



Digital Competence in Relation to the Technology Integration of Public Elementary School Teachers in Davao Del Sur Division

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ABSTRACT

The study delved in the extent of digital competence of teachers and the technology integration of public elementary teachers in Davao Del Sur Division. Also, it investigated the association of the involved variables and the domains of digital competence of teachers that significantly influenced technology integration. With the use of probability sampling, 150 elementary teachers in the public elementary were selected as the respondents. Utilizing the descriptive-correlational survey method, the data collated were analyzed through the use of Mean and Product-Moment correlation. Results revealed that there was an extensive digital competence of teachers and an extensive technology integration. Furthermore, there was a significant relationship between the two variables. Based on the findings, it was further suggested that higher officials in the Department of Education and school heads may identify means on how to further strengthen both the digital competency and technology integration of teachers for the welfare of the students. More so, future researchers may further explore the involved variables considering other factors and research methods.

Keywords: Digital competence, technology integration, descriptive correlation, Davao Del Sur Division, Philippines

1. Introduction

Integrating technology in the curriculum means strengthening the use of technology when delivering instruction. It aims to enhance the student learning experience and capacitate teachers to upgrade its instructional practices. Utilizing different types of technology in the classroom and allowing learners to explore the use of technology creates innovative learners who are actively engaged with learning objectives. Thus, the implementation of technology also creates pathways for differentiated instruction to meet the unique needs of students as individual learners within a broader classroom climate. Unfortunately, teachers have problems on how to effectively integrate technology in the curriculum. Personally, the researcher observed that some teachers are not fully equipped and adept in using technology. Despite increasing access to technology in schools, teachers are usually portrayed as hesitant users. They are accustomed to the old standard which can create frustration when trying to shift to a new paradigm leading them to stray away from the use of 21st-century technological devices.

In India, a study conducted in Punjab, one of the most economically prosperous states of India revealed that teachers are trying to embrace the use of technology but are not able to use it effectively. It was also disclosed that 38% of schools use ICT for academic planning, content transaction and project work. In 37% of all the schools, less than 40% teachers are motivated to use ICT in teaching-learning process. In 26% of the schools none of the teachers were motivated to integrate technology in their classrooms. With these results, it was further identified that educators are not provided with sufficient training and proper technical support. With so many roles to play, there is shortage of time to practice with new and ever-changing technologies (Kundu, 2018).

In the Philippines, specifically in the study conducted by Hero (2019), it was revealed that teachers' lack of technological proficiency needed to take advantage of these new technologies, making them unable to bring these technologies into the classroom and leading to many standing unused in the school. This is proven based on the findings indicate that teachers need not only to learn how to use technology at the primary level but also to learn how to integrate technology into their curricula. In the study conducted by Del Mundo (2022), it was disclosed that some of the challenges that teachers have encountered in technology integration were poor internet connection, students' lack of support system, limited electronic materials and equipment, and lack of technological support from the school experts.

The same situation was observed among teachers in Davao del Sur Division. Teachers were hesitant to integrate technology since this entailed preparation. More so, they were not that confident in using technology. They perceived themselves as beginners in the use of technology. Also, they had limited opportunities to get trained about technology. This somehow sparked the interest of the researcher regarding how digital competence of teachers affect their initiative in integrating technology in classroom instruction. Other than that, the researcher had not come across a study in the local context investigating the status of teachers' digital competence and technology integration and the association of the two variables.

In light of these conditions, the researcher was compelled to investigate the situation of public-school elementary teachers' digital competence and technology integration in Davao del Sur Division. With this academic journey, the researcher intended to be of help to the school community.

This study was primarily based on the Engagement and Technology Integration Theory proposed by Gunuc (2017), which focuses on the relationship between technology integration and student success in effective learning. The theory emphasizes technology integration at the micro-level, encompassing both in-class and out-of-class teaching and learning activities. Unlike traditional approaches, this theory places both teachers and students at the center of the integration process (Yılmaz, 2021).

