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THE INFLUENCE OF TEACHERS' TECHNOLOGICAL PROFICIENCY ON THE APPLICATION OF INTERACTIVE LEARNING MATERIALS

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ABSTRACT

This study aimed to examine the influence of teachers' technological proficiency on the application of interactive learning materials among 274 public elementary school teachers in Central District, Panabo City, using a non-experimental quantitative design with a descriptive-correlation technique. Stratified random sampling was employed, and data were collected using modified and enhanced adapted survey questionnaires with high reliability and internal consistency. The findings indicate that teachers' technological proficiency is generally rated as extensive, with troubleshooting common technology issues being the most evident skill and development and sharing of digital content as the least evident. Similarly, the application of interactive learning materials is rated as extensive, with interactive assessments being the most frequently used, while real-time engagement is the least applied. A strong positive relationship was observed between teachers' technological proficiency and the application of interactive learning materials, particularly in the domain of digital content development. However, troubleshooting common technology issues showed no significant relationship with interactive learning materials. Further analysis confirmed that effective use of educational software, adaptation to new technologies, and digital content development significantly influence interactive learning application. The study supports the Technological Pedagogical Content Knowledge (TPACK) model and Diffusion of Innovations Theory while partially contradicting the Social Cognitive Theory regarding the impact of troubleshooting skills.

KEYWORDS: *Technological Proficiency; Interactive Learning Materials; TPACK, Digital Content; Real-Time Engagement*

INTRODUCTION

The ability of teachers to effectively apply interactive learning materials in the classroom is often hindered by a low level of technological proficiency. This gap in skills leads to underutilization of innovative educational tools that can significantly enhance student engagement and learning outcomes. Recognizing this issue, the proposed study aims to explore the influence of teachers' technological proficiency on their ability to implement interactive learning materials effectively. By examining this relationship, the research seeks to identify key factors that contribute to successful integration of technology in education and provide actionable insights for training programs. Thus, enhancing teachers' technological skills could transform classroom dynamics and improve the overall educational experience for students.

In the global discourse on educational technology, the application of interactive learning materials presents both opportunities and challenges across different regions including the USA, Africa, Asia, and the Philippines. Zhang and Nouri (2019) provide a systematic review of learning computational thinking through programming platforms like Scratch, highlighting issues such as the uneven access to digital tools and lack of teacher training which inhibit the effective use of interactive materials in the USA. This aligns with findings by Kizilcec, Chen, Jasińska, Madaio, and Ogan (2021), who reported significant disparities in mobile learning adoption during school disruptions in sub-Saharan Africa due to infrastructural limitations and resource scarcity, impacting the effectiveness of educational technologies in these regions.

In Asia, Dey and Bandyopadhyay (2019) discuss the challenges faced by underprivileged school children in India regarding blended learning environments. Their study indicates that the lack of adequate technological infrastructure and insufficient teacher training on blending technology with traditional teaching methods severely restricts the potential benefits of interactive learning materials. Similarly, So, Chen, and Wan (2019) highlight that in many parts of Asia, there is still a significant gap in teachers' ability to facilitate self-regulated learning through multimedia e-learning tools, primarily due to inadequate professional development and the lack of pedagogical strategies integrating technology.

Turning to Africa, Barakabitze et al. (2019) explore the transformation of educational systems using ICTs in STEM subjects and identify key obstacles such as poor internet connectivity, limited access to technological devices, and a general lack of ICT competence among teachers as major barriers. This is compounded by issues of funding and policy-making that fail

to support the scale-up of technology-driven education solutions across the continent. These challenges are mirrored in the research by Zawacki-Richter, Marín, Bond, and Gouverneur (2019), who point out that the slow adoption of artificial intelligence applications in higher education globally can be attributed to a similar lack of educator involvement in the development and implementation of AI technologies, suggesting a broader issue of disconnect between technology advancements and practical teaching applications.

