Teachers' Technological Competence of Pedagogical Strategies: Their Influence to Learners' Performance

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Abstract

This study explored the relationship between teachers' technological competence in pedagogical strategies and learners' academic performance in Antique during the 2024–2025 school year. It focused on examining teachers' skills in utilizing digital tools, integrating multimedia resources, facilitating online collaboration, and implementing technology-enhanced assessment practices. In addition, the study sought to determine how these competencies influence students' task completion, class participation, and overall academic achievement. A descriptive-correlational research design was employed, and respondents were selected through stratified random sampling to ensure adequate representation across grade levels and schools. Data were collected using a researcher-developed questionnaire that underwent expert validation and pilot testing to ensure its reliability and appropriateness for measuring the variables under investigation. Findings revealed that teachers generally demonstrated a strong level of technological competence, particularly in their ability to use digital tools effectively in classroom instruction. Learners also showed favorable levels of academic performance, especially in areas related to task fulfillment and active engagement during class activities. The analysis indicated a meaningful relationship between teachers' effective use of technology and students' improved academic behaviors and outcomes. No notable disparities emerged based on gender, although learners from higher grade levels tended to exhibit slightly stronger academic performance. Lastly, the teachers' capacity to integrate technology into pedagogical practices plays a vital role in enhancing student engagement, motivation, and learning outcomes. It recommends that schools continue to provide ongoing professional development opportunities, adequate technological resources, and instructional support to further strengthen the effective use of technology in teaching and learning.

Keywords: technological competence, pedagogical strategies, learners' performance, technology integration, Antique

Introduction:

In today's classrooms, integrating technology has become essential for enhancing teaching effectiveness and improving student learning outcomes. Teachers' technological competence—their

ability to skillfully use digital tools and resources within pedagogical strategies—is a key factor in creating engaging and meaningful learning experiences (Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich, 2017). When used effectively, technology allows educators to design interactive lessons, provide differentiated instruction, and address the diverse needs of learners (Ertmer & Ottenbreit-Leftwich, 2010).

Research indicates that teachers who are confident and competent in using technology are better equipped to implement innovative teaching methods, such as multimedia presentations, online assessments, and collaborative digital activities, which can significantly enhance student performance (Hsu, 2016). Technological competence also enables teachers to provide timely feedback, monitor student progress, and encourage self-directed learning, all of which contribute to higher engagement and achievement (Mishra & Koehler, 2006).

Despite its importance, many teachers still encounter challenges in effectively integrating technology due to limited training, inadequate resources, or lack of confidence in using digital tools (Tondeur et al., 2017). In the context of Antique, exploring how teachers' technological competence influences their pedagogical strategies and learners' academic performance is crucial for improving instructional practices and learning outcomes.

This study focuses on understanding the relationship between teachers' technological competence and learners' performance among 365 respondents in Antique during the 2024–2025 school year. Specifically, it examines teachers' skills in using digital tools, multimedia resources, online collaboration platforms, and assessment technologies, alongside learners' performance in terms of grades, task completion, and classroom participation. The study also investigates whether there is a significant relationship between teachers' technological competence and student outcomes, as well as whether factors such as age, gender, teaching experience, or grade level influence learners' performance.

By addressing these questions, the study aims to provide practical insights into how technology can be effectively integrated into teaching to improve learning outcomes. The findings are intended to guide educators, school leaders, and policymakers in designing professional development programs and instructional interventions that harness technological tools to enhance teaching effectiveness and student achievement.

Methodology

This study used a descriptive-correlational research design to explore the relationship between teachers' technological competence in pedagogical strategies and learners' academic performance in Antique during the 2024–2025 school year. A total of 365 respondents were selected through stratified random sampling to ensure representation across different schools, grade levels, and classes, providing a diverse and balanced sample.

Data were collected using a researcher-developed questionnaire divided into two main sections. The first section assessed teachers' technological competence, including their use of digital tools, multimedia integration, online collaboration, and digital assessments. The second section focused on learners' academic performance, capturing self-reported grades, task completion, and classroom participation.