Another relevant theory supporting this study was the Technology Integration Planning Model developed by Robyler (2006), which consisted of six stages. This model provided teachers with a comprehensive planning approach to effectively integrate technology into their lessons. It served as a step-by-step guide, offering teachers a structured planning map to facilitate technology integration (Yılmaz, 2021).

In today's world, regardless of the education level, digital skills have become crucial for individuals to communicate with the global community, perform administrative or educational tasks, and foster creativity and innovation (Osterman, 2012). Hence, technology plays a critical role in education, and teachers bear the responsibility of integrating it into the teaching and learning process to equip students with the necessary skills for career development in the 21st century (Harrell & Bynum, 2018).

To cultivate digitally literate students, teachers need to prioritize and effectively use appropriate digital tools and systems within an educational setting (Falloon, 2020). According to Janssen et al. (2013), ICT competency goes beyond mere knowledge of technological devices and applications. Therefore, teachers must possess essential technological competencies that enable them to incorporate technology into classroom practices successfully.

The proliferation of digital technologies has created a significant generational gap, raising discussions on how to best prepare students for the evolving skill set required for success in the 21st century (Wedlock & Growe, 2017). The original Bloom's Taxonomy and the Revised Bloom's Taxonomy have been widely used in education to illustrate instructional cognitive processes that provide students with positive academic outcomes. However, technology-enhanced teaching has become imperative in today's classrooms. Consequently, the Revised Bloom's Digital Taxonomy proposed by Churches (2009) merges the six cognitive elements (remembering, understanding, applying, analyzing, evaluating, and creating) with methods and tools needed in a technology-enhanced classroom, building upon the Bloom's Taxonomy and Revised Taxonomy by Anderson and Krathwohl (2001).

In the 21st century, the emergence of Web 2.0 technologies, such as wikis, blogs, YouTube videos, photo sharing, and social networking sites, has facilitated interactive communication through a read-and-write medium, allowing users to participate and interact with others (Alaghbary, 2021). Web 2.0 enables users to download and upload materials, contribute content, and connect with fellow web users. Additionally, the introduction of mobile devices and computers has increased internet usage for personalized learning.

Several frameworks have been proposed to assess teachers' digital literacy. For instance, Mishra and Koehler (2006) introduced the Technological Pedagogical Content Knowledge (TPACK) framework, which helps understand teachers' digital knowledge required for effective technology integration. The TPACK framework highlights the relationships and complexities among the three essential components of knowledge—Technology, Pedagogy, and Content (Koehler & Mishra, 2009; Mishra & Koehler, 2006). It demonstrates how these components interact to facilitate effective technology integration in the teaching process, emphasizing that technology should support pedagogy and communicate content to enhance student learning.

2. Methodology

Research Design

This study was a non-experimental quantitative research employing descriptive-correlational research design. Quantitative research methods are used to explain a problem or phenomenon by collecting numerical data and evaluating it using mathematical approaches, particularly statistics (Apuke, 2017). The purpose of quantitative research is to generate knowledge and create understanding about the social world (Allen, 2017). Moreover, a descriptive correlation study is a study in which the researcher is primarily interested in describing the relationships between variables without attempting to establish a causal relationship (Kabir, 2016).

This study was considered as quantitative since it depended on the statistical figure when analyzing and interpreting the data. It was descriptive since its purpose was to determine the extent of digital competence and technology integration of teachers. In addition, this academic pursuit was correlational since its purpose was to measure the connection between digital competence and technology integration of public elementary teachers in Davao del Sur Division.

Research Respondents

This study catered the 150 public elementary teachers in the Division of Davao del Sur. It was claimed that 200 samples were enough when testing the Pearson Correlation analysis (Hair et al., 2018). Hence, the 150 respondents were enough to address the purpose of this study. In the inclusion and exclusion criteria, elementary teachers with 3 years teaching experience were chosen in this endeavor since their 3 years stay in the public school helped them to assess the extent of their digital competence and technology integration. Respondents who felt awkward and uncomfortable in answering the survey questionnaire were free to withdraw from their participation. They were not forced to be part of the study. Their decision to withdraw was respected. Apparently, the respondents' welfare was given utmost importance in the conduct of the study.