In the Philippines, studies by Nuncio et al. (2020) and Olea (2019) shed light on the local educators' struggles with integrating web 2.0 tools in teaching, noting that while there is enthusiasm towards adopting these new technologies, there exists a significant barrier in terms of training and infrastructure readiness. The E-learning programs discussed by Nuncio et al. reveal that while there are promising outcomes in terms of student engagement and access to education, the effectiveness of these programs is often undercut by inadequate technological resources and lack of sustained support for both teachers and students in remote areas.

A significant problem in the Panabo Central District is the inconsistent application of interactive learning materials, which has been observed to impact the quality of education adversely. This inconsistency is often attributed to the varying levels of technological proficiency among teachers, which affects their ability to effectively utilize and integrate digital tools into their pedagogical strategies. The gap in skills leads to a disparity in the educational experiences of students, thereby raising concerns about equity and access to quality education. This study will address these issues by investigating the root causes of poor application of interactive learning materials and proposing targeted strategies to improve teachers' technological competencies. Through this research, it is anticipated that actionable insights will be generated, contributing to the broader goal of enhancing the educational landscape in Panabo City by empowering teachers with the necessary technological skills to enrich their teaching methodologies.

Despite the growing importance of technology in education, there remains a notable gap in empirical research specifically focusing on how teachers' technological proficiency directly affects the use of interactive learning materials, particularly within the context of Panabo Central District of Panabo City. Current literature predominantly explores general technology integration in classrooms or its impact on student outcomes, often overlooking the specific link between teachers' technological skills and their effectiveness in implementing interactive educational tools. This gap underscores the need for a targeted study that can provide localized insights into how enhancing technological proficiency among teachers can lead to more effective educational practices. Such a study is essential for developing tailored professional development programs that address the specific technological needs of teachers in this district.

The urgency of conducting this study in Panabo Central District stems from the district's ongoing efforts to improve educational quality and adapt to digital transformation in learning environments. As schools within the district continue to acquire more digital tools and resources, it becomes increasingly critical to ensure that teachers are not only equipped with these tools but are also fully capable of leveraging them to enhance learning experiences. Without a clear understanding of the current state of teachers' technological proficiency and its impact on educational practices, efforts to integrate technology may not reach their full potential, possibly leading to wasted resources and missed educational opportunities. Also, as the educational landscape evolves, the district faces the pressing need to prepare students for a highly digital future, making it imperative to optimize the use of interactive learning materials through well-prepared teachers. Thus, this study aims to fill a crucial research need and provide actionable data that can help steer educational strategies and investments in teacher training effectively.

REVIEW OF SIGNIFICANT LITERATURE

This section covers discussions on variables and their indicators. It includes analyses of concepts, ideas, and perspectives sourced from various authors through a range of books, journals, and electronic platforms.

Teachers' Technological Proficiency

Technological proficiency refers to teachers' ability to effectively use and integrate technology into their teaching practices. This proficiency encompasses a range of skills from basic computer operations to more advanced capabilities like utilizing educational software, online platforms, and digital tools to enhance learning outcomes (Saubern et al., 2020). Knezek et al. (2019) contribute significantly to the understanding of how to effectively measure teachers' technological proficiency through the validation of a teacher educator technology competencies survey. Their research provides robust evidence that the validated survey can accurately assess the technological competencies essential for educators in today's digitally focused teaching environments. This study is pivotal as it not only highlights the necessary technological skills that educators must possess but also offers a reliable tool for educational institutions to evaluate and enhance their faculty's proficiency in integrating technology into pedagogy.

High levels of teachers' technological proficiency significantly impact teaching effectiveness, particularly in integrating technology into educational settings. Guggemos and Seufert (2021) provide substantial evidence that professional development specifically targeting both teaching with and about technology markedly enhances in-service teachers' abilities to integrate digital tools into their classrooms. Their study shows that continuous professional training not only boosts teachers' confidence in using technology but also enriches their pedagogical strategies, leading to a more engaging and effective learning environment (Guggemos & Seufert, 2021). Similarly, Aslam, Khan, Asad, and Ahmed (2021) explore the impact of Technological Pedagogical Content Knowledge (TPACK) on digital proficiency among higher education

faculty in Pakistan. Their findings suggest that a strong foundation in TPACK significantly correlates with higher levels of digital proficiency, indicating that teachers' understanding of how to blend technology with pedagogy is crucial for successful technology integration in the classroom.

