United International Journal for Research & Technology

*Volume 05, Issue 04, 2023 | Open Access | ISSN: 2582-6832*

# Learning Continuity in Technology and Livelihood Education (T.L.E.) Instruction Through Information and Communication Technology (ICT) Integration

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***Abstract*—** This study aimed to determine the extent of perception of teachers on the level of integration of Information and Communication Technology (ICT) in teaching Technology and Livelihood Education (TLE) at the 2nd Congressional District of Sorsogon for school year 2023-2024. It utilized the descriptive-survey method of research. There were 71 respondents involved in the study which were randomly selected from five big secondary schools from the 2nd Congressional District of Sorsogon. Similarly, a researcher-made questionnaire was used in gathering in the primary data. The frequency, rank, and weighted mean were the statistical tools used in analyzing the data.

***Keywords*—** information and communication technology, level of integration, perception, Technology and Livelihood Education

## I. INTRODUCTION

This study deals into the transformative impact of Information and Communication Technology (ICT) on instructional methods and learning environments, focusing on Technology and Livelihood Education (TLE). Against the backdrop of challenges posed by disruptions to traditional learning, particularly due to the COVID-19 pandemic, the study explores the crucial role of ICT in ensuring learning continuity. The primary objective is to uncover how teachers perceive and utilize ICT tools for sustained and effective learning experiences in TLE. By examining teachers' perspectives, the research aims to shed light on the challenges and opportunities inherent in achieving learning continuity, contributing valuable insights to the ongoing discourse on educational resilience in the face of technological advancements and unforeseen disruptions.

As of May 2021, educational institutions in 26 countries had implemented nationwide closures, while schools in 55 countries were partially open, with restrictions in place. An estimated 90 percent of the world's school-aged children have had their education disrupted by the pandemic, according to UNESCO (Human Rights Watch, 2021).

The global impact of the COVID-19 pandemic on education has resulted in a substantial shift in the delivery and experience of learning. School closures prompted a swift move to remote learning, underscoring the pivotal role of technology in education and revealing disparities in access that contribute to educational inequalities. Teachers showcased adaptability, embracing novel teaching methods and navigating virtual classrooms. The pandemic triggered a reevaluation of traditional assessment approaches and emphasized the importance of holistic well-being in education. As schools gradually reopened, a hybrid model combining in-person and online learning gained prominence, signifying a new era marked by flexibility, innovation, and global collaboration in response to evolving challenges. In the Philippines, the pandemic has led to significant changes and challenges in the educational system. The swift transition to distance learning involved various modalities such as online classes, modular learning, and televised educational programs. The Department of Education (DepEd) implemented diverse approaches to ensure the continuity of learning despite the limitations imposed by the pandemic.

***The Secretary of the Department of Education, Leonor***

Magtolis Briones introduced the Basic Education Learning Continuity Plan (BE-LCP) for academic school calendar for 2020-2021 in the time of COVID 19 (DepEd Order No. 12, s. 2020). This represents the Department's reaction to the difficulties brought about by COVID-19 in the realm of primary education, with the aim of ensuring that education endures, regardless of the alterations and potential risks faced both presently and, in the times, ahead. The Basic Education Learning Continuity Plan (BE-LCP) of the Department of Education (DepEd) in the Philippines is a comprehensive strategy developed to ensure that

education continues amid various challenges, including natural disasters, public health crises like the COVID-19 pandemic, and other calamities. The BE-LCP encompasses a range of initiatives aimed at maintaining the continuity of learning for students across the country.

The Department of Education (DepEd) issued a momentous memorandum that highlighted the evolving landscape of education in the Philippines. In consideration of the well-being of the learners affected by extreme climate conditions as they attend in-person classes, the Office of the Undersecretary for Operations reiterates DepEd Order No. 037, s. 2022, titled "Guidelines on the Cancellation or Suspension of Classes and Work in Schools in the Event of Natural Disasters, Power Outages/Power Interruptions, and Other Calamities. DO 037, s. 2022 provides for the implementation of modular distance learning in the event of canceled or suspended classes due to natural disasters, calamities, and human-induced hazards to ensure learning continuity and that learning competencies and objectives are met (Memorandum OASOPS No. 2023-077). This memorandum provided a clarion call to the education sector, signaling a paradigm shift towards embracing information and communication technology (ICT) for the continuity of learning. This pivotal moment was not just a response to the global events that disrupted traditional educational methods, but also a visionary leap into the future, recognizing the vital role ICT plays in the realm of education. These stresses the Department of Education's (DepEd) commitment to ensuring the safety and well-being of students, teachers, and staff in the face of unforeseen circumstances.

The pandemic likely accelerated underlying trends related to digitalization, bringing investment and capacity needs to the spotlight and to countries' education policy agenda (OECD, 2021). However, the digital divide has posed a significant hurdle, with students in marginalized communities often lacking access to necessary devices and stable internet connections. The Department of Education (DepEd) has rolled out initiatives to mitigate these challenges, distributing printed modules and partnering with telecommunications companies to enhance connectivity. Blended learning approaches, combining both online and offline methods, have emerged as a flexible solution. Teachers have undergone training to navigate the intricacies of virtual instruction, emphasizing digital literacy and innovative content creation. Mental health and well-being have become focal points, with schools offering support services to address the emotional toll of the pandemic on both students and educators. As vaccination efforts progress, there is a growing optimism about the eventual return to in-person classes, highlighting the resilience and adaptability of the Philippine education system in the face of unprecedented challenges.

