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TECHNOLOGY INTEGRATION IN EARLY CHILDHOOD EDUCATION: BENEFITS AND CHALLENGES FOR KINDERGARTEN TEACHERS

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ABSTRACT

The integration of technology in early childhood education has become increasingly prevalent, offering both benefits and challenges for kindergarten teachers. This research investigated the impact of technology integration on kindergarten education, exploring its benefits in enhancing learning experiences and addressing challenges faced by educators. Through a comprehensive review of literature and empirical evidence, the study examines the ways in which technology can support and enrich early childhood learning, including its potential to promote engagement, creativity, and critical thinking among young learners. Additionally, the research delved into the challenges encountered by kindergarten teachers in integrating technology into their teaching practices, such as access barriers, digital literacy gaps, and concerns about screen time. Synthesizing existing research and drawing on insights from educators, the study provided valuable insights into effective strategies for technology integration in kindergarten classrooms, highlighting best practices and innovative approaches that optimize the benefits of technology while mitigating its challenges. Ultimately, the findings of this research contribute to the ongoing discourse on technology integration in early childhood education, offering practical recommendations and implications for policymakers, educators, and other stakeholders invested in the holistic development of young children in the digital age.

Keywords: *Technology Integration, Early Childhood Education, Kindergarten Teachers*

INTRODUCTION

Technology has become an increasingly important component of contemporary education, providing teachers with opportunities to enrich instructional materials, facilitate interactive learning experiences, and present concepts through different forms of media. In early childhood education, digital resources can support the delivery of developmentally appropriate learning activities when they are carefully selected and integrated into teaching practices. However, the effectiveness of educational technology depends not merely on the availability of devices and digital materials but also on teachers' ability to use these tools purposefully in achieving learning objectives. Thus, technology integration in kindergarten requires an understanding of how teachers incorporate digital resources into classroom instruction and the conditions that facilitate or hinder their implementation.

Kindergarten is a formative stage in which children develop foundational competencies in language, literacy, numeracy, communication, and social interaction. At this stage, learning experiences need to be engaging, meaningful, and appropriate to children's developmental characteristics. Educational technology may provide opportunities to present stories, illustrations, sounds, videos, and interactive activities that complement conventional teaching approaches. Nevertheless, its use requires careful instructional planning to ensure that digital activities support children's learning rather than simply provide entertainment. Smith et al. (2016) emphasized the importance of considering instructional appropriateness when integrating technology into early childhood education. This perspective suggests that kindergarten teachers need to evaluate whether digital tools are suitable for children's developmental needs, learning objectives, and classroom activities before incorporating them into instruction.

The integration of technology into kindergarten instruction also requires teachers to possess the knowledge and confidence necessary to select appropriate digital resources and connect them with curricular objectives. Teachers' beliefs about technology, their existing practices, and the barriers they encounter can influence how digital tools are incorporated into classroom activities. Hsu (2016) examined teachers' beliefs, practices, and barriers concerning technology integration, highlighting the need to consider the relationship between teachers' perspectives and their implementation of technology. Similarly, Mertala (2019) explored preservice teachers' perceptions of digital technologies in early childhood education, providing a perspective on how educators understand and interpret the role of technology in young children's learning. These studies suggest that teachers' perceptions and beliefs are important considerations in understanding how technology is used in early childhood classrooms.

The importance of teachers' preparation is further emphasized in studies examining technology integration in teacher education. Voogt and McKenney (2017) discussed technological, pedagogical, and content knowledge in teacher education, particularly in relation to preparing teachers to use technology for early literacy. Luo et al. (2021) examined the integration of digital technology into an early childhood teacher preparation program in China, highlighting the relevance of incorporating technology-

related competencies into professional preparation. These perspectives suggest that effective technology integration involves more than technical familiarity. Kindergarten teachers also need to understand how digital tools can complement teaching strategies, support literacy development, and address the learning needs of young children. Consequently, professional development should consider teachers' instructional knowledge, practical skills, and confidence in using technology for meaningful learning experiences.

Despite the potential benefits of educational technology, its integration into early childhood education presents challenges that may affect teachers' instructional practices. These challenges may involve insufficient technological resources, limited professional development, inadequate technical support, and difficulties in selecting developmentally appropriate digital materials. Kharashi (2019) discussed the benefits and challenges of technology use in early childhood education, providing a basis for examining both the instructional opportunities and practical concerns associated with its implementation. Alenezi (2017) examined obstacles encountered by teachers in integrating technology with instruction, while Dinc (2019) investigated prospective teachers' perceptions of barriers to technology integration in education. These studies reinforce the importance of examining the challenges teachers experience and the conditions that may influence their ability to use technology effectively.

