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The Level of Technology Integration in Teaching Different Subjects in Secondary School

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Abstract: ***This study aimed to determine the level of technology integration and teachers' preparedness in using technology for teaching different subjects at Bulan National High School (BNHS) during the school year 2024-2025. Given the increasing importance of digital tools in education, the study sought to evaluate the extent of technology use, its impact on student engagement, and the challenges encountered by teachers. The study employed a descriptive research design with a quantitative approach. A total of 50 secondary school teachers participated, representing various subject areas. Data collection involved survey questionnaire that measured the digital tools and applications used, the level of preparedness for technology integration, and the difficulties faced by teachers. The gathered data were analyzed using descriptive statistics. Findings revealed that smartphones (frequency = 45) were the most commonly used digital tool, while Google Classroom (frequency = 15) was the most utilized application. Teachers were found to be moderately prepared for technology integration (mean = 3.24). The level of technology integration in teaching was also at a moderate level (mean = 3.3), suggesting sporadic use of digital tools. Teachers reported that technology positively influenced student participation. However, the major challenges faced included lack of training (48 respondents) and limited financial resources (48 respondents), along with poor internet connectivity (47 respondents). The results suggest the need for targeted ICT training, budget allocation for digital resources, and improved internet connectivity. Establishing peer-learning communities and implementing monitoring systems can further enhance technology integration. Addressing these challenges through structured training and resource support can significantly improve technology-based teaching and learning at BNHS. Thus, improving academic performance.***

Keywords: technology integration, teacher preparedness, digital tools, secondary education, ICT training

1. Introduction

In the 21st century, technology integration has become a crucial element in the education system worldwide. As schools' endeavor to meet the educational needs of students in an increasingly digital world, the integration of technology into teaching and learning processes has gained significant attention. This study aims to investigate the level of technology integration in teaching different subjects in secondary schools, focusing on the extent to which teachers incorporate technological tools and resources into their instructional practices.

In the early 2000s, initiatives promoting technology use in schools gained momentum, driven by programs like 1:1 computing, the provision of digital resources, and professional development for teachers in many countries. Researchers began focusing on how technology affects teaching practices, learning outcomes, and classroom environments. Over the past few decades, educational systems worldwide have recognized the transformative potential of technology in enhancing learning and teaching processes. As digital tools and internet access became more prevalent, educational reformers pushed for the integration of technology to support interactive learning, develop students' 21st-century skills, and improve educational outcomes, Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2020).

In secondary education, the integration of technology became a critical area of interest, particularly how teachers incorporate digital tools into different subject areas. Studies began investigating factors such as teacher proficiency, available resources, and student engagement to assess the effectiveness of technology integration. As the COVID-19 pandemic further accelerated the adoption of digital learning methods, this research area gained even more relevance, highlighting the need for better understanding of how prepared teachers are to integrate technology into their teaching practices across various disciplines, Koehler, M. J., & Mishra, P. (2009).

The integration of technology in education is often associated with improved learning outcomes, enhanced student engagement, and the development of digital literacy skills. According to Mishra and Koehler's (2016) Technological Pedagogical Content Knowledge (TPACK) framework, effective technology integration requires teachers to possess a blend of content knowledge, pedagogical knowledge, and technological knowledge. This framework suggests that successful technology integration is not merely about having access to technology but also about the appropriate application of technology in ways that enhance teaching and learning.

The level of technology integration may vary across different subjects. For instance, studies have shown that subjects like science and mathematics often have higher levels of technology integration due to the availability of subject-specific software and tools (Judson, 2016). Conversely, subjects like social studies and language arts may have lower levels of integration due to perceived challenges in aligning technology with subject content (Herro, 2015).

The use of technology across all educational settings should not just be a passing fad; it has practically become a necessity in all educational systems to be able to be relevant, responsive, and effective. The development of digital tool and resource use has grown at such a rapid rate that its practice in the delivery of education has changed; there is some dire need to understand how technology is used across subject matters in secondary schools. The modern system of education, therefore, has to ensure that learners are equipped with 21st-century skills such as critical thinking, problem-solving, collaboration, and digital literacy; otherwise, students would be incapable of competing successfully in a world that is driven by technology. Knowledge of the level of technology in instructing various subjects supports these objectives since

the students would not only learn about their content but also important means of delivering that content using technology.