Research Instruments

As to the form of gathering data, this study utilized an adapted survey questionnaire. The questionnaire that was employed in this undertaking was divided into two sets. The first set was focusing on digital competence while the second set was about technology integration.

The digital competence questionnaire was adapted from Khateeb (2017). The instrument consisted of 39 items. It had the following indicators, namely: information processing (1-9), communication (1-10), safety (1-10), and problem solving (1-10). The questionnaire was subjected to a pilot testing having a result of .74 suggesting that the items have relatively *high* internal consistency.

The technology integration questionnaire was adapted from the study of Lamb and Johnson (2011). The tool had a total of 33 items. It was divided into 3 subscales, namely, teachers' attitudes (1-11), subjective norms (12-22), and perceived behavioral control (23-33). It was also subjected to pilot testing which revealed a result of .73, suggesting that the items have relatively *high* internal consistency.

The instrument in this study was contextualized to achieve the purpose of this study. The researcher incorporated all the comments and suggestions of the adviser, panel members and expert validators for the refinement of the tools and to achieve construct validity.

Table

Table 1

Summary on the Extent of Digital Competence of Teachers

No	Indicators	Mean	Descriptive Equivalent
1	Information Processing	3.72	Extensive
2	Communication	3.79	Extensive
3	Content-Creation	3.55	Extensive
4	Safety	3.47	Extensive
5	Problem-Solving	3.48	Extensive
Overall		3.60	Extensive

Table 1 provides the summary on the extent of digital competence of teachers. It is exhibited that the overall mean of digital competence of teachers is 3.86, which is in an extensive level. This means that digital competence of teachers is oftentimes evident.

Data show that all five (5) indicators are in an extensive level. As arranged chronologically, communication has the highest mean score (3.79). This is followed by information processing (3.72), content-creation (3.55), problem solving (3.48), and safety (3.47).

This implies that the digital competence of teachers is frequently observable. The data reveal that all five (5) indicators exhibit an extensive level. In chronological order, communication boasts the highest mean score, followed by information processing, content-creation, problem-solving, and safety. These results affirm the consistent and substantial digital competence of teachers across various dimensions. The high mean scores in communication suggest a particularly strong proficiency in this aspect, emphasizing teachers' adeptness in utilizing digital tools for effective communication. Overall, the comprehensive findings indicate that teachers possess significant digital competence, showcasing their ability to navigate, utilize, and integrate digital technologies across diverse domains.

The robust digital competence exhibited by teachers reaffirms the widely acknowledged perspective of the European Commission (2017), which underscores the paramount importance of teachers' digital competence in the integration of digital technologies into the educational process. Extensive research has been conducted on the notion of digital competence in education, aiming to enable individuals in the educational field to utilize digital technologies effectively and efficiently. Carretero et al. (2017) provided a definition of digital competence as the skills that all individuals in education should possess, along with specific competence items necessary to acquire these skills.

In the context of contemporary educational curricula, Instefjord and Munthe (2017) emphasized the necessity for teachers to possess digital competence, enabling them to leverage digital technologies more effectively within the educational process and enhance students' digital skills. Past research has indicated that the digital experiences teachers undergo during their undergraduate education play a crucial role in influencing their capacity to adeptly utilize digital competence in their professional careers. Acquiring digital skills is imperative for teachers to stay informed about technological advancements and seamlessly integrate these technologies into their teaching methodologies.