Furthermore, Hartman et al. (2019) examined educators' perceptions of technology integration in classroom instruction, providing additional context for understanding how teachers view and experience the implementation of educational technology. These perceptions may be relevant in identifying concerns about instructional effectiveness, classroom management, available resources, and the demands associated with integrating technology into teaching. However, teachers' perceived barriers and actual classroom practices should be examined separately because the presence of a reported challenge does not necessarily establish the extent to which technology is used in instruction. A systematic assessment of teachers' practices and experiences is therefore necessary to identify the specific areas requiring support.

The use of technology in early childhood education also involves considerations beyond teachers' instructional decisions. Buza et al. (2020), in their study of digital technologies in early childhood education in Kosovo, examined the attitudes and practices of parents and teachers. Their findings revealed differing perspectives between parents and preschool teachers regarding the role of digital technology in children's learning and development. The study emphasized the importance of cooperation between parents and teachers in maximizing the benefits and addressing potential risks associated with digital technology use. This perspective highlights the need to consider the broader learning environment in which kindergarten teachers operate, including parental expectations and the importance of developmentally appropriate technology use.

The experiences of teachers during the COVID-19 pandemic further demonstrated

the importance of preparedness and support in technology-mediated instruction. Ford et al. (2021) examined early childhood distance learning in the United States during the pandemic and identified challenges and opportunities associated with delivering learning experiences remotely. Although distance learning differs from the regular integration of technology in face-to-face kindergarten instruction, the experiences documented during the pandemic provide relevant context for understanding the demands placed on early childhood educators when technology becomes an essential component of teaching. These experiences underscore the importance of teachers' readiness, access to appropriate resources, and the capacity to adapt instructional practices to different learning circumstances.

In the context of the Districts of Daram I, Daram II, Villareal I, and Zumarraga, the need to strengthen kindergarten teachers' technology integration competencies is reflected in the reported professional development needs of teachers. Based on the Learning and Development Needs records of the Human Resource Development Office of the Schools Division of Samar (2022), 37 teachers in Daram I, 48 in Daram II, 33 in Villareal I, and 51 in Zumarraga expressed interest in training related to information and communication technology integration. These figures indicate a potential demand for professional development among teachers in the four districts. However, teachers' expressed interest in training does not, by itself, establish the extent of their competencies or the effectiveness of their existing classroom practices. An assessment of their current practices, knowledge, and challenges is therefore necessary to identify the specific areas in which professional support may be needed.

The need to examine kindergarten instruction is also reflected in the Early Childhood Care and Development assessment results reported in the four districts. In Daram I, the reported standard scores for School Years 2019–2020, 2020–2021, and 2021–2022 were 80, 74, and 81, respectively. In Daram II, the corresponding scores were 83, 70, and 72. Villareal I recorded scores of 72, 71, and 76, while Zumarraga recorded 83, 76, and 79. According to the District PROMEDS records (2022), these results reflected varying levels of overall development across the districts and school years. Although these assessment results provide a basis for reviewing the developmental status of kindergarten learners, they do not establish that technology integration caused the observed variations. Rather, they highlight the importance of examining classroom instructional practices and identifying opportunities to strengthen learning experiences appropriate to the developmental needs of young children.

Furthermore, the Division Learning Resources and Management System report (2023) provides local information on the status of technology integration in the four districts. The reported indicators include the availability and use of digital tools, such as computers, tablets, and interactive whiteboards; the presence of monitoring mechanisms for technology use; and the availability of digital learning materials, including electronic books aligned with the Kindergarten curriculum. These indicators provide a basis for assessing the extent to which technological resources are available and incorporated into classroom instruction. However, the presence of devices and digital materials does not necessarily demonstrate that teachers use them effectively or

consistently. Examining teachers' actual practices and the support available to them is therefore essential in determining the current status of technology integration in kindergarten classrooms.