To ensure the validity of the instrument, it was reviewed by experts in educational technology and pedagogy. A pilot test was conducted with 30 respondents outside the main sample, resulting in a high reliability score with a Cronbach's alpha of 0.88.

Data analysis involved descriptive statistics, including mean and standard deviation, to determine the levels of teachers' technological competence and learners' academic performance. Pearson correlation analysis was used to examine the relationship between teachers' technological competence and learners' performance. Additionally, t-tests and ANOVA were conducted to explore whether demographic factors—such as age, gender, teaching experience, or grade level—had any influence on learners' outcomes.

Throughout the study, ethical considerations were strictly observed. Participation was voluntary, respondents provided informed consent, and confidentiality of all collected data was maintained to ensure the integrity and ethical conduct of the research.

Result

The study found that teachers in Antique generally exhibit a moderately high level of technological competence in their pedagogical strategies, with an overall mean score of 3.74 (SD = 0.47). Among the different areas of competence, the use of digital tools received the highest rating (M = 3.80, SD = 0.45), followed closely by multimedia integration (M = 3.76, SD = 0.48), online collaboration (M = 3.70, SD = 0.49), and digital assessment strategies (M = 3.69, SD = 0.50). These findings indicate that teachers are effectively incorporating technology into their teaching, supporting the view of Tondeur, van Braak, Ertmer, and Ottenbreit-Leftwich (2017) that technological competence is essential in contemporary classrooms.

Learners' academic performance was also perceived to be moderately high, with an overall mean score of 3.71 (SD = 0.50). Breaking this down, task completion received the highest rating (M = 3.75, SD = 0.48), followed by class participation (M = 3.72, SD = 0.49), and overall grades or performance outcomes (M = 3.66, SD = 0.52). These results suggest that students are actively engaging with technology-enhanced instruction, which aligns with Hsu's (2016) observation that teachers' technological competence positively influences student learning through more interactive and engaging teaching approaches.

The analysis also revealed a significant positive correlation between teachers' technological competence and learners' academic performance (r = 0.63, p < 0.001). This indicates that students perform better when their teachers are more proficient in using technology within their pedagogical strategies, echoing Mishra and Koehler's (2006) assertion that technological pedagogical skills are critical for effective learning outcomes.

When considering demographic factors, no significant differences were found based on learners' gender (p > 0.05). However, higher-grade students reported slightly better performance compared to lower-grade students (F = 3.45, p = 0.031), suggesting that age, maturity, and perhaps greater familiarity with technology may enhance students' responsiveness to technology-integrated teaching strategies. Overall, the findings underscore the vital role of teachers' technological competence in enhancing instructional effectiveness and supporting student learning. Investing in the development of these skills can lead to more engaging, interactive, and effective educational experiences for learners.

Discussion

The findings of this study underscore the important role that teachers' technological competence plays in supporting and enhancing learners' academic performance. The moderately high levels of competence observed among teachers—especially in using digital tools and integrating multimedia—demonstrate that educators in Antique are able to effectively incorporate technology into their teaching practices. This aligns with Tondeur, van Braak, Ertmer, and Ottenbreit-Leftwich (2017), who highlight that teachers' ability to integrate technology is key to engaging students and improving instructional outcomes. The incorporation of online collaboration and digital assessment strategies further reflects the use of innovative approaches that support differentiated and interactive learning, consistent with the observations of Ertmer and Ottenbreit-Leftwich (2010).

Learners' academic performance was also rated moderately high, particularly in task completion and class participation. These findings suggest that technology-enhanced pedagogical strategies not only support learning but also foster student engagement and motivation. This supports Hsu's (2016) argument that teachers' technological competence positively impacts learners' outcomes by facilitating interactive and learner-centered instruction.

The study further revealed a significant positive relationship between teachers' technological competence and learners' academic performance ($r = 0.63$, $p < 0.001$). This indicates that students tend to achieve better outcomes when educators are proficient in employing technology within their teaching strategies. This result aligns with Mishra and Koehler's (2006) Technological Pedagogical Content Knowledge (TPACK) framework, which emphasizes the critical interplay of technology, pedagogy, and content knowledge in maximizing student learning.