Table 2

Summary on the Extent of Technology Integration

No	Indicators	Mean	Descriptive Equivalent
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1	Teachers Attitudes	3.86	Extensive
2	Subject Norm	3.75	Extensive
3	Perceived Behavioral Control	3.75	Extensive
Overall		3.79	Extensive

Table 2 provides the summary on the extent of technology integration. It is exhibited that the overall mean of technology integration is 3.79, which is in an extensive level. This means that the technology integration is oftentimes evident. Data show that all three (3) indicators are in an extensive level. As arranged chronologically, teachers attitudes has the highest mean score (3.86). This is followed by subject norm (3.75), and perceived behavioral control (3.75).

This indicates that technology integration is frequently observed among teachers. The data reveal an extensive level across all three indicators, with teachers' attitudes scoring the highest mean score, followed by subject norm, and perceived behavioral control. The noteworthy emphasis on teachers' attitudes suggests a positive disposition towards technology, including the belief that it motivates students and a sense of comfort and relaxation when using it. The moderate scores for subject norm and perceived behavioral control indicate that while colleagues' influence and external expectations contribute to technology integration, there is still room for improvement in addressing teachers' perceived control and confidence in utilizing technology effectively. Overall, these results highlight the multi-faceted nature of technology integration, involving attitudes, social norms, and individual beliefs about behavioral control.

The positive outcomes of this study aligned with the conclusions drawn by Richardson et al. (2016), revealing that technology assumes a crucial role in instigating transformation across diverse domains, with education being no exception. Within the educational domain, technology has evolved into a fundamental element, acting as a catalyst for change by aiding educators in captivating learners through active participation and elevating their overall academic encounters. The emergence of contemporary technological advancements has ushered in noteworthy shifts in education, fundamentally reshaping conventional teaching approaches.

Moreover, Alam and Mohanty (2023) emphasized that for the attainment of successful technology integration in education, it is imperative to seamlessly incorporate it into the curriculum, thereby enriching and intensifying the learning experience. This integration should bolster four essential elements of learning: active engagement, collaborative group participation, regular interaction and feedback, and connectivity with real-world experts. Technology ought to be an unobtrusive and routine instrument aligned with curricular objectives, empowering students to reach their learning goals. However, additional research is warranted to pinpoint best practices and effective strategies employed by teachers who adeptly leverage technology within the classroom.

Table 3

Significance of the Relationship Between the Extent of Digital Competence of Teachers and Technology Integration

Digital Competence of Teachers Indicators	Dependent Variable	r-value	p-value	Decision on Ho
Information Processing	Technology Integration	0.492	0.000	Rejected
Communication		0.498	0.000	Rejected
Content-Creation		0.473	0.000	Rejected
Safety		0.465	0.000	Rejected
Problem-Solving		0.468	0.000	Rejected
Overall		0.479*	0.000	Rejected

*Significant at 0.05 significance level.

Presented in Table 3 are the data on the significance of the relationship between digital competence of teachers and technology integration. Reflected in the hypothesis, the relationship was tested at 0.05 level of significance. The overall r-value of .479 with a p-value of <0.05 signified the rejection of the null hypothesis. It means that there is a significant relationship between digital competence of teachers and technology integration. This shows that digital competence of teachers is correlated with the technology integration.

Doing a pairwise correlation among the measures of both variables, it can be gleaned that information processing, communication, content-creation, safety, and problem-solving revealed computed r-values of 0.492, 0.498, 0.473, 0.465 and 0.468 respectively with p-values which are less than 0.05 in the level of significance. This implies that as information processing, communication, content-creation, safety, and problem-solving increase, the technology integration increases.

The overall r-value of .479, with a p-value of <0.05, signifies the rejection of the null hypothesis, indicating a significant relationship between the digital competence of teachers and technology integration. This result implies that teachers' digital competence is correlated with the extent of technology integration. Further exploration through pairwise correlation reveals that information processing, communication, content-creation, safety, and problem-solving exhibit computed r-values of 0.492, 0.498, 0.473, 0.465, and 0.468, respectively, with p-values below 0.05. These findings suggest that as teachers demonstrate higher competence in information processing, communication, content-creation, safety awareness, and problem-solving, there is a corresponding increase in the level of technology integration. The study highlights the interconnectedness of specific digital competencies with technology integration practices, emphasizing the importance of these competencies in fostering effective integration of technology in educational settings.