In addition to the documented professional development needs and resource-related concerns, discussions with kindergarten teachers in the four districts have identified perceived benefits and challenges associated with technology integration. Teachers have described the potential of digital resources to make lessons more engaging, provide varied learning materials, and support the presentation of concepts through multimedia activities. They have also identified concerns involving limited technological infrastructure, internet connectivity, access to appropriate devices, and the adequacy of training and technical assistance. These concerns are consistent with the literature emphasizing the importance of teachers' knowledge, instructional practices, perceptions, and contextual support in technology integration (Alenezi, 2017; Dinc, 2019; Hartman et al., 2019; Hsu, 2016; Ihmeideh & Al-Maadadi, 2018). Nevertheless, these reported experiences need to be examined systematically to determine which challenges are most prevalent and which aspects of technology integration require further improvement.

The literature and local information point to the importance of examining technology integration in kindergarten instruction in the Districts of Daram I, Daram II, Villareal I, and Zumarraga. Existing studies have examined teachers' perceptions, instructional practices, professional preparation, and barriers to technology integration in various educational contexts. However, the extent to which these findings reflect the experiences and instructional practices of kindergarten teachers in the four districts remains to be established. The local information on teachers' professional development needs, kindergarten learners' developmental assessment results, and the status of technological resources further indicates the importance of investigating how technology is currently incorporated into classroom instruction. Rather than assuming that increased access to technology automatically leads to improved learning outcomes, the study recognizes the need to determine how teachers use available resources and what conditions influence their instructional decisions.

In view of these considerations, the present study examined the kindergarten teachers' technology integration practices in the Districts of Daram I, Daram II, Villareal I, and Zumarraga, Schools Division of Samar. Specifically, it aims to determine the extent to which teachers integrate technology into their instructional practices, identify the challenges they encounter, and examine the professional development and resource-related needs that may support more purposeful and developmentally appropriate technology integration. The findings may serve as a basis for developing a professional development program that addresses identified competency gaps, strengthens teachers' instructional knowledge and confidence, and promotes the effective use of educational technology in kindergarten classrooms.

Research Questions

This study examined technology integration in early childhood education and its benefits and challenges for Kindergarten teachers in the Districts of Daram I, Daram II, Villareal I, and Zumarraga, Schools Division of Samar, during the School Year 2023-2024.

Specifically, the study sought answers to the following questions:

1. What is the profile of the teacher-respondents in terms of the following variables:
    - 1.1 age and sex;
    - 1.2 civil status;
    - 1.3 gross monthly family income;
    - 1.4 highest educational attainment;
    - 1.5 number of years as Kindergarten teacher;
    - 1.6 relevant in-service trainings;
    - 1.7 latest performance rating based on IPCRF; and
    - 1.8 attitude toward technology integration?
2. What is the level of technology integration in Kindergarten as perceived by the teacher-respondents according to the following:
    - 2.1 age-appropriate content;
    - 2.2 limited screen time;
    - 2.3 interactive and educational applications;
    - 2.4 teacher supervision;
    - 2.5 balanced learning;
    - 2.6 accessibility;
    - 2.7 regular assessment; and
    - 2.8 parent involvement?
3. Is there a significant relationship between the level of technology integration in Kindergarten as perceived by the teacher-respondents and their profile variables?
4. What are the benefits of technology integration in Kindergarten as perceived by the teacher respondents according to the following?
    - 4.1 enhanced engagement;
    - 4.2 individualized learning;
    - 4.3 improved literacy skills;
    - 4.4 mathematical proficiency;
    - 4.5 creativity and expression; and
    - 4.6 enhanced motivation?
5. Is there a significant relationship between the profile variates of teacher-respondents and the benefits of technology integration?
6. What are the challenges encountered by the teacher-respondents regarding technology integration in Kindergarten?
7. Is there a significant relationship between the level of technology integration and the following:
    - 7.1 benefits of technology integration; and
    - 7.2 challenges encountered?
8. What intervention program can be proposed based on the result of the study?

Locale of the Study

Figure 1-3 showed the map of the locale of the study, which encompassed the Districts of Daram I, Daram II, Villareal I, and Zumarraga, all within the Schools Division of Samar.