In the specific context of the second district of Sorsogon, particularly in Bulan Districts, social media platforms have played a crucial role as a strategy for implementing Distance Learning. The creation of group chats and other social media accounts, specifically designed for different groups such as co-teachers, parents, learners, and administrators, aimed to monitor submissions, track learners' progress, share updates, conduct follow-ups, and facilitate communication with parents when necessary, among other objectives (Albor, B. S., Gatchalian-Fortes, A. C., and Delumen-Albor, M. R. I., 2021).

In the Irosin District, efforts have been made to create video lessons for the Irosin Info News DepEd TV channel as part of the DepEd programs during the pandemic (District Memo #08, s. 2021). The anticipated output consists of video lessons that can be broadcast on television, where the majority of students have access.

The researcher's exploration of ICT integration in Technology and Livelihood Education (TLE) instruction reflects a deep curiosity and a passionate desire to understand how technology can bridge traditional pedagogy with contemporary learner needs. The study recognizes that the success of ICT integration depends on educators' readiness and students' receptivity, emphasizing the transformative potential of technology in education. The thesis delves into the complexities of Learning Continuity in TLE Instruction through ICT Integration, aiming to uncover strategies, challenges, and outcomes in this evolving educational landscape. Rather than offering prescriptive solutions, the researcher provides insights as a valuable resource for educators, policymakers, and learners navigating the transformative journey. The research comprehensively examines key aspects of ICT integration in TLE, including lesson planning, lesson delivery, assessment, monitoring, and reports preparation. The subsequent chapters aim to contribute to the collective knowledge of the educational community.

This study aimed to determine the extent of perception on Information and Communication Technology (ICT) integration of the Technology and Livelihood Education (TLE) teachers at the 2nd Congressional District Province of Sorsogon for SY 2023-2024.

Specifically, it sought to answer to the following:

1. What ICT resources are used by teachers during suspension of classes along:
   a. Software
   b. Hardware

2. What is the extent of perception of teachers on ICT integration along:
   a. Lesson Plan Preparation
   b. Delivery of Lesson
   c. Assessment
   d. Monitoring
   e. Reports Preparations

3. What are the problems encountered by the teachers in the integration of ICT along the identified variables?

4. What learning continuity plan can be developed based on the result of the study?

## II. METHODOLOGY

This study aimed to determine the extent of teachers' exposure to ICT integration in lesson delivery at Gallanosa National High School, Bulan National High School, Matnog National High School, Gubat National High School, and Bulusan National High School for the school year 2023-2024. The descriptive survey method of research was employed to assess teachers' perceptions regarding ICT integration in teaching TLE, along with the problems they encountered in facilitating lesson delivery.

The study employed survey questionnaires as the main data collection instrument to gather numerical data, using a descriptive-survey method. The respondents were 71 teachers who voluntarily participated in the survey from the mentioned schools. The statistical tools utilized were the frequency, percentage, and weighted mean. The proposed output of the study was informed by the outcomes of the conducted process.

The respondents for this study were selected using a purposive sampling technique from the TLE faculty of five schools in the 2nd district, namely Gallanosa National High School, Bulan National High School, Matnog National High School, Gubat National High School, and Bulusan National High School. This sampling approach was chosen because it allows the researcher to specifically target high school teachers who are actively using ICT resources in their discussions and who have varying levels of experience and expertise in TLE. The researcher considered the teachers' teaching experiences, familiarity with technology, and their potential to provide valuable insights into the integration of ICT in the classroom. By using purposive sampling, the researcher can ensure that the sample consists of teachers who are most relevant to the study and can provide meaningful data based on their characteristics and needs. A total of 71 teachers participated in the survey, 23 from Bulan National High School, 7 from Bulusan National High School, 17 from Gallanosa National High School, 13 from Gubat National High School and 11 from Matnog National High School.

A survey questionnaire, distributed to junior high school teachers in the Technology and Livelihood Education (TLE) department, served as the primary data collection tool in the five major high schools of the second district of Sorsogon. The questionnaire used in the study was developed by the researcher and underwent a thorough review process. It was then submitted to the adviser and a panel of experts for checking and approval. After being checked, copies of the survey questionnaire were distributed to the respective respondents. The first part focuses on examining the different Information and Communication Technology (ICT) resources that teachers employ during class suspensions. This may include devices like computers, tablets, or smartphones, software applications, online platforms, and communication tools. The second part focuses on assessing the level of Information and Communication Technology (ICT) integration in various key aspects of the teaching and learning process, specifically in the areas of Lesson Plan Preparation, Delivery of Lesson, Assessment, Monitoring, and Reports Preparation. To achieve this, the researchers utilized a questionnaire that employed a structured rating scale, allowing respondents to express their perceptions through indicators ranging from "strongly agree" to "strongly disagree" and corresponding numerical values of 1 to 5.

The third part of the questionnaire, where respondents rank problems from 1 (most problematic) to 5 (least problematic) in relation to lesson plan preparation,

delivery of the lesson, assessment, monitoring, and reports preparation, serves as a vital component of this study.

Unstructured interviews were also employed to gather information from the respondents. After collecting the questionnaires, the researcher administered follow-up questions to validate and confirm the on-site experiences of the teachers regarding ICT integration in TLE. The researcher promptly compiled the data and forwarded it to a statistician for analysis. The data were then processed and interpreted using relevant statistical tools and measures.

The data analysis procedure for assessing the utilization of ICT (Information and Communication Technology) resources by teachers during the suspension of classes involves employing various statistical measures such as frequency count, weighted mean, ranking, and percentage. These methods aim to provide a comprehensive understanding of the extent to which teachers rely on ICT tools and the challenges they encounter in different aspects of their teaching responsibilities, including lesson plan preparation, delivery of lessons, assessment, monitoring, and reports preparation.

