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Instructional Competence of the Elementary Teachers: Investigating the Multidimensional Knowledge Framework

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Abstract

This study aimed to assess the teaching competencies of elementary school teachers from grades 4 to 6 in a digital classroom setting, specifically examining their proficiency across the triad of content knowledge, pedagogical knowledge, and technological knowledge. A researcher-designed survey instrument was utilized and administered to thirty teachers from two elementary public schools. The survey measured competency across the three key areas. Results demonstrated high levels of competency across all three domains, with mean scores of 4.42 for content knowledge, 4.35 for pedagogical knowledge, and 3.61 for technological knowledge. The correlations between these competency scores and years of teaching experience and highest educational attainment were non-significant ($p > 0.05$). Complete demographic data was provided by all thirty participants with 100% response rate. These findings suggest that high competency levels are present regardless of experience or educational background within this sample of teachers from the two public elementary schools. Further research is needed to explore contributing factors and the generalizability of these results to broader populations. A prospective study tracking student academic performance, correlated with the previously assessed teacher competency scores, is required to establish a robust correlation between teacher skills and sustained student achievement within digital learning environments. In conclusion, while this study indicates high teacher competency in the selected schools, further research is necessary to confirm these findings in more diverse settings and to better understand the relationship between teacher skills and student outcomes.

Keywords: Competency, digital classroom, elementary teachers, Pedagogy, Technology

1. Introduction

1.1. Introduction

The rapid adoption of technology has brought significant changes to educational systems, particularly in elementary education where foundational learning takes place. This transformation has created both opportunities and challenges for teachers who must adjust to learning environments that are increasingly shaped by digital tools and platforms. The shift toward technology-enriched classrooms has significantly altered teaching practices in elementary schools and has called for a reassessment of the competencies teachers need in order to remain effective. Effective teaching has long been anchored in Shulman's (1986) triad of knowledge, which includes content knowledge, pedagogical knowledge, and knowledge of learners. Each of these domains contributes to successful instruction, as strong content knowledge enables teachers to explain concepts clearly and connect lessons to real-world applications, effective pedagogy helps engage students and support understanding, and knowledge of learners allows instruction to be differentiated and made responsive to students' needs and backgrounds. Building on this foundation, the Technological Pedagogical Content Knowledge or TPACK framework introduced by Mishra and Koehler in the early 2000s emphasized that effective technology integration depends not merely on the use of digital tools but on the strategic interplay of content, pedagogy, and technology to support learning objectives and improve student engagement. In the digital age, teachers are therefore expected not only to possess subject matter expertise and sound pedagogical skills but also to understand how technology may be used meaningfully to enhance learning in diverse classroom contexts.

1.2. Teaching Competencies Involving the Triad of Knowledge

Teaching competence has been widely associated with the integration of several forms of teacher knowledge. According to Shulman (2010), the triad of knowledge refers to content knowledge, pedagogical content knowledge, and pedagogical knowledge, all of which are necessary for effective teaching. This framework emphasizes that teachers must understand their subject matter, know how to teach it effectively, and apply general principles of teaching and learning in ways that help students develop deep understanding. In a related perspective, Vygotsky (1978) and Dewey (1938) highlighted the

interconnectedness of the learner, the content, and the context, suggesting that learning is shaped not only by what is taught but also by who is learning and the environment in which learning occurs. In digital classrooms, this relationship becomes even more critical because technology influences both the content delivery and the learning experience. A successful digital classroom, as discussed by Cuban (2001) and Christensen, Eyring, and Hedberg (2011), goes beyond the simple presence of technological devices and instead requires thoughtful integration of digital tools to support engagement, personalization, and effective instruction. Within the context of academic programs such as the Diploma Programme, teaching competence also includes the ability to guide students through inquiry-based learning, assessment standards, and intercultural understanding, all of which reflect the broad and evolving demands placed on educators in contemporary learning environments.

1.3. Content Knowledge

Content knowledge remains one of the most essential dimensions of teaching competence. Shulman's work emphasized that teachers must possess deep understanding of the subjects they teach as well as the ability to transform that knowledge into forms accessible to learners. Studies by Darling-Hammond (2000) and Goldhaber and Anthony (2003) established a link between strong teacher content knowledge and improved student performance, noting that teachers with stronger grasp of subject matter are more capable of addressing misconceptions and engaging learners meaningfully. Cochran-Smith and Villegas (2015) further argued that teacher preparation programs should not only develop mastery of subject matter but also include effective approaches for delivering such knowledge. Other studies, such as Garet et al. (2001), emphasized the role of professional development in strengthening teachers' content knowledge, especially when such programs focus on collaboration and active learning. In diverse classrooms, content knowledge also includes the ability to recognize cultural contexts and language development, as noted by Gibbons (2002). Likewise, Biancarosa and Snow (2006) emphasized that elementary teachers need competence in both science content and literacy to support deeper understanding among learners. As technology has become more embedded in education, Mishra and Koehler (2006) highlighted that teachers must also understand how technology can support content delivery and student engagement, reinforcing the complexity of content knowledge in modern classrooms.