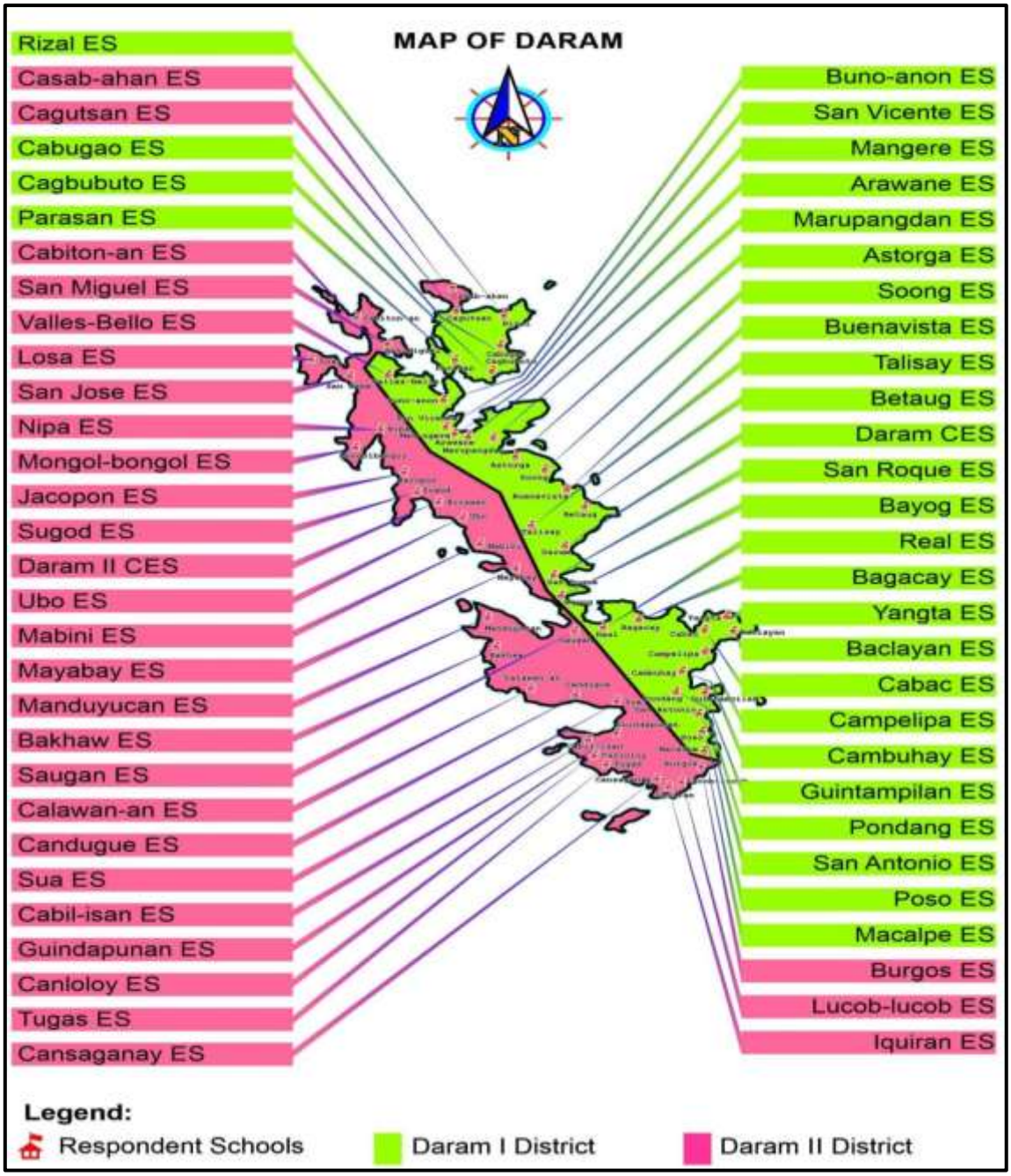


Figure 1

The Map Showing the Locale of the Study (Districts of Daram I and II)