Descriptive statistics were employed to analyze the frequency and percentage of ICT resources utilized by teachers during the suspension of classes, aiding in summarizing and presenting the main features of the dataset. The researcher also utilized frequency distribution to present the count or frequency of each ICT resource, offering a clear picture of their utilization frequency.

To assess the extent of teachers' perception on ICT integration across the mentioned categories a Likert scale was used. A Likert scale is a widely used method for measuring attitudes and perceptions, allowing respondents to express their level of agreement or disagreement with a statement.

## III. RESULTS AND DISCUSSION

The presentation and analysis of the data are the following: 1) ICT resources used by teachers during suspension of classes along software and hardware; 2) extent of perception of the teachers in ICT integration along lesson plan preparation, delivery of lesson, assessment, monitoring, and reports preparation, 3) problems encountered by the teachers in the ICT integration along the identified variables; and 4) proposed learning continuity plan to enhance the ICT integration.

### *1) ICT resources used by the teachers during the suspension of classes*

This portion encompasses the ICT resources utilized by the teachers during the suspension of classes along software and hardware. Multiple responses were used by the respondents.

Software. Table 2A contains the frequency and rank of the ICT resources utilized by the teachers during the suspension of classes along software.

***Table 2A:*** *ICT resources used by the teachers along software*

| ICT resources | f(n=71) | rank |
|---|---|---|
| **Facebook/Messenger** | 67 | 1 |
| **WIFI/Internet** | 53 | 2 |
| **Google Meet** | 26 | 3 |
| **Google Classroom** | 18 | 4 |
| **ZOOM** | 16 | 5 |

This means that teachers tapped into a wide array of ICT resources. These resources encompass both traditional tools as well as more modern communication platforms. This diversity reflects the flexibility and resourcefulness of teachers in adapting to the circumstances. Facebook/Messenger emerged as the top choice, emphasizing the importance of social media platforms in communication and instruction. Creating group chats for both students and teachers fosters easy collaboration, offering a platform for discussing topics, sharing insights, and working on assignments or projects. This real-time communication tool allows students to seek clarification, engage in discussions, and share resources conveniently. Group chat supports peer support, motivation, and flexible learning. It serves as a space for collaborative problem-solving, feedback exchange, and reflection on learning experiences. Interactive discussions in group chat enhance student engagement,

while instructors can provide guidance, share announcements, and address concerns. In the digital age, exposure to group chat helps students develop crucial communication skills for various professional settings. Smartphones and laptops followed closely, demonstrating the convenience and accessibility these devices offer. In addition to the array of ICT tools, teachers made use of online learning platforms like Zoom, Google Meet, and Google Classroom. This indicates their readiness to adapt to virtual teaching methods and leverage technology to facilitate student learning during class suspension.

Hardware. The frequency and rank of the ICT resources utilized by the teachers during the suspension of classes along hardware are presented in Tabe 2B.

***Table 2B:*** *ICT resources used by the teachers along hardware*

| ICT resources | f (n=71) | rank |
|---|---|---|
| **Smartphone** | 66 | 1 |
| **Laptop** | 65 | 2 |
| **Printer** | 56 | 3 |
| **Desktop computer** | 22 | 4 |
| **Scanner** | 19 | 5.5 |
| **Television** | 19 | 5.5 |
| **Tablet computer** | 17 | 7 |
| **Radio** | 13 | 8 |

Laptops and smartphones serve as versatile tools for teachers, aiding in lesson planning, resource gathering, and curriculum development. They enable communication with students through messaging apps and email. Essential for professional development, these devices support continuous learning through online courses, webinars, and educational forums. Teachers utilize laptops and smartphones to plan and implement ICT integration strategies, monitor students' progress through learning management systems, and assess performance digitally. Additionally, these devices facilitate collaboration with colleagues on lesson planning and administrative tasks, including attendance tracking, grading, and parent communication through various applications.

According to Devi (2022) the accessibility of ICT resources does not guarantee its successful implementation in teaching, and this is not merely because of the lack of ICT infrastructure but also because of other problems such as lack of high-quality hardware, suitable educational software, and access to ICT resources.

***2) Extent of Perception of the teachers in ICT integration***

This portion discusses the extent of perception of the teachers in ICT integration along lesson plan preparation, delivery of lesson, assessment, monitoring, and reports preparation.

Lesson Plan Preparation. Table 3A includes the weighted mean and interpretation of the extent of perception of the teachers in ICT integration along lesson plan preparation.

***Table 3A.*** *Extent of perception of the teachers in ICT integration along lesson plan preparation*

| Indicators | Weighted Mean | Interpretation |
|---|---|---|
| **1. Enhances the creation of lesson plans** | 4.70 | Very highly perceived |
| **2. Incorporates the ICT elements into the lesson plans** | 4.65 | Very highly perceived |
| **3. Integrates the ICT for diverse learning needs of the students** | 4.63 | Very highly perceived |
| **4. Improves the overall quality of the lesson plans** | 4.59 | Very highly perceived |
| **5. Gives opportunity to integrate the sufficient ICT training acquired in preparing the lesson** | 4.45 | Highly perceived |
| **6. Believes that ICT integration in lesson plan preparation is essential for effective teaching** | 4.65 | Very highly perceived |

| | | |
|---|---|---|
| **7. Builds confidence in using the ICT tools for lesson preparation** | 4.59 | Very highly perceived |
| **8. Improves the students' engagement and understanding of the lessons** | 4.70 | Very highly perceived |
| **Overall Weighted Mean** | 4.62 | Very highly perceived |

This indicates a high level of acceptance and recognition of the benefits of technology in the teaching and learning process. This suggests that teachers acknowledge the importance of incorporating digital tools and resources to enhance their teaching strategies. Teachers prepared electronic lesson plans by leveraging various digital tools and platforms, such as word processing software.