The study therefore, help in pinpointing the gaps and areas of strength in current practices in ensuring standards in education are met through all subjects. Despite the advanced provision for this technology, unequal access to technology remains a form of digital divide and hence remains one of the huge challenges facing education. Awareness of such differences can be empowering, for both policymakers and educators can then correct such imbalances to ensure that all students, once they have embarked on schools, are entitled to quality technology-enhanced education regardless of socio-economic background. Critical to this effective infusion of technologies into education is investment in the provision of adequate training and support to teachers. Many studies have shown that teachers' feelings of being prepared to use technology effectively are limited.

This add to the knowledge regarding those aspects where teachers are lagging and need further professional development and support. The research can lead to the design of professional development programs that enhance the confidence and competence of teachers in using technology by pointing out specific challenges and barriers faced by teachers in integrating technology into different subjects. Very many studies have shown that when integrated usefully, technology can enhance student interest and learning outcomes. Still, the technological impact is differential based on the subject and the way that it is used. Hence, the current study shall leave room for evidence on the different subjects' use of technology and its effect on student participation and student achievement.

Education systems worldwide are increasingly incorporating digital tools and technology to enhance teaching and learning. The global trend toward technology in classrooms—further accelerated by the COVID-19 pandemic—has highlighted the need for teachers to adapt to new instructional methods. As such, it is crucial to assess how effectively secondary school teachers in Bulan National High School are integrating technology into their teaching practices across different subjects.

In the Philippines, the Department of Education (DepEd) has been actively promoting technology integration through its programs such as the DepEd Computerization Program (DCP) and the Learning Continuity Plan (LCP). With these initiatives, it is important to evaluate how schools like Bulan National High School are implementing these guidelines and policies, ensuring that they align with the country's vision for modern education. Understanding the current level of technology integration helps gauge how well the school is meeting these national educational goals, International Society for Technology in Education (ISTE) Standards for Educators (2017).

Different subjects—such as Mathematics, Science, English, and Social Studies—require varied instructional strategies, and the integration of technology can differ significantly from one subject to another. This study identified the unique challenges and opportunities in each subject area, providing insights into how technology can be most effectively utilized to enhance both teaching practices and student learning outcomes. A critical factor in the successful integration of technology is the preparedness and proficiency of teachers. By examining the level of technology integration at Bulan National High School, the study assessed how equipped the teachers are in terms of knowledge, skills, and resources. Understanding their readiness will help in identifying gaps in professional development and in formulating targeted training programs to improve their technology competency.

Research has shown that effective technology integration can lead to improved student engagement and learning outcomes, but this depends on how well it is implemented. Evaluating the level of technology integration at Bulan National High School will provide data on how technology is influencing students' learning experiences. This, in turn, will help educators refine their approaches and ensure that students are gaining the most from technology-enhanced lessons.

Bulan National High School serves a large student population, and ensuring that students have access to quality, technology-enhanced education is crucial for their future success in a digital world. This study provides actionable insights for school administrators, teachers, and policymakers in Bulan, helping them make informed decisions on resource allocation, infrastructure improvements, and teacher training to support technology integration. There is limited research focusing specifically on technology integration in secondary schools in rural areas like Bulan. This study added to the body of knowledge in this field by providing localized data and insights that can guide future research and policy development, particularly in similar rural settings across the Philippines.

Objectives of the Study

This study determined the level of technology integration and level of preparedness of teacher in using technology in teaching different subjects in Bulan National High School, school year 2024-2025.

Specifically, it sought answers to the following questions:

1) What are the different digital tools and applications utilized by the teacher during technology integration?
2) What is the level of preparedness of teacher handling different subjects during technology integration?
3) How does technology integration improve the level of interest and motivation of learners?
4) What are the difficulties encountered by teachers in using technology integration in teaching?
5) What training program on technology integration can be proposed to improve the use of technology in teaching?

2. Methodology

Method Used

The study employed a quantitative descriptive research design. This approach is appropriate for gathering quantifiable data on the level of technology integration and the preparedness of teachers at Bulan National High School. The data were collected through surveys and questionnaire, allowing for a systematic description of the current state of technology use in the school. The participants of the study

included secondary school teachers at Bulan National High School for the school year 2024-2025. A stratified random sampling technique was used to ensure representation from different subject areas. This method helped in capturing a broad spectrum of technology integration across various subjects taught in the school.

Structured questionnaire was developed to collect data on the level of technology integration, teacher preparedness, the impact on student motivation, challenges faced by teachers, and their professional development needs. The questionnaire included both Likert-scale items and open-ended questions to capture detailed information. To complement the quantitative data, semi-structured interviews may be conducted with selected teachers to gain deeper insights into their experiences and perceptions of technology integration in their teaching practices.