1.4. Pedagogical Knowledge

Pedagogical knowledge refers to teachers' understanding of how to teach effectively in ways that are engaging, comprehensible, and responsive to learners' needs. Shulman (2010) emphasized that knowing content is not enough, as teachers must also know how to present it meaningfully and support students' learning processes. Desimone (2009) noted that effective professional development contributes significantly to pedagogical knowledge when it includes coherence, active learning, and sustained engagement. Ertmer and Ottenbreit-Leftwich (2010) also explained that pedagogy plays a central role in technology integration, since teachers must know how to choose and apply digital tools in ways that enhance student learning rather than simply using technology for its own sake. Gess-Newsome (2015) expanded this perspective by linking pedagogical knowledge with 21st-century skills, particularly in relation to inquiry-based learning and the integration of technology in science teaching. Hollie (2017) added that culturally and linguistically responsive teaching requires educators to understand their students' backgrounds so that instruction becomes more relevant and effective. Other work, including that of Abell and Roth (2016), highlighted the importance of pedagogical knowledge in inquiry-based elementary science instruction, while Emmer and Evertson (2013) emphasized classroom management as a necessary support for strong pedagogy. Tomlinson and Imbeau (2010) likewise connected pedagogical knowledge to differentiated instruction, stressing that teachers must be able to adapt their approaches to the varied abilities and needs of learners in diverse classrooms.

1.5. Technological Knowledge

Technological knowledge has become an increasingly important component of teacher competence in contemporary education. Ertmer and Ottenbreit-Leftwich (2010) explored how teachers' confidence in and beliefs about technology shape their classroom integration practices, stressing the importance of professional development that addresses both technical skills and pedagogical application. Harris and Hofer (2011) found that focused professional development can improve teachers' confidence and competence in integrating technology in practical classroom settings. Wastiau and Van deursen (2013) also underscored the importance of digital literacy in teacher preparation, while Teo (2011) examined how perceptions of usefulness and ease of use affect teachers' willingness to adopt technology. Gordon and Brown (2014) identified specific technologies that helped increase student engagement in elementary classrooms, and Petersen (2011) found that effective training in educational technology improved not only teachers' preparedness but also student engagement and achievement. Hsu and Ching (2019) further emphasized that TPACK development is influenced by collaboration, ongoing training, and access to resources, particularly in elementary STEM settings. Yun and Zhi (2022) reported that effective technology integration enhanced student engagement, academic performance, differentiated instruction, and collaboration, while also identifying barriers such as limited resources, insufficient training, and lack of administrative support. These findings collectively suggest that technological knowledge is not only about operating digital tools but also about understanding how technology may meaningfully transform teaching and learning.

1.6. Interplay of Content, Pedagogy, and Technological Knowledge

The interaction among content, pedagogy, and technology forms the core of effective teaching in digital learning environments. Shulman explained that pedagogical content knowledge brings together content knowledge, knowledge of learners, and pedagogy to help teachers anticipate difficulties students may encounter and determine effective ways of teaching specific topics. Building on this concept, Mishra and Koehler (2006) introduced the TPACK framework to show that technology, pedagogy, and content are interwoven and equally important in modern teaching. Koehler and Mishra (2009) argued that teaching is a complex and ill-structured domain requiring understanding of subject matter, instruction, and technological tools in ways that make learning meaningful. Gunuç and Babacan (2017) added that technology integration must be carried out intentionally and with careful planning if it is to become effective in classroom practice. Although technology is now common across disciplines, its availability does not automatically ensure meaningful use, and teachers must continuously update their knowledge and skills to keep pace with innovations. Ersanli (2016) stressed that teachers need to understand how technology, pedagogy, and content interact in order to support learning effectively, while Wu (2013) noted that there remains limited research on domain-specific TPACK, particularly outside science and mathematics and among in-service teachers. Kultsum (2017) also observed that this domain substantially affects the teaching-learning process and learners' achievement. Overall, the literature suggests that teachers must possess not only individual competencies in content, pedagogy, and technology but also the ability to integrate these dimensions in purposeful and creative ways.