Lesson plans were enhanced by incorporating multimedia elements, including embedded videos, images, interactive simulations, or links to online resources supporting the lesson content. Electronic lesson plans were saved using cloud-based platforms, making them easily shareable with colleagues and accessible from multiple devices. The teachers' strong perception that ICT integration enhances the creation of lesson plans and improves student engagement and understanding is a positive sign. It implies that teachers may find ICT to be an effective tool for not only improving their instructional materials but also for making the learning process more engaging and comprehensible for their students. While the teachers' high perception regarding the opportunity to integrate the ICT training acquired in lesson preparation is slightly lower, it is still in the "perception" range. This may indicate that while they recognize the value of ICT training, they may not yet fully leverage the skills they've acquired in their actual lesson planning. This suggests that there might be room for further professional development to fully harness the potential of ICT in teaching.

This is supported by the study of Ghavifekr, S. & Rosdy, W.A.W. (2015) implying that ICT integration helps teachers to design their lesson plans in an effective, creative and interesting approach that would result in students' active learning. The interactive nature of ICT tools encourages teachers to adopt innovative and dynamic teaching approaches, fostering a more engaging classroom environment. Additionally, ICT facilitates the incorporation of real-world examples and applications into lesson plans, making the learning experience more relevant and practical for students. Overall, ICT integration equips teachers with the means to create lessons that stimulate students' curiosity, promote critical thinking, and encourage active participation, thereby enhancing the overall quality of education.

Delivery of Lesson. The weighted mean and interpretation of the extent of perception of the teachers in ICT integration along delivery of lesson are contained in Table 3B.

***Table 3B.*** *Extent of perception of teachers in ICT integration along delivery of lesson*

| **Indicators** | **Weighted Mean** | **Interpretation** |
|---|---|---|
| **1. Enhances the students' engagement in the lesson delivery** | 4.66 | Very highly perceived |
| **2. Helps illustrate complex concepts and topics more effectively** | 4.61 | Very highly perceived |
| **3. Facilitates interactive and participatory learning experiences of the students** | 4.56 | Very highly perceived |
| **4. Improves the ability to personalize instruction to meet the diverse needs of students** | 4.52 | Very highly perceived |
| **5. Builds confidence and competence in using ICT tools to deliver lessons effectively** | 4.52 | Very highly perceived |
| **6. Enhances the students' active participation and collaboration in the lessons** | 4.58 | Very highly perceived |
| **7. Enhances the ability to provide real-world examples and applications** | 4.54 | Very highly perceived |
| **Overall Weighted Mean** | 4.57 | Very highly perceived |

This suggests that teachers acknowledge the importance of using technology to enhance the teaching and learning experience in the classroom. Teachers utilize video lessons, PowerPoint presentations, and audio recordings in lesson delivery to enhance engagement, understanding, and accessibility. Video lessons are assigned as homework, freeing up class time for interactive activities. Videos excel in demonstrating experiments and complex concepts, and guest speakers via video offer diverse perspectives. PowerPoint serves as a visual aid, using visuals to enhance comprehension. Audio recordings benefit various learning styles and aid language practice. Interactive elements foster student participation, promoting active learning. Overall, these multimedia tools cater to different learning needs, making lessons more engaging and accessible. The highest weighted mean in the data reflects teachers very highly perceived that ICT integration enhances student engagement during lessons. This is a significant outcome, as engaged students tend to be more motivated and responsive to learning activities, which may positively impact their academic performance. Teachers also very highly perceived that ICT assists in effectively illustrating complex concepts and topics. This indicates that they may find digital tools and resources valuable for simplifying and visualizing challenging subject matter, making it more understandable for students. The lowest weighted mean still falls within the "very highly perceived" category, indicating that teachers very high perception that ICT integration improves their ability to personalize instruction to meet the diverse needs of students. Although this aspect has a slightly lower mean compared to the others, it still demonstrates a high level of agreement regarding the potential for personalization through technology.

This result is again supported by the study of Ghavifekr, S. & Rosdy, W.A.W. (2015) that most teachers agreed that the use of ICT enables the students to be more active and engaging in the lesson. This indicates a consensus between teachers and students, affirming that the utilization of ICT affords students opportunities to actively engage and assume various roles, contributing to an enhanced learning experience.

Assessment. Table 3C presents the weighted mean and interpretation of the extent of perception of the teachers in ICT integration along assessment.

***Table 3C.*** *Extent of perception of teachers in ICT integration along assessment*

| Indicators | Weighted Mean | Interpretation |
|---|---|---|
| **1. Creates assessments which are aligned with the learning objectives and outcomes** | 4.51 | Very highly perceived |
| **2. Facilitates efficient and accurate grading of assessments** | 4.56 | Very highly perceived |
| **3. Allows for the incorporation of multimedia elements to better evaluate students' understanding of the lessons** | 4.51 | Very highly perceived |
| **4. Provides opportunities for formative assessment which allows to track the students' progress in real-time** | 4.46 | Highly perceived |
| **5. Assists in identifying the students' strengths and weaknesses** | 4.34 | Highly perceived |
| **6. Engage the students in the assessments conducted using the ICT** | 4.32 | Highly perceived |
| **7. Improves the ability to provide timely feedback to students** | 4.41 | Highly perceived |
| **Overall Weighted Mean** | 4.44 | Highly perceived |

It implies that teachers may acknowledge the advantages of using technology to support the assessment process. Using automated grading tools, teachers can swiftly assess multiple-choice questions, quizzes, and assignments, saving considerable time. Technology enables instant feedback, empowering students to promptly identify and address mistakes. It supports the collection and analysis of assessment data, offering educators insights into student performance trends. Remote and online assessments are facilitated, providing flexibility in participation and scheduling. Gamified assessments add enjoyment and motivation to the evaluation process. Additionally, technology simplifies the storage and retrieval of assessment records, reducing administrative burdens and paperwork. The highest weighted mean in the data indicates that teachers very highly perceived that ICT facilitates efficient and accurate grading of assessments. Teachers may have perceived that students are engaged in assessments conducted using ICT, but this aspect has

a slightly lower mean compared to the others. Teachers also agree that ICT assists in identifying students' strengths and weaknesses. While this aspect has a slightly lower mean, it is still in the "perceived" range, signifying the recognition of its importance.

