedagogical content knowledge. In J. Gess-Newsome & N. G. Lederman (Eds.), *Examining Pedagogical Content Knowledge* (pp. 95–132). Springer.
- Mavhunga, E., & Rollnick, M. (2013). Improving PCK of chemical equilibrium in pre-service teachers. *African Journal of Research in Mathematics, Science and Technology Education*, 17(1–2), 113–125.
- Nilsson, P. (2008). Teaching for understanding: The complex nature of pedagogical content knowledge in pre-service education. *International Journal of Science Education*, 30(10), 1281–1299.
- Park, S., Jang, J. Y., Chen, Y. C., & Jung, J. (2011). Is pedagogical content knowledge (PCK) necessary for reformed science teaching? Evidence from an empirical study. *Research in Science Education*, 41(2), 245–260.
- Qobilovna, A. M. (2023). Communicative competence as a factor of teacher's professional competency. *American Journal Of Social Sciences And Humanity Research*, 3(09), 32-44.
- Rollnick, M., Bennett, J., Rhemtula, M., Dharsey, N., & Ndlovu, T. (2008). The place of subject matter knowledge in pedagogical content knowledge: A case study of South African teachers teaching the amount of substance and chemical equilibrium. *International Journal of Science Education*, 30(10), 1365–1387.
- Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4–14.
- Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57(1), 1–23.
- Sibomana, J. P., & Ndayambaje, I. (2024). Teachers' Professional Development and Job Performance in Public Secondary Schools of Kicukiro District, Rwanda. *African Journal of*

Empirical Research, 5(3), 444-459.

Taber, K. S. (2002). *Chemical misconceptions: Prevention, diagnosis and cure*. Royal Society of Chemistry.

Xu, T., Gao, Q., Ge, X., & Lu, J. (2024). The relationship between social media and professional learning from the perspective of pre-service teachers: A survey. *Education and Information Technologies*, 29(2), 2067-2092.

Zaragoza, A., Seidel, T., & Hiebert, J. (2024). Exploring preservice teachers' abilities to connect professional knowledge with lesson planning and observation. *European Journal of Teacher Education*, 47(1), 120-139.

Zhi, R., & Wang, Y. (2023). English as a foreign language teachers' professional success, loving pedagogy and creativity: A structural equation modeling approach. *Thinking Skills and Creativity*, 49, 101370.