The questionnaire was developed based on the Technological Pedagogical Content Knowledge (TPACK) framework, substitution, Augmentation, Modification, and redefinition (SAMR) model, and relevant literature. It was pilot-tested to ensure validity and reliability before being administered to the target population. A semi-structured interview guide was created to explore themes related to the research questions, allowing for in-depth exploration of teachers' experiences with technology integration.

Data from the questionnaire were analyzed using descriptive statistics, such as means, standard deviations, frequencies, and percentages, to determine the levels of technology integration and teacher preparedness. Responses from the open-ended questions and interviews were analyzed using thematic analysis to identify common themes and patterns related to the challenges faced by teachers and their professional development needs.

Respondents of the Study

The study targeted all secondary school teachers at Bulan National High School during the school year 2024-2025. This included teachers handling various subjects such as Mathematics, Science, English, Social Studies, Technology and Livelihood Education (TLE), and other relevant subjects. There are 50 of teachers at Bulan National High School who were considered as respondents of this study. A stratified random sampling method was employed to ensure representation across different subject areas. The stratification was based on the subjects taught to ensure that the sample accurately reflects the diversity of teaching practices within the school.

Table A: Respondents

Respondents	F	%
TLE Teacher	10	20
Math Teacher	10	20
Science Teacher	10	20
English Teacher	10	20
Araling Panlipunan Teacher	10	20
Total	50	100

Instruments Used

The study used a structured questionnaire as the primary instrument for data collection. This questionnaire was designed to gather detailed information on the level of technology integration, teacher preparedness, challenges, and professional development needs in teaching different subjects at Bulan National High School. In the level of technology integration; it contained items that assess the extent to which technology is integrated into teaching practices for various subjects. It included questions on the frequency of technology use, types of technologies employed (e.g., computers, projectors, educational software), and specific applications in classroom settings. While the level of preparedness; it measured teachers' preparedness in using technology for teaching. This section includes questions on their confidence, training received, and self-assessment of their skills in using technology effectively in the classroom. Along Impact on Learners' Interest and Motivation; it may Evaluates how the integration of technology has influenced students' interest and motivation. This section includes items on student engagement, participation, and the perceived effectiveness of technology in enhancing learning outcomes. Along Challenges and Difficulties; it identified the challenges and difficulties faced by teachers in integrating technology into their teaching. This section covered issues such as lack of resources, technical difficulties, and insufficient training.

The questionnaire was subjected to content validation by experts in educational technology and survey design. A pilot test was be conducted with a small sample of teachers to check for clarity, relevance, and reliability. Cronbach's alpha was used to assess the internal consistency of the Likert scale items.

Data Gathering Procedures

With the instrument ready for administration, a letter of request was addressed to the Superintendent of Schools Division of Sorsogon. Upon granting the approval, the researcher asked permission from the public school's district supervisor and the respective school principal for the actual conduct of the study. The questionnaires were distributed to the identified respondents for them to accomplish. The researcher set a target of a 100 percent retrieval rate for the instruments. The data gathered from the respondents were collated, tallied, and analyzed for statistical interpretation.

To gather data for the study on technology integration and teacher preparedness at Bulan National High School, there are steps to follow 1) Ensure the questionnaire is well-structured, validated, and reliable. Incorporate any feedback from the pilot test and expert reviews. 2) Seek approval from relevant authorities at Bulan National High School and any necessary ethical clearances from educational or research boards. 3) Outline the procedures, timelines, and responsibilities for data collection.

Choose an appropriate method based on the teachers' preferences and available resources. Options included online surveys (using tools like Google Forms or SurveyMonkey), paper surveys, or a combination of both. Distribute the questionnaire at a time that minimized disruption to teachers' schedules, such as during a planning period or at the start of a school term.

Sources of Data

The study utilized a comprehensive data collection approach to assess technology integration in secondary schools. **Survey**

questionnaires were distributed to teachers to gather quantitative data on their technology usage, preparedness, and professional development needs. Interviews with teachers and administrators provide qualitative insights into the challenges and experiences related to technology integration. Classroom observations were conducted to evaluate the real-world use of technology in teaching and identify both issues and effective practices.

Additionally, school records and reports will be analyzed to assess the availability of technology resources and document professional development activities. Focus groups with teachers explored their collective views on technology integration, difficulties faced, and professional development requirements. Data from educational technology tools**,** such as learning management systems, were examined to determine their effectiveness and usage patterns. Finally**,** student feedback was collected through surveys or interviews to gauge their perceptions of how technology impacts their learning experience and motivation.