Additionally, a research highlights the importance of validating digital competencies through structured assessments like the DigCompEdu check-in questionnaire. The study within the Andalusian university context confirms that systematic assessment tools can effectively measure and thus support the development of teachers' digital competencies, aligning with broader educational sustainability goals (Cabero-Almenara et al., 2020). In a similar vein, Birisci and Kul (2019) investigate the predictors of technology integration self-efficacy among preservice teachers. Their research underscores the role of specific training and experience in technology use as key factors boosting preservice teachers' confidence and capability to incorporate technology into future teaching practices. This points to the essential role of targeted educational programs in cultivating a tech-savvy teaching force equipped to navigate and utilize the rapidly evolving digital tools.

Meanwhile, the integration of technology into educational settings significantly enhances the deployment of interactive learning materials, as evidenced by recent empirical studies. Tuma (2021) specifically explores the use of educational technology in lectures, demonstrating that teachers' technological proficiency directly influences the effectiveness of interactive teaching methods. The study provides evidence that adept use of technology in lectures not only engages students more effectively but also aids in the deeper understanding of complex concepts, thereby increasing overall academic achievement. In a similar vein, a study investigate the relationship between teachers' technological skills and their ability to integrate both instructional and application software into their teaching practices. Their findings reveal two path models that explain how technological proficiency underpins teachers' capabilities to enhance classroom learning through varied software tools, highlighting the critical role of ongoing professional development in technology use for educators (Dogan, Dogan, & Celik, 2021).

Further extending this discussion, Asad et al. (2021) examine the integration of e-learning technologies in higher education institutes of Pakistan, noting that teachers' technological proficiency is crucial for fostering an interactive and engaging teaching and learning environment. Their study indicates that well-implemented e-learning strategies, supported by proficient use of technology by educators, can transform the educational experience, making it more dynamic and accessible for students. Additionally, Ventayen (2019) assesses educators' competencies in applying technological tools in teaching and underscores the disparity in technology integration across different educational contexts. Ventayen's research suggests that enhancing educators' competencies in technology not only improves teaching effectiveness but also prepares students more robustly for the digital world, advocating for targeted training programs to upgrade educators' technological skills.

The effective use of educational software and tools significantly enhances the application of interactive learning materials, particularly in fostering critical thinking and improving user interfaces for both teaching and learning experiences. Sinaga and Setiawan (2022) demonstrate that electronic interactive teaching materials (EITMs) employed in e-learning environments can notably improve junior high school students' critical thinking skills. Their study emphasizes the pivotal role of well-designed EITMs in engaging students more deeply with content and stimulating higher-order thinking processes, ultimately leading to enhanced learning outcomes. In a related context, Farhan, Razmak, Demers, and Laflamme (2019) explore the comparative effectiveness of e-learning systems and instructional communication tools, developing and testing a new user interface that addresses specific needs from the perspectives of both teachers and students. Their research highlights that user-friendly and intuitively designed interfaces significantly contribute to the usability of e-learning platforms, thereby increasing the effectiveness of educational technologies in classroom settings. This approach not only facilitates easier access to educational content but also enhances the overall teaching and learning experience by integrating feedback from actual users into the design process.

The adaptation to new technologies significantly influences the application of interactive learning materials, as evidenced by studies focusing on digital educational applications and open educational resources (OER). Al-Malah, Hamed, and Alrikabi (2020) investigate the use of the Mozabook digital education application, highlighting its effectiveness in enhancing eLearning performance. Their research reveals that the interactive features of the Mozabook application not only facilitate a more engaging learning environment but also improve students' academic performances by making the content more accessible and adaptable to individual learning needs. Similarly, Nipa and Kermanshachi (2020) assess the impact of OER developed within interactive learning environments, emphasizing that such resources, when effectively implemented, enhance educational outcomes by providing richer, more flexible learning experiences. Their study underscores that the successful adaptation and integration of new technological tools, like OER, depend critically on their design and alignment with pedagogical objectives, ultimately facilitating greater interactivity and learner engagement in educational settings.