While gender did not appear to significantly influence performance, students in higher grade levels demonstrated slightly better academic outcomes, suggesting that age and maturity may contribute to greater responsiveness to technology-based instructional approaches.

Finally, the vital impact of teachers' technological competence on effective teaching and learning. By equipping educators with the skills to integrate technology meaningfully into their pedagogical strategies, schools can enhance student engagement, motivation, and academic achievement, ultimately contributing to more dynamic and effective learning environments.

Conclusion

The study concluded that teachers in Antique demonstrated a moderately high level of technological competence in their pedagogical strategies, particularly in the use of digital tools, multimedia integration, online collaboration, and digital assessments. This competence significantly influences learners' academic performance, as students exhibited moderately high levels of task completion, class participation, and overall performance outcomes.

The significant positive correlation ($r = 0.63$, $p < 0.001$) between teachers' technological competence and learners' performance indicates that the effective integration of technology into teaching strategies enhances engagement, motivation, and learning outcomes. While demographic factors such as gender did not significantly affect performance, higher-grade students showed slightly better outcomes, suggesting that maturity and developmental readiness may enhance responsiveness to technology-integrated instruction.

Overall, the findings underscore the crucial role of teachers' technological competence in shaping instructional effectiveness and improving learners' academic achievement. Schools and

educational policymakers are encouraged to support the development of technological skills among teachers, provide adequate resources, and promote innovative pedagogical strategies to maximize students' learning potential.

Recommendations

Professional Development on Technology Integration

Schools and educational authorities should provide regular training programs to enhance teachers' technological competence, focusing on the effective use of digital tools, multimedia resources, online collaboration platforms, and digital assessments (Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich, 2017).

Incorporate Technology into Daily Instruction

Teachers are encouraged to integrate technology-based activities into daily lessons, including interactive presentations, simulations, and collaborative online projects, to promote engagement and improve learners' academic performance (Ertmer & Ottenbreit-Leftwich, 2010).

Support for Differentiated Learning

Utilize technology to provide differentiated instruction tailored to learners' needs, enabling students to progress at their own pace and engage in self-directed learning (Hsu, 2016).

Monitoring and Feedback Mechanisms

School administrators should implement monitoring and feedback systems to assess the effectiveness of technology integration in classrooms and provide guidance to teachers on improving pedagogical strategies.

Resource Provision and Infrastructure Enhancement

Ensure that schools are equipped with adequate technological resources, including computers, tablets, reliable internet access, and software tools, to enable effective technology-based teaching.

Collaboration and Sharing Best Practices

Encourage teachers to collaborate, share best practices, and participate in communities of practice focused on innovative pedagogical strategies using technology.

Implementing these recommendations can strengthen teachers' technological competence, enhance instructional effectiveness, and improve learners' engagement and academic performance in schools.

References

1. Basilotta-Gómez-Pablos, V., Matarranz, M., Casado-Aranda, L.-A., & Otto, A. (2022). Teachers' digital competencies in higher education: A systematic literature review. International Journal of Educational Technology in Higher Education, 19, Article 8.
2. Bo-Ching Chen, Y.-T. Wu, & Y.-T. Chuang. (2024). The impact of teachers' perceived competence in information and communication technology usage and workplace anxiety on well-being, as mediated by emotional exhaustion.
3. Huda, M. N., & Salva, E. T. (2024). Technology competence and motivation as predictors of teaching performance. Atlantis Press.
4. Malubay, M. T. (2023). Characterizing mathematics teachers' technological pedagogical content knowledge. European Journal of Education Studies.

5. Ok-tiana Handini. (2024). The impact of technological pedagogical and content knowledge on teacher professional development in technology integration practices. Jurnal Teknologi Pendidikan, 27(1).

6. Front-Educ (2022). Evaluating the effectiveness of a TPACK-based training program for pre-service teachers. Frontiers in Education.

7. Verónica Basilotta-Gómez-Pablos, et al. (2022). Digital Teaching Competence in Higher Education: A Systematic Review. MDPI.