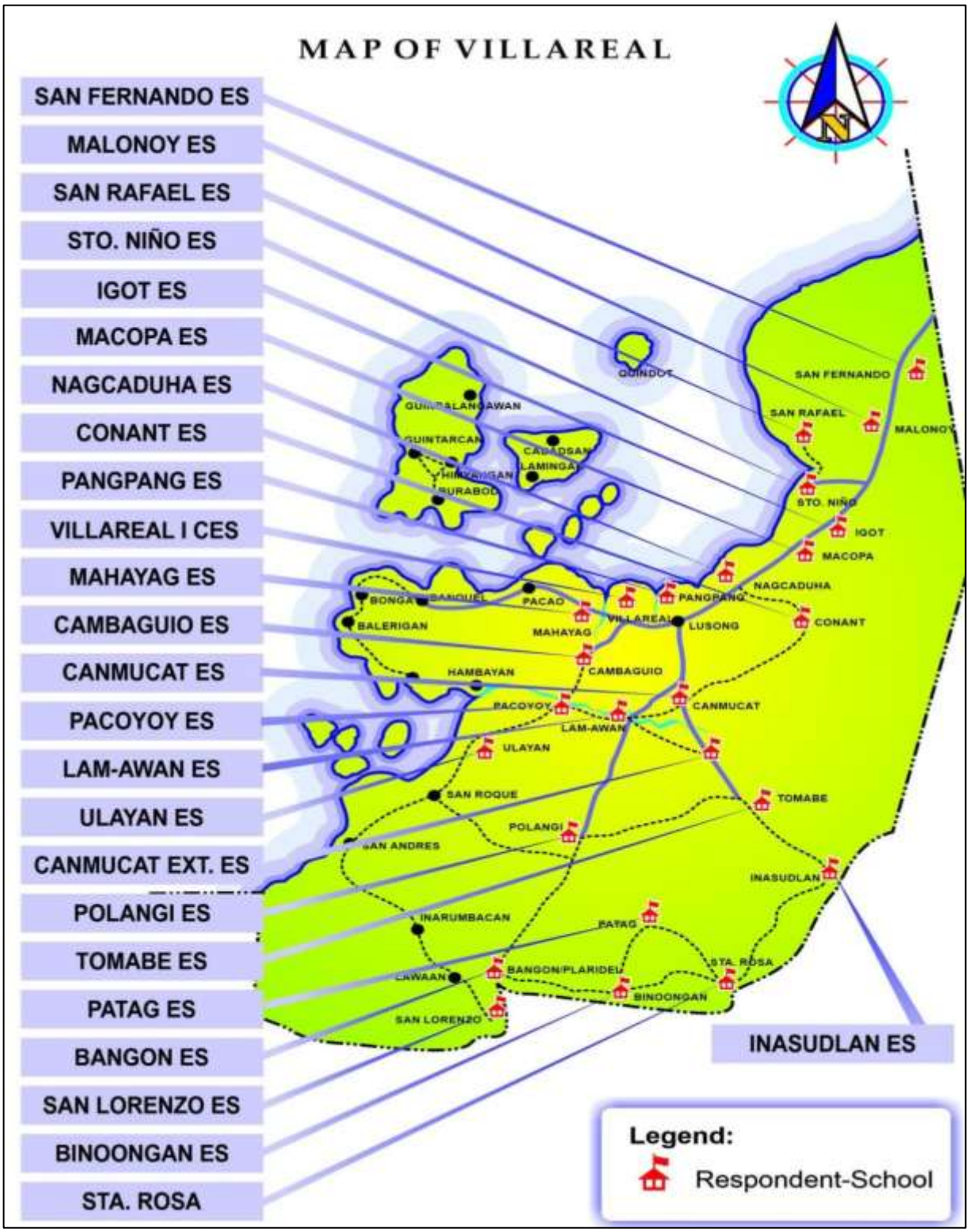


Figure 2
The Map Showing the Locale of the Study (District of Villareal)