Statistical Treatment of the Data

The data that were gathered from the respondents were subjected to various statistical analyses before its interpretation. For the study on technology integration and teacher preparedness at Bulan National High School, here is a detailed approach to the statistical treatment of data.

For problem 1 frequency count and rank used in the question. For problem 2, utilized weighted mean to determine the perceptions of the respondents about the level of technology integration in teaching different subjects and the level of preparedness of teacher in using technology integration in teaching handling different subjects. Using the Likert scale:

1	-	Strongly Disagree	1.0 – 1.49
2	-	Disagree	1.5 – 2.49
3	-	Neutral	2.5 – 3.49
4	-	Agree	3.5 – 4.49
5	-	Strongly Agree	4.5 – 5.0

Respondents would select the option that best represents their level of agreement or disagreement with each statement. This scale allowed for nuanced responses and can be used to gather data on various aspects of attitudes, perceptions, or practices related to technology integration and preparedness.

For problem 3, thematic analysis was used to determine the level of interest and motivation of learners. Categorize responses into themes and sub-themes to understand the underlying issues and needs. This involved coding the data and grouping similar responses together. Quantify the occurrence of specific words or phrases to identify key issues and concerns related to technology integration.

For problem 4, frequency count and rank used to identify the challenges and difficulties faced by teachers in integrating technology into their teaching. This section covers issues such as lack of resources, technical difficulties, and insufficient training.

3. Results and Discussions

Findings

Based on the data gathered, the following findings were revealed:

1) Smartphones ranked first among digital tools used in technology integration, with a frequency of 45. (This indicates that most teacher respondents utilized smartphones in their teaching-learning activities. When effectively integrated into instructional strategies, smartphones serve as powerful tools to enhance classroom learning and engagement.)
2) Google Classroom ranked first among digital applications used in teaching, with a frequency of 15. Microsoft PowerPoint followed with 13, while Email ranked third with 12. These applications were the most commonly utilized by teachers for technology integration in instruction.
3) Teachers demonstrated a moderate level of preparedness in technology integration, with all indicators reflecting mean values in this category. ICT competencies through training and curriculum alignment both scored 3.42, while updating on technological trends scored 3.36. These findings indicated limited digital competencies despite available training opportunities.
4) Technology integration in secondary school teaching was at a moderate level. Tracking and analyzing students' progress had a mean value of 3.54, indicating that teachers seldom utilized technology for this purpose, reflecting minimal overall technology integration in instructional practices.
5) There were 45 teacher respondents who claimed that when an instance allowed them to integrate technology, they witnessed how certain digital tools and applications intensified the encouragement of students to participate actively in learning engagement.
6) The lack of training on ICT integration in teaching practices and the limited financial allocation were the topmost issues. Both had 48 as the frequency obtained and placed them in rank 1.5. Poor internet connectivity had 47 as the achieved frequency and ranked 3rd.
7) Proposed Training Design on Enhancing Teacher Competencies in Technology Integration for Effective Teaching and Learning

4. Conclusions and Recommendations

4.1 Conclusions

Based on the findings, the following conclusions are drawn;

1) The study reveals that smartphones are the most frequently used digital tool by teachers in their teaching-learning activities. Furthermore, the most commonly used as digital application are google classroom, Microsoft PowerPoint and email.
2) The teachers' preparedness for technology integration is described as moderately prepared
3) **The** moderate level of technology integration in the classroom indicates that while teachers recognize the importance of using technology, its application in teaching remains sporadic.
4) Teachers reported that the integration of technology has positively influenced student participation in the learning process.

5) The study highlights that the lack of proper training on ICT integration and limited financial resources are the major challenges faced by teachers in using technology effectively.
6) The findings emphasize the need for more comprehensive and targeted training programs to enhance teachers' digital competencies.

4.2 Recommendations

Based on the conclusions of the study the following recommendations are made:

1) Targeted and comprehensive training programs that focus on developing advanced ICT skills be implemented.
2) Budgets to acquire digital tools, devices, and software that support technology integration be allocated.
3) Use of technology integration in the classroom instruction be intensified.
4) Mentoring of teachers who are not computer literate be part of the training program
5) Teachers be encouraged to use technology to support active learning strategies, where students are engaged in problem-solving, collaboration, and creative tasks.
6) Future researchers should examine technology integration strategies, assess student learning impacts, analyze teacher training effectiveness, and identify barriers for improvement.

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