The ability to troubleshoot common technology issues plays a crucial role in the effective application of interactive learning materials, as demonstrated by recent studies examining the integration of e-learning in education. Alenezi (2020) explores how e-learning materials enhance teaching and learning behaviors, noting that the proficiency in managing and resolving technological issues can significantly reduce disruptions, thereby maintaining the flow and engagement of lessons. This study highlights that educators' ability to quickly address technical glitches is essential for leveraging the full potential of digital tools to facilitate learning. In a similar vein, a study, emphasizes that students value the seamless integration of

technology in their curriculum. The findings suggest that minimizing technical interruptions not only enhances student satisfaction but also improves the overall effectiveness of e-learning environments by allowing students to focus more on content rather than technical issues (Turkyilmaz et al., 2019). Together, these studies underline the importance of technological troubleshooting skills in educators to ensure that the deployment of interactive e-learning materials achieves its intended educational outcomes without undue disruption.

The development and sharing of digital content significantly impact the effectiveness of interactive learning materials, particularly in fostering social skills and promoting a culture of collaboration among educators. Suryani, Sutimin, Abidin, and Akmal (2021) investigate the effects of digital learning materials on students' social skills within social studies contexts, demonstrating that well-designed digital content not only enhances knowledge acquisition but also significantly improves interpersonal interactions among students. Their study suggests that digital materials provide diverse communicative and collaborative opportunities, thereby facilitating more effective social learning environments (Suryani, Sutimin, Abidin, & Akmal, 2021). On a similar note, Mei, Aas, and Medgard (2019) explore how teachers in higher education utilize digital tools for teaching and the culture of sharing such resources. Their research highlights that teachers who actively develop and share digital learning tools foster a collaborative teaching culture, which enhances resource accessibility and pedagogical innovation. This practice not only enriches the teaching process but also supports peer learning and the dissemination of best practices across educational settings.

STATEMENT OF THE PROBLEM

The primary objective of this study was to evaluate the influence of teachers' technological proficiency on the application of interactive learning materials in Central District, Panabo City. As such, the research explored the following questions:

1. What is the extent of teachers' technological proficiency in terms of:
    - 1.1 effective use of educational software and tools;
    - 1.2 adaptation to new technologies;
    - 1.3 troubleshooting common technology issues; and
    - 1.4 development and sharing of digital content?
2. What is the extent of teachers' application of interactive learning materials in terms of:
    - 2.1 incorporation of multimedia elements;
    - 2.2 use of collaborative tools;
    - 2.3 design and implementation of interactive assessments; and
    - 2.4 engagement in real-time interactions?
3. Is there a significant relationship between teachers' technological proficiency on the application of interactive learning materials?
4. Which domains of teachers' technological proficiency significantly influence the application of interactive learning material?

METHODOLOGY

This section provides a comprehensive overview of the research design, including details on the research respondents, ethical considerations, research instruments, and procedural steps. It also outlines the methods for data collection and analysis, ensuring a clear framework for the study.

Research Design

In the context of this study, the researcher opted for a quantitative research approach. This approach involved a systematic examination of phenomena through the collection and statistical analysis of numerical data to test hypotheses and explore relationships between variables (Ahmad et al., 2019). A quantitative research design was highly appropriate for studying the influence of teachers' technological proficiency on the application of interactive learning materials due to its ability to provide objective, numerical data that could be statistically analyzed. This design facilitated the measurement of the extent to which teachers' technological skills correlated with their effectiveness in integrating interactive tools into their pedagogy. By employing a quantitative approach, the study yielded reliable and generalizable results that could inform policy decisions and targeted interventions aimed at enhancing technological integration in education.

Additionally, the descriptive research method was employed as part of this quantitative framework. This method was essential for gathering, analyzing, and presenting data that depicted the characteristics of a population or phenomenon without altering the variables involved. It aimed to accurately capture the current conditions and variables by observing and documenting behaviors, opinions, and circumstances (Mohajan, 2020). Utilizing a descriptive approach in this study allowed for a detailed observation and description of the current state of teachers' technological proficiency and how it impacted their use of interactive learning materials. This approach was suitable as it helped establish a baseline understanding of the variables in question, offering insights into the prevalence and distribution of technological skills among teachers within the specific context of Panabo Central District. Descriptive statistics enabled the researcher to summarize large amounts of data effectively, providing a clear picture of the educational landscape that could guide further hypothesis testing or exploratory studies.