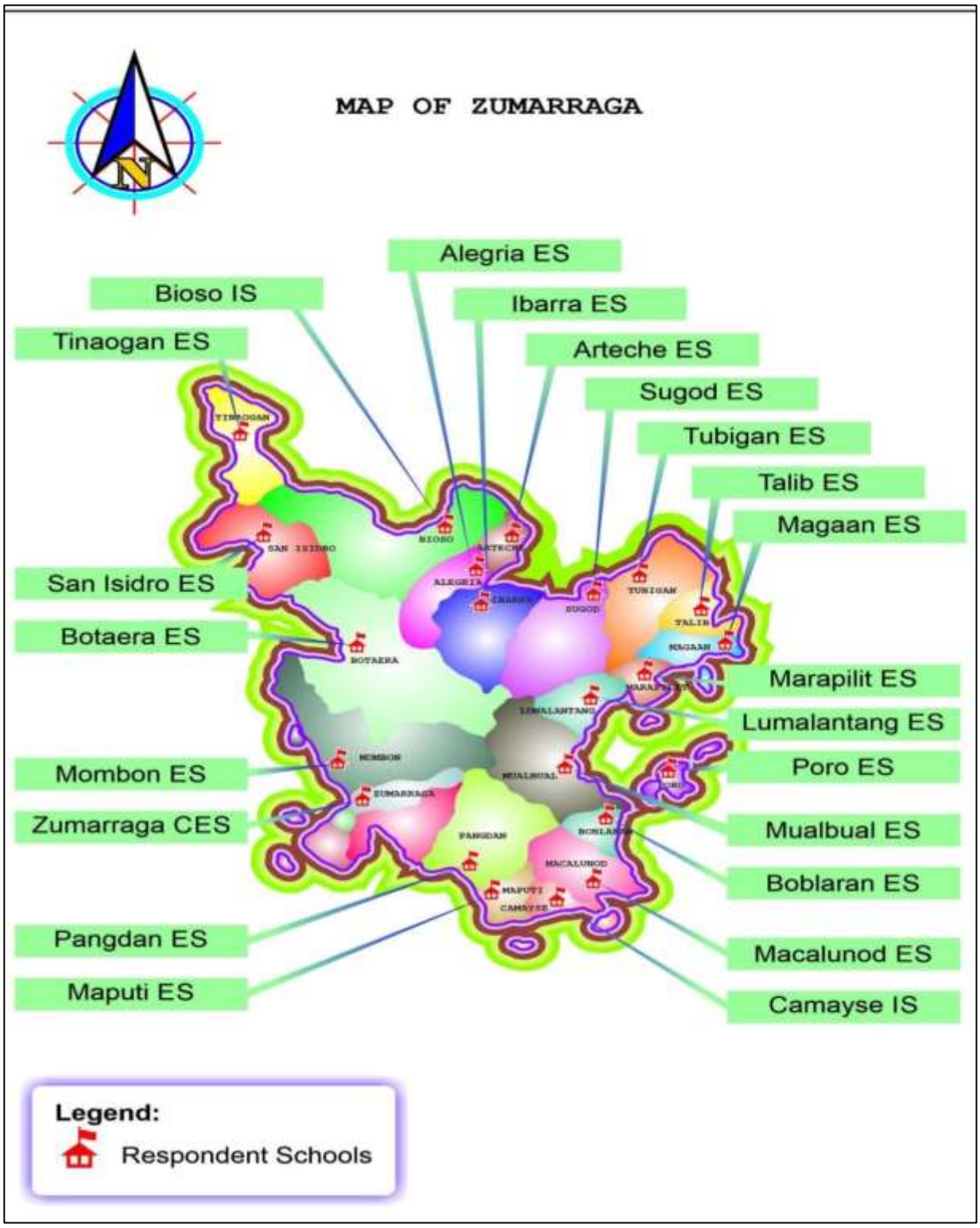


Figure 3
The Map Showing the Locale of the Study (District of Zumarraga)

METHODOLOGY

The study employed a quantitative descriptive-correlational research design to examine technology integration in early childhood education and its perceived benefits and challenges among Kindergarten teachers in the Districts of Daram I, Daram II, Villareal I, and Zumarraga, Schools Division of Samar, during School Year 2023–2024. The descriptive component determined the respondents' profiles, attitudes toward technology integration, perceptions of its implementation in Kindergarten education, perceived benefits, and challenges encountered, while the correlational component examined the relationships between selected profile variables and their perceptions of technology integration. Data were gathered through a structured questionnaire adapted from Hero (2019), which underwent validation by the Panel of Oral Examiners of Samar College, Inc., College of Graduate Studies.

Using total enumeration, all 108 Kindergarten teachers from the four districts were included as respondents. The questionnaire was administered through face-to-face distribution and an online platform, subject to approval from the appropriate DepEd authorities and school heads, to accommodate the geographical and logistical challenges of reaching participating schools. The collected data were analyzed using frequency count, percentage, mean, median, mean absolute deviation, and weighted mean to describe the respondents' profiles and responses, while appropriate inferential statistical tests, including the Mann-Whitney U test, independent-samples t-test, Spearman's rank correlation coefficient, chi-square test, Cramer's V, and Fisher's t-test, were employed to determine significant differences and relationships among the variables, as applicable to the nature and measurement of the data.

RESULTS AND DISCUSSION

The following were salient findings of the study:

1. The majority of teachers fell within the 32-36 age bracket, with a significant representation of younger and older students as well. The high mean absolute deviation of 9.52 years indicates a diverse age composition among the teachers, reflecting varying educational and career backgrounds, life stages, and responsibilities.

2. The study revealed a significant gender imbalance, with females being the majority compared to males. This imbalance prompted further investigation into the factors influencing gender participation, such as societal norms and subject preferences. The low number of male participants highlighted the need to investigate obstacle to achieving gender diversity in research.

3. The civil status of the teacher-respondents revealed a diverse representation of individuals, with the majority falling into the categories of single and married individuals.