This result is supported by the study of Joaquin et al., (2020) stating that amid the pandemic, universities have embraced online learning, which comes in two forms: synchronous, involving real-time lectures and assessments with set timelines, and asynchronous, encompassing delayed-time activities such as pre-recorded video lectures and assessments that are not time-bound. In contrast, asynchronous learning includes pre-recorded video lectures, discussion forums, and assessments with flexible timeframes. Students engage with the learning materials at their convenience, making it suitable for those with varying schedules. While it lacks the immediacy of synchronous learning, it provides students with the autonomy to manage their time and pace of learning.

Monitoring. The weighted mean and interpretation of the extent of perception of teachers in ICT integration along monitoring are listed in Table 3D.

***Table 3D.*** *Extent of perception of teachers in ICT integration along monitoring*

| Indicators | Weighted Mean | Interpretation |
|---|---|---|
| **1. Track and monitor the students' progress and performance effectively** | 4.54 | Very highly perceived |
| **2. Allows to collect and analyze data on students' learning outcome efficiently** | 4.52 | Very highly perceived |
| **3. Enables to identify the students who may require additional support or intervention** | 4.48 | Highly perceived |
| **4. Uses digital dashboard or platforms to keep track of the students' attendance and participation** | 4.28 | Highly perceived |
| **5. Allows for real-time feedback and adjustments to instructional strategies** | 4.46 | Highly perceived |
| **6. Improves the monitoring of the overall effectiveness of teaching** | 4.46 | Highly perceived |
| **7. Enhances the students' active participation and accountability in their progress** | 4.46 | Highly perceived |
| **Overall Weighted Mean** | 4.46 | Highly perceived |

This means that the overall weighted mean of 4.46, described as "highly perceived," indicates that teachers may see the value of ICT integration in monitoring student progress. This recognition implies that teachers may have acknowledged the benefits of using technology to effectively track and assess student performance and outcomes. The highest weighted means in the data reveal that teachers very highly perceived that ICT integration enables effective tracking and monitoring of students' progress and allows for the efficient collection and analysis of data on student learning outcomes. This reflects the recognition of technology's capacity to streamline data-driven decision-making in education. While teachers' high perception that they use digital dashboards or platforms to monitor student attendance and participation, this aspect has a slightly lower mean compared to others. It suggests that while digital tools are employed, there may be room for further optimization of these platforms to enhance tracking attendance and participation effectively.

This result is supported by the study of Falck et al. (2018) suggesting that the utilization of ICT has the potential to enhance personalized instruction and provide improved monitoring of students' progress. ICT equips educators with the means to better monitor student progress. Through learning analytics and online platforms, teachers may identify struggling students, track their performance, and provide timely support. This empowers educators to make informed instructional decisions.

Reports Preparation. Table 3E presents the weighted mean and interpretation of the extent of perception of the teachers in ICT integration along reports preparation.

*Table 3E. Extent of perception of teachers in ICT integration along reports preparation*

| Indicators | Weighted Mean | Interpretation |
|---|---|---|
| 1. **Enhances the efficient reports preparation on student performance and outcomes** | 4.61 | Very highly perceived |
| 2. **Allows to generate reports with data visualization and analysis features** | 4.59 | Very highly perceived |
| 3. **Enhances the presentation of assessment results to stakeholders** | 4.52 | Very highly perceived |
| 4. **Customizes and tailor reports to meet the specific needs of different audiences** | 4.45 | Highly perceived |
| 5. **Improves the ability to provide comprehensive and timely feedback to students** | 4.58 | Very highly perceived |
| 6. **Enables to easily achieve and access the past reports and students' performance data** | 4.68 | Very highly perceived |
| 7. **Makes the reports prepared easily accessible and user-friendly for stakeholders** | 4.62 | Very highly perceived |
| **Overall Weighted Mean** | 4.58 | Very highly perceived |

This means that the overall weighted mean of 4.58, described as "very highly perceived" indicates that teachers view ICT integration as a valuable tool in the preparation of reports. This suggests that teachers acknowledge the benefits of technology in streamlining and enhancing the reporting process. The highest weighted mean in the data signifies that teachers very high perception that ICT integration makes it easy to access past reports and students' performance data. This streamlining of data access may improve efficiency and enable educators to make informed decisions based on historical data. Teachers express agreement that ICT allows for the customization and tailoring of reports to meet the specific needs of different audiences. While this aspect has a slightly lower mean, it still falls within the "high perception" range, indicating that teachers recognize the potential for customization but may see room for improvement in this area.

This is supported by the study of Bobillier Chaumon et al., (2014) and Pedagoo (2020), manifesting that ICT uses different technologies to capture, communicate, collect, analyse, store and distribute the information needed to perform a specific task faster.

Problems encountered by the teachers in the level of ICT integration

This segment encompasses the problems encountered by the teachers in the level of ICT integration along lesson plan preparation, delivery of lesson, assessment, monitoring, and reports preparations.

Lesson Plan Preparation. Table 4A contains the sum of ranks and rank of the problems encountered by the teachers during lesson plan preparation.