Moreover, the correlational research method was utilized to investigate the relationships between teachers' technological proficiency and the application of interactive learning materials. This method was instrumental in determining the nature and degree of associations between variables, employing statistical tools such as correlation coefficients to delineate these relationships (Hassan, 2024). The correlational research method was particularly suitable for examining the relationship between teachers' technological proficiency and their application of interactive learning materials. It allowed the researcher to identify patterns and predict potential trends without manipulating study variables, thus maintaining the natural setting of the educational environment. By determining the strength and direction of the association between teachers' technological skills and their pedagogical practices, the study offered valuable insights into how enhancements in technological training could directly benefit instructional methods.

Research Respondents

The respondents of the study were the 274 elementary school teachers in Panabo Central District of Panabo City. To determine the sample size of 274 teachers from a total population of 867 in Central District, Panabo City, Slovin's formula was used. The researcher first calculated the sample size using the formula, where N represented the population size and e was the margin of error. For a population of 867 teachers and a margin of error of 0.05, the researcher computed the sample size (n) to be 274. This sample size ensured that the findings were statistically representative of the target population while maintaining a reasonable margin of accuracy.

In the study of the influence of teachers' technological proficiency on the application of interactive learning materials in elementary schools of Panabo Central District, Panabo City, the inclusion criteria for respondents were carefully defined to ensure that the data collected was both relevant and reliable. The respondents were elementary school teachers currently employed in the district who actively engaged in classroom instruction. This focus ensured that the findings were applicable to those directly involved in the integration of technology in educational settings. Additionally, the respondents were required to have been teaching for at least one year, ensuring they had sufficient experience and familiarity with the school's curriculum and technology use. This criterion helped in understanding the practical application of technology across varying levels of experience and expertise. The study included teachers across different grades to capture a broad perspective on technological application in diverse classroom environments, providing a comprehensive analysis of how technological proficiency influenced the use of interactive learning materials in elementary education.

Once the sample size was established, the researcher employed random sampling methods to choose the respondents. Simple random sampling, a fundamental probability sampling technique, was used to ensure that every individual in the population had an identical chance of being included in the sample. This approach guaranteed that all segments of the population had an equal likelihood of selection, effectively minimizing selection bias (Noor et al., 2022). For this study, the researcher assigned a unique number to each teacher within the population and then utilized a random number generator to select 274 teachers, thus maintaining an unbiased and representative sample of the overall population. Additionally, the researcher took careful measures to ensure that the selected teachers accurately represented the district's demographic and diverse characteristics, enhancing the study's overall validity.

Research Instrument

For the current study, the research methodology included the deployment of carefully structured survey questionnaires designed to explore the intricacies of the investigation. The questionnaire was divided into two distinct parts. The first part focused on teachers' technological proficiency, examining this through a lens of four key indicators: effective use of educational software and tools, adaptation to new technologies, troubleshooting common technology issues, and development and sharing of digital content. The Cronbach's alpha value for this instrument was 0.820, which was described as good and interpreted as reliable and consistent. Responses were collected using a 5-point Likert scale to assess the extent of agreement or disagreement with each statement, with subsequent analysis based on predefined ranges of means that effectively categorized the data. This structured approach ensured a comprehensive evaluation of the variables under study.

Data Analysis

The following statistical tools were utilized by the researcher in processing the gathered data:

Mean. This was used to determine the extent of teachers' technological proficiency and the application of interactive learning materials, providing a general indication of trends within the data. In this study, the mean supplied answers to SOP 1 and 2, offering a clear understanding of the average levels of technological proficiency among teachers and the frequency of their use of interactive learning materials.