4. The gross monthly family income among teacher-respondents revealed a

notable concentration within the 30,000 to 39,999.99 range, with Php 33,000.00 as the mode.

5. The teacher-respondents' highest educational attainment revealed a majority with advanced degrees or pursuing further education, indicating a strong commitment to professional development and enhancing teaching skills.

6. The distribution of teacher-respondents by the number of years as kindergarten teachers revealed a balanced mix of experience levels, with the median at 6 years.

7. The number of relevant In-Service Training (INSET) attended reveals a concerning trend, with a grand weighted mean falling within the "Never" range. Teachers had limited access to relevant INSET programs at higher administrative levels, highlighting a significant gap in professional development opportunities that could impact their knowledge, skills, and classroom practices.

8. The latest performance rating based on IPCRF showed a trend towards high-performance levels among Teacher-Respondents, with a substantial proportion achieving ratings in the upper range of the scale, indicating a commendable level of dedication, effectiveness, and commitment among teachers.

9. The teacher-respondents showed strong support for integrating technology in early childhood education, seeing it as enhancing engagement, customizing instruction, boosting creativity, and improving parent-teacher communication.

10. The teacher-respondents perceived technology integration in kindergarten education very positively, demonstrating a highly integrated and excellent approach across various aspects. They prioritized age-appropriate content selection, limited screen time, interactive and educational applications, teacher supervision, balanced learning, accessibility, regular assessment, and parent involvement. This comprehensive integration strategy emphasizes student well-being, cognitive and emotional development, individualized learning experiences, and inclusive practices, showcasing a commitment to leveraging technology to enhance student learning outcomes effectively. The teachers' proactive stance towards technology integration, balanced approach to screen time, and emphasis on holistic development through diverse learning experiences underscore their dedication to creating engaging, inclusive, and effective learning environments for young learners in kindergarten.

11. Results indicated that factors like attitude toward technology integration and relevant in-service trainings significantly influenced perceptions of technology integration, while age, sex, civil status, income, educational attainment, and teaching experience had negligible associations. Teachers with positive attitudes toward technology integration were notably more likely to perceive a higher level of technology integration, highlighting the importance of attitudes in shaping perceptions of technology use in kindergarten classrooms.

12. The teacher-respondents believed that technology can enhance student engagement by making learning more interactive, personalized, and connected to real-world experiences. Technology was also seen as a powerful tool for enabling individualized learning, where content and instruction can be tailored to meet the unique needs and abilities of each student. The teacher-respondents further recognized the benefits of technology in improving literacy skills, mathematical proficiency, creativity, and self-expression among kindergarten students. They believed that digital resources, interactive applications, and multimedia tools can captivate students' interest, reinforce key concepts, and foster critical thinking and problem-solving abilities. Additionally, the teachers perceive that technology integration can enhance student motivation by providing immediate feedback, gamified elements, and opportunities for collaborative learning and real-world exploration. Overall, the teacher-respondents had a highly positive perception of the benefits of technology integration in kindergarten education, highlighting its potential to transform learning experiences, promote holistic development, and foster a love for learning among young students.

13. The relationship between the perceived benefits of technology integration in kindergarten as reported by teacher-respondents and various profile variates was explored. While factors like age, sex, civil status, income, educational attainment, teaching experience, and in-service trainings showed negligible associations with perceived benefits, teachers' attitudes toward technology integration significantly influenced how they viewed the benefits of integrating technology in the classroom.

14. The challenges encountered by teacher-respondents regarding technology integration in kindergarten classrooms are perceived as minor obstacles, with various issues like limited access to resources and teacher training mentioned but not considered significant hindrances. Overall, while challenges exist, teacher-respondents did not view them as major barriers to effectively integrating technology into early childhood education.

15. The study found a strong positive relationship between the level of technology integration and the perceived benefits of technology integration in kindergarten classrooms. As technology integration increases, so do advantages like better student engagement, personalized learning, improved literacy and math skills, and enhanced creativity. In contrast, the relationship between the level of technology integration and the challenges encountered by teachers regarding technology integration was found to be negligible. This indicated that the challenges faced by teachers may not be directly related to the extent of technology integration, but rather influenced by other factors like access to resources and professional development.

Conclusions

From the findings of the study, the following conclusions were drawn:

1. The diverse age composition among the teachers reflects varying educational and career backgrounds, life stages, and responsibilities, which can contribute to a rich

and dynamic teaching environment.