*Table 4A. Problems encountered by the teachers in ICT integration along lesson plan preparation*

| Problems Encountered | Sum of Ranks | Rank |
|---|---|---|
| 1. **The access to ICT resources is limited.** | 193 | 2 |
| 2. **The use of ICT tools for lesson planning and instruction is not effective due to disparities in digital skills and proficiency levels among educators.** | 256 | 4 |
| 3. **The access to specific software, digital content, or online platforms is not readily available or affordable.** | 215 | 3 |
| 4. **Lesson planning in digital formats consumes more time, as educators adapt to new technologies and tools.** | 257 | 5 |
| 5. **Slow internet connectivity disrupts the lesson planning process and leads to frustration.** | 143 | 1 |

It means that the most significant challenge encountered by teachers during lesson plan preparation is slow internet connectivity. This disruption may have a considerable impact on the lesson planning process. Teachers rely on the internet for access to resources, communication, and research. Slow connectivity may impede their efficiency and lead to frustration. Another notable challenge is the limited access to ICT resources. This may encompass a shortage of computers, software, or other essential tools needed for lesson planning. The limited availability of resources may hinder teachers from effectively integrating technology into their lesson plans. Teachers also encounter difficulties related to the inaccessibility of specific software, digital content, or online platforms. This may be attributed to factors such as costs, availability, or restrictions on access. The unavailability or unaffordability of these resources may limit teachers' ability to create engaging and interactive lesson plans.

Based on teachers' actual experiences, there were times when accessing online learning materials was impossible due to slow internet connectivity. Teachers had to search for alternative online resources to create an effective lesson plan. Due to poor connectivity, teachers would only rely on readily available materials, which might be insufficient for planning their lessons. Teachers employ several strategies to address poor connectivity challenges during lesson preparation. They download crucial resources in advance, ensuring accessibility even with unstable internet during lessons. Collaboration with colleagues for resource sharing is common, reducing the individual burden on teachers with connectivity issues. Lesson planning is strategically scheduled during periods of better connectivity. Many teachers invest in mobile hotspots or use personal mobile data as a backup solution for internet connectivity. These adaptive measures help ensure seamless lesson preparation despite connectivity constraints.

This result is supported by the study of Almanthari et al. (2020) that have observed that teachers are encountering obstacles due to a lack of internet access and available devices during the implementation of e-learning. Domingo (2020) reported the NTC data that as of October 2020, the Philippines' fixed broadband speed is ranked 32nd in Asia, while its mobile internet speed placed 34th out of 50 countries in the continent. Moreover, the country's internet speed in Southeast Asia is only about a tenth of regional leader Singapore's 229.42 Mbps speed for fixed broadband, and 64 Mbps speed for mobile connection.

Delivery of Lesson. The sum of ranks and rank of the problems encountered by the teachers along delivery of lesson are contained in Table 4B.

***Table 4B.*** *Problems encountered by the teachers in ICT integration along delivery of lesson*

| Problems Encountered | Sum of Ranks | Rank |
|---|---|---|
| **1. Online or technology-integrated lessons are disrupted due to technical issues, leading to interruptions and frustration for both teachers and students.** | 217 | 3 |
| **2. Maintaining student engagement and interaction is difficult in an online or blended learning environment due to limited face-to-face interactions and peer-to-peer engagement.** | 209 | 2 |
| **3. The digital literacy of students and teachers is at different levels, making it challenging to navigate and use ICT tools effectively for instruction.** | 235 | 4.5 |
| **4. Students have unequal access to the necessary ICT tools, creating disparities in participation and engagement.** | 169 | 1 |
| **5. Content is not effectively delivered through ICT tools, especially for hands-on T.L.E. subjects.** | 235 | 4.5 |

The primary challenge reported by teachers creates disparities in participation and engagement in the learning process. Students with limited access may struggle to fully engage in online or technology-integrated lessons, potentially impacting their learning outcomes. The second-ranked challenge pertains to the maintenance of student engagement and interaction in online or blended learning environments. Limited face-to-face interactions and peer-to-peer engagement may make it challenging for teachers to keep students actively engaged in the learning process. This is particularly important for sustaining motivation and effective learning. Teachers also face challenges related to technical issues that disrupt online or technology-

integrated lessons. These issues may result in interruptions and frustration for both teachers and students. Technical disruptions may hinder the smooth delivery of lessons and impact the overall learning experience.

When queried about concrete scenarios that highlighted unequal access to essential ICT tools among their students, teachers shared the following insights: when a teacher assigns an online research project or collaborative activity, students without personal devices may encounter challenges participating fully, resulting in disparities in engagement. Furthermore, discrepancies arise as some students benefit from dedicated study spaces, quiet environments, and parental support for ICT-related tasks, whereas others lack these resources, impacting their ability to fully engage in virtual classes or complete online assignments. Additionally, financial barriers hinder certain students' access to necessary ICT tools. Moreover, some students struggle with navigating various ICT tools due to a lack of essential skills, a challenge exacerbated by their limited access to these ICT devices.

To tackle the challenges faced by students lacking personal devices and disparities in online engagement, teachers implemented a device-sharing program, enabling students with personal devices to voluntarily share with those without. They also introduced alternative assignment options to accommodate students with limited device access. Additionally, a structured schedule for shared device access was established within the classroom, ensuring equal opportunities for all students. The implementation of peer-assisted learning further encouraged students with stronger ICT skills to support their peers.

This result is similar to the study of Muthuprasad et al. in 2021 stating that the slow internet connection leads to frustration among learners when attempting to access learning platforms and materials. Students in rural areas experience interruptions in their participation in online learning activities, primarily caused by inadequate internet connectivity. Insufficient internet connectivity frequently leads to interrupted participation in online classes and activities. Students may experience frequent disconnections, buffering issues, and overall instability, which disrupt the flow of their learning experience.