1.7. Research Gap and Rationale of the Study

Despite the growing body of research on digital education, there remains limited understanding of how content knowledge, pedagogical knowledge, and learner knowledge interact within elementary education in Bongao, Tawi-Tawi. Existing literature has often examined these domains separately, focusing for example on the usefulness of information and communication technologies or on isolated instructional strategies, rather than on how these factors collectively improve teaching competence in digital settings. There is also a need for more contextualized studies that examine how instructional practices may be differentiated to respond to the needs of elementary learners in Bongao. Present literature has not sufficiently addressed how educators can adapt to differences in learners' styles, technological exposure, and educational needs. Because of these gaps, there is a strong need for further research that explores how current knowledge, digital literacy, and pedagogical strategies may be integrated to support effective teaching in diverse elementary classrooms. Such research is important not only for theoretical development but also for providing practical guidance that can improve educational experiences and outcomes for learners in the region. In light of these concerns, the study aimed to investigate the holistic integration of content, pedagogical, and learner knowledge in digital classrooms in Bongao, Tawi-Tawi.

1.8. Statement of the Problem

The study was conducted to determine the level of content knowledge, pedagogical knowledge, and technological knowledge among public elementary school teachers in Bongao, Tawi-Tawi. Specifically, it sought to describe the general demographic profile of the respondents in terms of years of teaching and highest educational attainment. It also aimed to determine the levels of competencies of the teacher-respondents in relation to content knowledge, pedagogical knowledge, and technological knowledge. Finally, the study examined whether a significant relationship existed between the general demographic profile of teachers and their competencies in the identified variables.

2. Material and methods

2.1. Research Design

The study employed a descriptive-quantitative research design to determine the level of competencies of elementary school teachers in terms of content knowledge, pedagogical knowledge, and technological knowledge. It was considered descriptive because it described the levels of teachers' competencies, and quantitative because it made use of statistical tools such as percentage, weighted mean, and Spearman correlation to analyze the demographic profile of the respondents and determine the relationship among the variables.

2.2. Research Locale

The study was conducted in two public elementary schools located in the Municipality of Bongao, Province of Tawi-Tawi. These schools were under the supervision of the Ministry of Basic, Higher and Technical Education (MBHTE).

2.3. Research Respondents

The respondents of the study consisted of all fourth, fifth, and sixth grade teachers from the two identified public elementary schools. Census sampling was used, which means that all teachers within the target group were included as respondents of the study.

2.4. Research Instrument

The study utilized a researcher-made survey questionnaire as the main instrument for data gathering. The questionnaire was divided into two parts. Part I focused on identifying the general demographic profile of the respondents, particularly their years of teaching and highest educational attainment. Part II consisted of thirty statements that measured the competencies of elementary school teachers. These statements were further grouped into three areas, with ten statements each for content knowledge, pedagogical knowledge, and technological knowledge. The validity of the instrument was established through evaluation by a panel of experts.

2.5. Data Gathering Procedure

After the validation of the instrument, a letter requesting permission to conduct the study was secured from the Dean of the College of Education and forwarded to the school principals for approval. Once permission was granted, the researchers coordinated with the teachers in the concerned schools. The questionnaires were then administered to the elementary school teachers. After the administration of the instrument, the gathered data were collected, tabulated, computed, and analyzed.

2.6. Statistical Treatment of the Data

The data were analyzed using appropriate statistical tools. Percentage and weighted mean were used to generalize the demographic profile of the respondents and determine their levels of competencies. To determine whether there was a significant relationship among the variables, the Spearman correlation test was employed.

3. Results and Discussion

3.1. Demographic Profile of the Respondents

The findings showed that among the 30 teacher-respondents, 13 or 43.33% had 5 to 10 years of teaching experience, which comprised the highest frequency. This was followed by 9 teachers or 30.00% who had 5 years or below, 6 teachers or 20.00% who had 11 to 15 years of experience, and 2 teachers or 6.67% who had 16 to 20 years of experience, while no respondent fell under 21 years and above. These results indicated that the majority of the respondents were relatively young or early-career teachers. In terms of highest educational attainment, 14 or 46.67% were baccalaureate degree holders, and another 14 or 46.67% had baccalaureate degrees with master's units. Only 2 or 6.67% had a master's degree, while none of the respondents had doctorate units or a doctorate degree, as reflected by 0.00% in both categories. These findings suggested that although many teachers had already begun graduate studies, only a few had completed them, and none had advanced to doctoral-level qualifications. This may imply the need for stronger support systems and incentives that would encourage teachers to complete graduate programs and pursue advanced academic preparation.