2. The gender imbalance in the teaching profession highlights the need to explore and address the underlying factors that influence gender participation, in order to promote greater diversity and inclusivity.

3. The diverse representation of civil status among the teacher-respondents suggests a range of personal and family circumstances that may impact their professional experiences and needs.

4. The concentration of teacher-respondents within the middle-income range suggests a stable financial situation, potentially enhancing their access to resources and opportunities for professional development.

5. The high level of educational attainment among the teacher-respondents demonstrates a strong commitment to professional development and enhancing their teaching skills.

6. The balanced mix of experience levels among the teacher-respondents suggests a healthy blend of fresh perspectives and seasoned expertise within the teaching community.

7. The limited access to relevant in-service training programs highlights a significant gap in professional development opportunities that could impact teachers' knowledge, skills, and classroom practices.

8. The high-performance ratings among the teacher-respondents indicate a commendable level of dedication, effectiveness, and commitment to their profession.

9. The teachers' positive and proactive attitude towards technology integration in early childhood education suggests a willingness to leverage technology in a balanced and developmentally appropriate manner.

10. The comprehensive technology integration strategy employed by the teacher-respondents demonstrates a commitment to creating engaging, inclusive, and effective learning environments for young learners in kindergarten.

11. The teacher’s attitudes strongly impact how they view technology, highlighting the need to cultivate positive attitudes toward technology among educators.

12. The teacher-respondents' highly positive perception of the benefits of technology integration in kindergarten education highlights the transformative potential of technology in enhancing learning experiences and promoting holistic student development.

13. The strong correlation observed between teachers' attitudes and their

perceived benefits of technology integration underscores the pivotal role in shaping how technology is valued and utilized within educational settings. This correlation leads to more innovative classroom practices and improved student learning outcomes.

14. The minor challenges encountered by teacher-respondents regarding technology integration suggests that they are able to effectively navigate and overcome these obstacles, indicating a high level of adaptability and resourcefulness.

15. The strong positive relationship between the level of technology integration and the perceived benefits suggests that increased technology integration can lead to enhanced student engagement, individualized learning, and improved academic outcomes in kindergarten classrooms.

Recommendations

Based on the conclusions drawn from the study findings, the following recommendations can be made:

1. Implement initiatives to address gender imbalances and encourage a diverse representation of teachers across age groups to enrich the teaching environment.

2. Provide more accessible and relevant in-service training programs to bridge the gap in professional development opportunities and support teachers in improving their knowledge, skills, and classroom practices.

3. Offer training and support to cultivate positive attitudes towards technology integration among educators, emphasizing its benefits in enhancing student engagement, individualized learning, and holistic development.

4. Promote a holistic approach to technology in kindergarten education, focusing on age-appropriate content, minimal screen use, interactive tools, teacher oversight, and ongoing evaluation for better learning experiences.

5. Identify and address minor obstacles faced by teachers in technology integration, such as limited access to resources, to ensure a smooth and successful implementation of technology in early childhood education.

6. Regularly assess the impact of technology integration on student outcomes and teacher practices to refine strategies, enhance effectiveness, and promote continuous improvement in kindergarten classrooms.

7. Another study may be conducted to validate the findings of this study.

Compliance with Ethical Standards

The study observed the ethical standards in conducting educational research to ensure the protection, rights, dignity, and welfare of the Kindergarten teacher-respondents from the Districts of Daram I, Daram II, Villareal I, and Zumarraga, Schools Division of Samar. Prior to data collection, the researcher secured permission from the Schools Division Superintendent, concerned District Supervisors, and school heads. The respondents were informed of the purpose, scope, and procedures of the study, as well as their rights to voluntary participation, confidentiality, and withdrawal from the study without penalty or adverse consequences. Informed consent was obtained before administering the questionnaire, and participation was not influenced by coercion or undue pressure. The researcher ensured that the information collected, including respondents' demographic profiles, attitudes, perceptions, and professional experiences, was treated with utmost confidentiality and used solely for academic and research purposes. No personally identifying information was disclosed in the presentation or publication of the findings, and responses were reported in aggregate form to protect the identities of the participants. For questionnaires administered through an online platform, appropriate measures were observed to restrict access to the collected data and safeguard the respondents' information. The researcher also ensured the accurate recording, analysis, and reporting of data, acknowledged the sources of adapted research instruments, and avoided fabrication, falsification, and plagiarism. These ethical safeguards were implemented in accordance with applicable institutional research policies, Department of Education guidelines, and relevant data privacy principles.

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