Assessment. Table 4C presents the sum of ranks and rank of the problems encountered by the teachers along assessment.

***Table 4C.*** *Problems encountered by the teachers in ICT integration along assessment*

| Problems Encountered | Sum of Ranks | Rank |
|---|---|---|
| **1. Internet connectivity problems disrupt online assessments.** | 186 | 1 |
| **2. Cheating and unauthorized access to assessment materials is not prevented.** | 201 | 2 |
| **3. Unequal access to ICT resources creates disparities in students' ability to participate and perform well.** | 207 | 4 |
| **4. Authentic assessment in T.L.E. subjects is not achievable because it involves hands-on or practical skills that are difficult to replicate in an online or remote setting.** | 204 | 3 |
| **5. Students with diverse learning needs, including those with disabilities, are not accommodated in online assessments.** | 263 | 5 |

This would imply that addressing internet connectivity problems is crucial. Schools and institutions should invest in robust internet infrastructure to ensure reliable access for both teachers and students during assessments. To combat cheating and unauthorized access, educational institutions should implement secure online assessment platforms that include features like remote proctoring, time limits, and secure assessment materials. Given the challenges of achieving authentic assessment in hands-on subjects online, educators may need to adapt their assessment methods. This might involve incorporating video submissions, real-world projects, or virtual labs to evaluate practical skills. Teachers may benefit from training and professional development opportunities to enhance their skills in conducting online assessments, preventing cheating, and adapting assessment methods to suit different subjects.

According to teachers' actual experiences, when Internet connectivity problems disrupt online assessments, here are their reported issues: delays in students submitting their assessments; challenges faced

by some students in starting or finishing assessments; loss of progress by students with unstable internet connectivity; difficulties in promptly loading assessment instructions; challenges in real-time assessments, such as quizzes with time constraints, for some students; increased anxiety and stress among students when faced with internet connectivity problems during assessments; and, of course, difficulties for teachers in providing timely feedback to students due to internet-related disruptions.

In response to teachers' concerns about Internet connectivity issues during online assessments, various solutions have been implemented. One approach involves providing offline options for assessments, allowing students to download and complete tasks without requiring real-time internet connectivity. Additionally, the submission windows for online assessments have been extended to accommodate potential delays caused by connectivity issues. To address interruptions during timed assessments, a buffer time has been applied to account for potential internet disruptions. Furthermore, educators have explored alternative assessment formats that are less reliant on real-time internet connectivity, including project submissions, written assignments, or recorded presentations. These strategies aim to mitigate the impact of connectivity challenges on the assessment process and ensure a fair and accessible evaluation for all students.

In general, assessment is regarded as an effective measure of both the quality and progress in online learning, as stated by Babbar and Gupta in 2021. Nonetheless, the utility of assessments, even when crafted by experts to elicit specific performances, hinges on digital infrastructure and home conditions that facilitate two-way communication and feedback between students and faculty for seamless and unrestricted learning to occur, as noted by Yan and Carless in 2021. Surprisingly, not enough consideration has been devoted to the impact of internet connectivity on students' ability to meet the expectations of online assessments. While assessments aid faculty in making informed decisions about students' progress, as emphasized by Carless and Winstone in 2020, situations where students are unable to submit assessments promptly due to poor Wi-Fi reception or internet connectivity may lead faculty to apply penalties indiscriminately, which contradicts the intended functioning of the feedback mechanism.

Monitoring. The sum of ranks and rank of the problems encountered by the teachers during monitoring are presented in Table 4D.

***Table 4D.*** *Problems encountered by the teachers in ICT integration along monitoring*

| Problems Encountered | Sum of Ranks | Rank |
|---|---|---|
| **1. Technical issues disrupt the monitoring process, leading to data inconsistencies and frustration.** | 153 | 1 |
| **2. The monitoring tools are not effectively used due to a lack of digital skills among the teachers.** | 213 | 2 |
| **3. Students' engagement is not properly measured because of ineffective monitoring strategies.** | 220 | 3 |
| **4. Appropriate monitoring tools aligned with T.L.E. instructional goals are not properly selected and implemented.** | 246 | 5 |
| **5. Technical support to teachers and students is not timely.** | 234 | 4 |

It means that the primary challenge reported by teachers is the disruption of the monitoring process due to technical issues. This issue may lead to inconsistencies in data and, more importantly, frustration among teachers. Technical problems may hinder the smooth flow of monitoring and may impact the reliability of the data collected. The second-ranked challenge is the underutilization of monitoring tools due to a lack of digital skills among teachers. This highlights the importance of teacher training and professional development to ensure that educators may effectively navigate and utilize digital tools for monitoring purposes. The third significant challenge revolves around the measurement of student engagement. Teachers indicate that ineffective monitoring strategies result in the inability to properly measure students' engagement. Accurately assessing student engagement

is essential for understanding and improving the learning process.

Teachers highlighted various challenges they encountered, including server crashes or platform glitches that resulted in the loss of monitored data. Additionally, interruptions and disconnections during virtual monitoring sessions were reported, preventing teachers from obtaining real-time insights into students' activities. Another issue mentioned was server delays or system lags, rendering teachers unable to access real-time information on students' progress, thereby hindering their ability to provide timely support. Login errors or system outages were identified as obstacles, preventing teachers from accessing monitoring platforms. Finally, instances of system downtime or crashes were reported, compromising the monitoring process and creating challenges in ensuring a fair and secure assessment environment.

To address challenges faced during virtual monitoring, the following solutions have been implemented: Alternative platforms were introduced to mitigate the impact of server crashes or glitches, ensuring the preservation of monitored data through online storage devices like Google Drive or the cloud. Additionally, a scheduling system was adopted to minimize system lags and enhance the accessibility of real-time information on students' progress by having specific teachers online at designated times.