3.2. Level of Competencies of the Teachers in Terms of Content Knowledge

The results revealed that the overall mean for teachers' competencies in terms of content knowledge was 4.42, interpreted as Highly Competent based on the scale where 3.50 to 4.49 meant Highly Competent and above 4.49 meant Very Highly Competent. Among the 15 indicators, the highest mean was obtained by the statement on seeking advice from colleagues on some topics to be discussed, which had a mean of 4.87 and was interpreted as Very Highly Competent. This was followed by communicating objectives to pupils prior to teaching, with a mean of 4.77, and teaching lessons even without the aid of books and lesson plans, with a mean of 4.71, both interpreted as Very Highly Competent. Other indicators that also fell within the Very Highly Competent range were having various ways and strategies of developing understanding of the topic at 4.65, reteaching lessons after prior assessment when pupils did not meet the objectives at 4.65, assisting pupils in group activities at 4.58, having sufficient knowledge about the subject to teach at 4.55, conducting assessment during and after discussion at 4.55, and preparing lesson plans and daily lesson logs ahead of time at 4.52. On the other hand, the indicators with lower means, though still interpreted as Highly Competent, included teaching lessons appropriately at 4.39 and reviewing the class and giving pointers prior to the quarterly examination period, also at 4.39. The indicators on having sufficient knowledge about the topics to be discussed, catering to the needs of pupils by leveling up their knowledge of the topic, and making extra effort in helping slow readers and learners through one-on-one discussion after class each obtained a mean of 4.42, while using instructional aides to teach the topic well obtained 4.48. These findings indicated that the teachers were generally well-equipped with content knowledge, demonstrating strong confidence in their subject areas, lesson preparation, instructional delivery, and assessment practices. The very high rating on consulting colleagues also pointed to a collaborative professional culture, while the relatively lower ratings on lesson delivery and review processes suggested areas that may still be improved through targeted professional development.

3.3. Level of Competencies of the Teachers in Terms of Pedagogical Knowledge

The findings showed that the overall mean for pedagogical knowledge was 4.35, interpreted as Highly Competent. The discussion in the results highlighted that statements 1 and 12 obtained high mean scores, suggesting strong assessment practices and effective integration of engaging teaching strategies. It was noted that teachers demonstrated the ability to assess student understanding effectively and to use games and puzzles as part of classroom instruction, which indicated a

balance between rigorous assessment and interactive learning experiences. However, lower mean scores were observed in statements 4 and 15, suggesting areas for improvement in the diversity of assessment methods and in the implementation of collaborative learning strategies such as group work and peer tutoring. In particular, statement 15, which referred to the use of group works and peer tutoring as methods in teaching, obtained a mean of 4.19 and was interpreted as Highly Competent. Although this still reflected a strong level of competence, it was lower compared with the stronger indicators under this domain. Overall, the results suggested that the respondents possessed solid pedagogical expertise characterized by strong classroom management, innovative teaching strategies, and active participation in seminars and training. At the same time, the findings implied that differentiated assessment, collaborative learning, and adaptive teaching methods should continue to be strengthened through professional development and mentoring initiatives.

3.4. Level of Competencies of the Teachers in Terms of Technological Knowledge

The results disclosed that the overall mean for technological knowledge was 3.61, which was interpreted as Highly Competent. Among the indicators, statement 5 obtained the highest mean and was identified as the only indicator interpreted as Very Highly Competent, showing that teachers were most confident in using projectors and PowerPoint presentations in teaching their lessons. This suggested that conventional presentation tools were the most familiar, accessible, and practical technologies for classroom instruction. The findings also showed that statement 15, which referred to using different Microsoft applications such as MS Word, MS Excel, and MS PowerPoint in evaluation, obtained a mean of 4.03 and was interpreted as Highly Competent. Another indicator reflected a mean of 3.97, which also fell under the Highly Competent category. The discussion further explained that the lower mean score for statement 4 suggested less extensive use of technology for creating engaging learning materials, particularly beyond traditional worksheets. This implied that while teachers were already confident in integrating basic and commonly used technologies, there remained room for growth in using more advanced, interactive, and innovative digital tools. Overall, the results suggested that teachers were already making consistent use of technology in different ways, including presentation tools and even allowing students to use phones for schoolwork, which reflected flexibility and responsiveness to contemporary learning practices. At the same time, the findings pointed to the need for continued professional development to help teachers expand their technological repertoire and optimize more creative digital resources in instruction.