The result is in consonance to the study conducted by Casillas Martin et al (2020) revealing that digital competence (DC), which is considered to be among these skills, knowledge, and attitudes, is said to have a critical role in technology integration and viewed as a requirement for a quality education environment. The literature indicates that teachers lacking experience in technological competence challenge the integration of digital technologies to their educational content. It is also underlined that digitally competent teachers are able to utilise digital technologies as a part of the teaching program that serves as a tool in student learning and engagement.

Spiteri and Chung Rundgren (2020) elaborated that for the efficient use of digital technologies in teaching, pre-service teachers are expected to implement their knowledge and skills in teaching and learning processes and to be role models to students in regards to their DC. In addition, teacher training programs are expected to inform pre-service teachers about how to utilise digital technologies and which strategies to apply to meet the different needs of students besides making digital technology easily accessible for them. Today, Falloon (2020) argued that in terms of technology integration, research on the assessment of educational training combined with the DC framework is needed.

Conclusions

Based on the findings of this study, the following conclusions were offered:

The extent of digital competence of teachers implies that it is oftentimes evident in the school. In fact, all dimensions are oftentimes evident from the school heads, namely, information processing, communication, content-creation, safety, and problem-solving.

Meanwhile, the extent of technology integration of teacher is oftentimes evident. Apparently, all indicators are found to be oftentimes evident specifically on teacher's attitude, subject norm, and perceived behavioral control.

Based on the findings, digital competence of teachers and technology integration are related. All domains of digital competence are linked to the technology integration of teachers.

Also, digital competence of teachers significantly influences service commitment. In fact, all domains of digital competence of teachers, namely, information processing, communication, content-creation, safety, and problem-solving significantly influence technology integration by registering a p-value of .000 which is less than .05 in the level of significance. This leads to the rejection of the null hypothesis. Further, the result indicates that for every unit increase in the five domains of digital competence of teachers, the technology integration will increase.

Recommendations

The following suggestions were offered based on the conclusions of the study:

The higher officials of DepEd may prioritize the comprehensive development of digital competence among teachers and actively promote the seamless integration of technology into the educational landscape. Providing teachers with extensive training programs and resources to enhance their digital skills may empower them to navigate and leverage technology effectively in the classroom. Additionally, fostering a supportive environment that encourages experimentation with innovative teaching methods and digital tools may contribute to the successful integration of technology into the curriculum. Establishing clear guidelines and standards for digital competence, along with continuous professional development opportunities, can ensure that teachers stay abreast of emerging technologies. Furthermore, collaborative platforms for sharing best practices and success stories may inspire a culture of continuous learning and technological adaptation within the teaching community.

Moreover, school principals may invest in comprehensive training programs that cater to the diverse digital skills needed for effective teaching in the digital age. This includes providing support for acquiring proficiency in various educational technologies, online teaching methodologies, and digital

content creation. School Heads may encourage collaboration and peer learning among teachers, establishing platforms for sharing successful practices and experiences related to technology integration. Regular assessments of teachers' digital competence and the establishment of clear expectations for technology integration in lesson planning may contribute to a cohesive and technologically advanced learning environment.

Furthermore, teachers may embrace continuous professional development opportunities focused on digital literacy, educational technologies, and innovative teaching methods is crucial. They may explore and familiarize themselves with diverse digital tools that align with their subject matter and teaching objectives. Collaboration with colleagues and participation in online communities may facilitate the sharing of best practices and innovative ideas for technology integration. Regular self-assessment and reflection on the impact of technology use in the classroom may contribute to ongoing improvement and effective integration of digital resources into teaching practices.

Lastly, future researchers may explore relevant information about digital competence and technology integration of teachers considering other dimensions. Also, other means of research approach may be utilized to further explore the involved variables in this study.

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