The study by Ookla in 2021 found that the Philippines ranked in the top 90 out of 138 as one of the slowest countries when it comes to internet connection speed. Pelgrum (2001) conducted a study involving practitioners from 26 countries to understand the primary obstacles to implementing ICT in schools. He found that four of the top ten barriers were associated with ICT accessibility. These included insufficient quantities of computers, limited peripheral devices, a shortage of software licenses, and inadequate immediate Internet access.

Reports Preparation. Table 4E lists the sum of ranks and rank of the problems encountered by the teachers along reports preparation.

***Table 4E.*** *Problems encountered by the teachers in ICT integration along reports preparation*

| Problems Encountered | Sum of Ranks | Rank |
|---|---|---|
| **1. The reports preparation process is disrupted due to technical issues, leading to delays and frustration.** | 204 | 2 |
| **2. The digital resources for report generation are not available.** | 218 | 4 |
| **3. Data privacy and security are compromised due to data protection regulations.** | 200 | 1 |
| **4. The reports are not user-friendly and are not easy to understand, especially for stakeholders with varied levels of digital literacy.** | 235 | 5 |
| **5. Teachers and administrators do not have proper training on how to effectively use digital tools for report generation and analysis.** | 208 | 3 |

It means that the primary challenge reported by teachers is the compromise of data privacy and security due to data protection regulations. This issue is of critical importance, as it pertains to the safeguarding of sensitive student data. Failure to comply with data protection regulations may have legal and ethical implications. The second-ranked challenge is the disruption of the reports preparation process due to technical issues. These issues may lead to delays and frustration among teachers. Technical disruptions may impede the smooth and efficient generation of reports, impacting the overall workflow. The third significant challenge is the lack of proper training for both teachers and administrators on how to effectively use digital tools for report generation and analysis. This emphasizes the importance of professional development programs that enhance digital literacy and competence in using these tools.

When teachers were asked about their actual experiences with data privacy and security being compromised due to data protection regulations during reports preparation, here are their answers: While preparing electronic grade reports, a teacher inadvertently sends a spreadsheet containing student grades to the wrong email list, compromising the privacy of individual student performance data. Another instance involves a teacher storing digital copies of student assessments, including detailed feedback, on a shared drive without proper encryption. Additionally, during the reports preparation process, a teacher

overlooks redacting personally identifiable information such as home addresses or contact numbers. Teachers also engage in the exchange of reports or sensitive information via unsecured email channels. Furthermore, digital copies of student reports are stored on a teacher's personal device without adequate security measures. In the event of device theft or loss, there is a risk of unauthorized access to students' confidential information.

To address the reported instances of data privacy and security compromise during reports preparation, the following solutions have been applied: Implemented stringent verification measures before sending electronic grade reports to prevent inadvertent sharing with the wrong email list. Ensured proper encryption and secure storage practices for digital copies of student assessments, including detailed feedback, stored on shared drives. Emphasized the importance of redacting personally identifiable information, such as home addresses or contact numbers, during the reports preparation process. Encouraged the use of secure channels for the exchange of reports or sensitive information, avoiding unsecured email channels. Implemented security measures for storing digital copies of student reports on personal devices, such as password protection or encryption, to mitigate the risk of unauthorized access in case of device theft or loss. Educational data, particularly data concerning school and staff performance, are highly sensitive due to their potential impact on future hiring decisions and their broader implications in society (UNESCO, 2018a). Educational and personal data of students and parents are more vulnerable to commercial data mining.

***3) Proposed Learning Continuity Plan to Enhance ICT Integration in TLE Instruction***

The primary goal of this learning continuity plan is to seamlessly integrate ICT into TLE instruction, ensuring that students have uninterrupted access to high-quality education, regardless of physical or logistical constraints.

***Specific Objectives***

1. Enhance the digital literacy skills of TLE teachers, enabling them to effectively integrate ICT tools into their instructional practices.
2. Ensure that all TLE classrooms and learning spaces are equipped with reliable internet connectivity and appropriate ICT devices.
3. Create a digital repository of TLE resources, including interactive modules, multimedia content, and instructional materials.

## IV. CONCLUSION AND RECOMMENDATIONS

Based on the findings of the study, the researcher arrived at the following conclusions:

1. The ICT resources along software used by teachers during suspension of classes are Facebook/Messenger, WIFI/Internet, and Google Meet. Similarly, the hardware resources are Smartphone, laptop, and printer.
2. The teachers very highly perceived that there is ICT integration in lesson plan preparation, delivery of lesson, and reports preparation. However, they highly perceived that ICT is integrated in assessment and monitoring.
3. The foremost problems encountered by the teachers in ICT integration are the slow internet connectivity which disrupts the lesson planning process, the unequal access of the students to ICT tools, disrupted online assessments caused by poor internet access, inconsistent data during monitoring process due to technical issues, and compromised data privacy and security.

### RECOMMENDATIONS

In the light of foregoing conclusions, the following recommendations were offered:

1. The school heads may provide additional ICT resources which are regularly utilized by the teachers and give in-house training on the online learning platforms used during asynchronous modality.
2. The teachers may sustain collaboration among TLE teachers and administrators to share best practices and experiences in ICT integration, creating a supportive community of learners.
3. The school heads may address the problems encountered by the teachers in ICT integration to deliver engaging and effective lessons.
4. The learning continuity plan may be submitted to the concerned authorities for further review and evaluation prior to its approved adoption and implementation.
5. Further research may be conducted to cover other secondary school in the province and subject areas aside from Technology and Livelihood Education.

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