3.5. General Level of Competencies of the Teachers

The findings indicated that the grand mean for the overall level of competencies of teachers was 4.43, which was interpreted as Highly Competent. This means that, in general, the teachers demonstrated strong competencies across the domains of content knowledge, pedagogical knowledge, and technological knowledge. The result implied that the respondents were generally well-prepared and capable in performing their instructional responsibilities, with particular strengths in content mastery and pedagogy, while maintaining a commendable level of technological competence. Although the teachers were already rated highly competent, the results also suggested that there remained opportunities for further enhancement, especially in maximizing the use of more advanced and innovative technological tools in the teaching-learning process.

3.6. Significant Relationship between the General Demographic Profile of Teachers and Their Competencies

The results revealed that there was no significant relationship between the general demographic profile of teachers and their competencies in content knowledge, pedagogical knowledge, and technological knowledge. For years of teaching in relation to content knowledge, the rho value was -0.18 with a p-value of 0.34, interpreted as Negligible Correlation and Not Significant. In relation to pedagogical knowledge, the rho value was -0.19 with a p-value of 0.29, also interpreted as Negligible Correlation and Not Significant. For technological knowledge, the rho value was 0.03 with a p-value of 0.87, likewise interpreted as Negligible Correlation and Not Significant. Similarly, educational attainment in relation to content knowledge yielded a rho value of -0.007 with a p-value of 0.97, interpreted as Negligible Correlation and Not Significant. Educational attainment in relation to pedagogical knowledge had a rho value of -0.02 with a p-value of 0.92, also interpreted as Negligible Correlation and Not Significant. In relation to technological knowledge, the rho value was 0.04 with a p-value of 0.83, which was likewise Negligible Correlation and Not Significant. Since all p-values were greater than the 0.05 level of significance, the null hypothesis stating that there was no significant relationship between the general demographic profile of teachers and their competencies in the variables was accepted. These findings suggested that teacher competency levels were not inherently dependent on years of teaching experience or educational attainment. Rather, they implied that professional growth and competency development should be made accessible to all teachers regardless of rank, experience, or degree level.

4. Conclusion & Recommendations

Based on the findings of the study, it was concluded that the elementary school teachers from Grades 4 to 6 in the two public elementary schools demonstrated a high level of competency in terms of content knowledge, pedagogical knowledge, and technological knowledge within the digital classroom environment. The respondents were composed mostly of teachers with 5 to 10 years of experience, which reflected a relatively young teaching workforce. Despite differences in teaching experience and educational attainment, the results showed no significant relationship between the

demographic profile of the teachers and their competency levels. This implied that competency was not determined solely by length of service or academic qualification, but may also have been influenced by professional development, school support, and individual commitment to teaching. Overall, the findings suggested that the teachers were generally well-equipped to function effectively in digital learning environments, although continued academic and professional advancement remained important for further growth and improvement.

In light of the findings and conclusion of the study, it was recommended that school administrators should continue strengthening the existing competencies of teachers in content knowledge, pedagogical skills, and digital literacy through sustained professional development programs that respond to their specific needs. Mentorship programs may also be established, particularly for teachers in the early and middle stages of their careers, in order to promote skill enhancement, collaboration, and professional support. Future researchers were likewise encouraged to conduct similar studies using larger and more diverse samples of elementary teachers across different school settings and geographic areas to determine the broader applicability of the findings. It was also recommended that qualitative methods such as interviews and classroom observations be used in future investigations to gain deeper insights into the teaching practices and perspectives of highly competent teachers. In addition, longitudinal studies may be undertaken to examine how teacher competency develops over time and how professional development initiatives contribute to sustained performance in digital classrooms. Further research should also explore the factors that may have contributed to the high level of competency observed among the respondents.

The study was limited to elementary school teachers from Grades 4 to 6 in only two public elementary schools in Bongao, Tawi-Tawi. It focused specifically on determining the teachers' competencies in content knowledge, pedagogical knowledge, and technological knowledge, as well as the relationship of these competencies with selected demographic variables such as years of teaching experience and highest educational attainment. Because the respondents were confined to a small and localized group, the findings may not be generalized to all elementary school teachers in other schools, divisions, or regions. Moreover, the study relied mainly on a researcher-made survey questionnaire, which reflected the self-reported perceptions of the respondents and may not have fully captured actual classroom practices. The use of quantitative measures alone also limited the depth of understanding of the teachers' experiences and the factors influencing their competencies in digital classroom environments.

Compliance with ethical standards

The study adhered to the ethical standards required in the conduct of research. Permission to conduct the study was obtained from the proper authorities before the data-gathering process began. Participation of the respondents was voluntary, and they were informed of the purpose of the study. The privacy, dignity, and confidentiality of the respondents were respected throughout the research process, and all information gathered was used strictly for academic and research purposes only.

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