Pearson Product-Moment Correlation. This statistical tool was used to determine the strength and direction of the relationship between teachers' technological proficiency and the application of interactive learning materials. It helped the researcher understand whether a positive or negative correlation existed between these variables in Panabo Central District, Panabo City. In this study, this analysis supplied an answer to SOP 3, revealing the nature and strength of the association between the two variables.

Regression Analysis. Regression analysis was employed to predict the influence of teachers' technological proficiency on the application of interactive learning materials in Panabo Central District, Panabo City. This method allowed the researcher to identify which aspects of technological proficiency had the most substantial impact on the effective use of interactive learning materials. In this study, regression analysis provided an answer to SOP 4, quantifying the predictive power of technological proficiency on the adoption of interactive teaching practices.

RESULTS AND DISCUSSIONS

This chapter presents the results generated from the data gathered. It is sequenced based on the objectives of the study as presented in the first chapter. Thus, it presents the extents of teachers' technological proficiency and application of interactive learning materials; the significant relationship among these variables; and the influence of teachers' technological proficiency on the application of interactive learning materials in Central District, Panabo City.

Teachers' Technological Proficiency

On Table 1, results reveal that teachers' technological proficiency in terms of effective use of educational software and tools is generally rated as extensive, with a mean score of 3.44, indicating that teachers frequently demonstrate proficiency in utilizing digital tools to enhance instructional delivery. This extensive rating suggests that teachers are generally capable of leveraging educational technology to support student learning, integrating software, multimedia, and digital assessment tools into their teaching practices. Such proficiency is essential for creating dynamic and interactive learning environments that cater to diverse student needs. This aligns with the perspective of Kononets et al. (2021), who emphasized that effective technology integration in education requires teachers to possess a balanced understanding of technological, pedagogical, and content knowledge.

The range of means for teachers' technological proficiency statements is from 3.34 to 3.55. The highest-rated statement is Using educational software to enhance lesson delivery, rated as extensive with a mean score of 3.55. In contrast, the lowest-rated statement is Customizing educational software to meet diverse learning needs, rated as moderately extensive with a mean score of 3.34. This finding is consistent with the observations of Suleiman et al. (2020), who noted that while teachers may be skilled in using technology, they may require further training and support to personalize digital resources to accommodate diverse learners effectively.

CONCLUSIONS AND RECOMMENDATIONS

This part of the paper presents the conclusion and recommendation of the researcher. The discussion is supported by the literature presented in the first chapters and the conclusion is in accordance with statements of the problem presented in this study.

Findings

The primary objective of this study was to evaluate the influence of teachers' technological proficiency on the application of interactive learning materials utilizing non-experimental quantitative design using descriptive-correlation technique. The researcher selected the 274 public elementary school teachers in Central District, Panabo City as the respondents through stratified random sampling method. The researcher made use of modified and enhanced adapted survey questionnaires which was pilot tested in a nearby school to ensure high reliability and internal consistency of the items in the instrument. The extent of teachers' technological proficiency is rated as extensive, reflecting frequent use of digital tools to support teaching and learning. Troubleshooting common technology issues is the most evident skill, indicating teachers' strong ability to maintain technology functionality. In contrast, development and sharing of digital content is the least evident, suggesting that teachers may further enhance their capacity to create and distribute digital instructional materials.

The extent of application of interactive learning materials among teachers is rated as extensive, demonstrating frequent use of multimedia elements, collaborative tools, and interactive assessments. The most evident indicator is the design and implementation of interactive assessments, reflecting teachers' ability to create dynamic learning experiences. Conversely, engagement in real-time interactions is the least evident, indicating that teachers may strengthen strategies for maintaining active student participation.

Further, the findings reveal a strong positive relationship between teachers' technological proficiency and the application of interactive learning materials, suggesting that technologically proficient teachers are more capable of integrating interactive tools. Among the indicators, development and sharing of digital content demonstrated the strongest relationship, highlighting the importance of content creation skills. Troubleshooting common technology issues showed no significant relationship, suggesting limited impact on teachers' ability to design interactive materials.

Furthermore, the results indicate that effective use of educational software, adaptation to new technologies, and development and sharing of digital content significantly influence the application of interactive learning materials. Among the indicators, development and sharing of digital content has the strongest influence, emphasizing the importance of content creation skills in interactive learning. Troubleshooting common technology issues did not significantly influence

the application of interactive learning materials, suggesting that reactive problem-solving skills may not directly enhance teaching adaptability.

Conclusions

Based on the findings of this study several conclusions were generated:

The findings conclude that the extent of teachers' technological proficiency in Central District, Panabo City, is generally rated as extensive, indicating that teachers frequently demonstrate strong skills in using digital tools, adapting to new technologies, and troubleshooting technical issues. This implies that teachers are well-prepared to leverage technology for instructional purposes, but further emphasis on digital content development and sharing can enhance their ability to create and disseminate interactive learning materials. Schools are encouraged to provide professional development programs focused on digital content creation, multimedia design, and collaborative content-sharing practices to further strengthen teachers' technological capabilities.

Also, the application of interactive learning materials among teachers in Central District, Panabo City, is generally extensive, reflecting their consistent use of multimedia elements, collaborative tools, and interactive assessments. This implies that teachers are generally proficient in designing and implementing dynamic learning experiences, but there is room to enhance real-time student engagement. Schools are recommended to provide targeted training on interactive teaching strategies, particularly in facilitating active student participation during live sessions and maintaining learner engagement in virtual environments.

Moreover, the findings confirm a strong positive relationship between teachers' technological proficiency and the application of interactive learning materials, indicating that teachers with strong technology skills are more capable of integrating digital tools into their teaching practices. This implies that enhancing teachers' technological proficiency can significantly improve their ability to design and implement interactive learning experiences, making lessons more engaging and effective. Schools are encouraged to conduct workshops that integrate technology skills with interactive teaching strategies, fostering a balance between digital competence and student-centered learning.

Finally, the results confirm that effective use of educational software, adaptation to new technologies, and development and sharing of digital content significantly influence the application of interactive learning materials among teachers in Central District, Panabo City. This supports the Technological Pedagogical Content Knowledge (TPACK) model by Mishra and Koehler (2006), which emphasizes the integration of technology, pedagogy, and content knowledge for effective teaching. It also aligns with Rogers' (1962) Diffusion of Innovations Theory, which suggests that teachers who are open to adopting new technologies are more likely to apply them effectively in their teaching practices. However, the non-significant influence of troubleshooting common technology issues partially contradicts Bandura's (1986) Social Cognitive Theory, which emphasizes that self-efficacy in technology management can enhance performance. This finding suggests that while troubleshooting skills are important, they may not directly enhance teachers' ability to design or apply interactive learning materials. Schools are recommended to prioritize training on effective software use, adaptive technology skills, and digital content creation to enhance teachers' proficiency in applying interactive learning materials.

Recommendations

Based on the findings and conclusions generated from the study, the researcher recommends the following:

It is recommended that teachers in Central District, Panabo City, be provided with training on the development and sharing of digital content, as this indicator showed the lowest mean. Schools may conduct workshops on multimedia content creation, digital resource customization, and effective content sharing practices among teachers. This approach will enhance teachers' ability to create and disseminate engaging instructional materials.

To enhance real-time student engagement, which showed the lowest mean among the application of interactive learning materials, teachers should receive training on effective techniques for managing live discussions and maintaining active participation. Schools may offer professional development on using interactive tools, managing virtual classrooms, and facilitating dynamic Q&A sessions. These strategies will help teachers maintain active student involvement during lessons. Given the non-significant relationship between troubleshooting common technology issues and the application of interactive learning materials, it is recommended that schools prioritize training on proactive digital skills rather than reactive problem-solving. Teachers should be trained on designing and implementing interactive content, as well as leveraging digital tools to enhance learning rather than simply resolving technical issues. This approach will promote a focus on innovative teaching methods rather than basic troubleshooting.

Since troubleshooting common technology issues showed a non-significant influence on the application of interactive learning materials, it is recommended that schools emphasize skills related to creative content development and effective software use. Teachers should receive training on designing multimedia content, customizing educational software, and integrating digital tools into their teaching practices. This will enhance their capacity to create interactive and engaging learning experiences.

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