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# ICT UTILIZATION IN SCIENCE TEACHING

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## Abstract

This study examined the level of Information and Communication Technology (ICT) utilization in science teaching during the Calendar Year 2024–2025 in a small-sized Schools Division in Central Visayas, Philippines. Employing a descriptive research design, the study utilized a researcher-developed survey questionnaire to gather data from 60 science teachers from Clusters 1 and 2 of the division. Instrument reliability was established through pilot testing with 30 science teachers from Clusters 3 and 4 using Cronbach's alpha. Data were analyzed using frequency, percentage, and mean to describe the respondents' profiles and ICT utilization levels, while the Mann–Whitney U test was applied to determine significant differences between groups. Results revealed that most respondents possessed a modest level of educational attainment and had limited exposure to ICT-related professional training. Findings further indicated that teachers generally demonstrated a moderate to high level of ICT utilization in science teaching, particularly in the use of basic digital tools, multimedia presentations, and online resources. However, inconsistencies were observed in the frequency and effectiveness of ICT integration, especially in the use of advanced applications such as online collaborative platforms and gamified assessments. These limitations were attributed to inadequate training, insufficient technological resources, and unstable internet connectivity. Based on the findings, the study concludes that while science teachers show readiness and positive engagement in ICT integration, targeted support remains necessary to ensure consistent and effective utilization. The results call for an intervention plan focusing on continuous professional development, improved digital infrastructure, stakeholder collaboration, and teacher mentoring is therefore recommended to enhance ICT integration in science teaching.

***Keywords:*** ICT Utilization, science teaching, digital tools, teacher professional development, intervention plan, philippines

**Bio-notes:**

Khin Jaasiel Alipar is a Licensed Professional Teacher and an emerging public administration professional with a strong foundation in education and administrative practice. A graduate of Bachelor of Elementary Education from Saint Joseph College Incorporated, he gained meaningful teaching experience before transitioning into administrative and service-oriented roles that strengthened his adaptability, communication, and digital competencies. He currently serves as an Administrative Officer II at Jose B. Cardenas Memorial High School – Uptown Campus, where he applies his skills in organization, coordination, and stakeholder support. Khin Jaasiel is presently pursuing a Master's Degree in Administration/Supervision at STI West Negros University, reflecting his commitment to professional growth and leadership development. With experience spanning teaching, customer service, online education, and administrative work, he demonstrates flexibility, teamwork, and technological proficiency, positioning himself as a capable professional in both the educational and administrative sectors.

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## Introduction

### Rationale

The integration of Information and Communication Technology (ICT) in science teaching has been recognized as an important factor in enhancing instructional delivery, promoting student engagement, and supporting meaningful learning experiences; studies show that ICT can transform traditional science instruction into more interactive and learner-centered approaches (Mahinay & Dulay, 2025). However, the extent to which science teachers consistently and effectively utilize ICT remains uncertain in many Philippine schools due to barriers such as inadequate technological infrastructure, poor internet connectivity, limited access to up-to-date digital tools, and insufficient ICT-related training for teachers. These challenges hinder the seamless integration of ICT across instructional delivery, online learning resources, and assessment practices, while also affecting teacher readiness and confidence in using digital tools to enhance student learning (Alpuerto, 2019). Given these persistent gaps, there is a need to systematically examine the current level of ICT utilization in science teaching and identify influencing factors to better understand how ICT integration may be optimized. This aimed to ensure inclusive and equitable quality education and promote digital literacy and skills development for lifelong learning (United Nations, 2015).

### Literature Review

Existing literature affirms that ICT integration in science education positively influences student motivation, conceptual understanding, and independent learning through interactive simulations, multimedia resources, and digital assessments (Castro, 2015; Teo, 2016; Bell & Trundle, 2017). Studies further indicate that teachers' educational attainment, length of service, and exposure to ICT-related training significantly affect their ability to integrate technology effectively in classroom instruction (Darling-Hammond et al., 2017; Kini & Podolsky, 2016). However, research also highlights persistent barriers, particularly in developing contexts, including insufficient training opportunities, lack of technical support, and limited access to digital resources (Ghavifekr & Athirah, 2014; Paje et al., 2021). While these studies provide valuable insights, there remains a gap in localized empirical data that examines ICT utilization in science teaching within small-sized school divisions, emphasizing the need for context-specific investigations.

### Theoretical Underpinnings

This study is anchored on the Technology Acceptance Model (TAM) proposed by Davis (1989), which explains users' acceptance and utilization of technology based on perceived usefulness and perceived ease of use. In the context of science teaching, TAM provides a framework for understanding how teachers' perceptions of ICT influence their willingness to integrate digital tools into instructional delivery, online learning, and assessment practices. When teachers perceive ICT as beneficial to improving student learning outcomes and consider it easy to use, they are more likely to adopt and sustain its use in their teaching practices. The model supports the premise that enhancing teachers' ICT skills, access to resources, and training opportunities can positively influence their acceptance of technology. Thus, TAM serves as a theoretical basis for identifying factors affecting ICT utilization and for designing an intervention plan aimed at strengthening technology integration in science education.

### Objectives

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This study aimed to determine the level of ICT utilization in science teaching in a small-sized Division of Central Visayas during the SY 2024-2025. More specifically, it aimed to determine (1) the level of ICT utilization in science teaching according to instructional delivery, online learning & digital resources, and learning assessment; (2) the level of ICT utilization in science teaching when grouped according to the aforementioned variables; and (3) whether a significant difference exists in the level of ICT utilization in science teaching when grouped and compared according to the aforementioned variables.

## Methodology

The study's methodology-related components, such as the research design, respondents, research instrument, data collection process, and ethical issues, are described in this section.

### Research Design

This study used a descriptive research design to evaluate the level of ICT utilization in teaching science, as a basis for an intervention plan during the Calendar Year 2024-2025 in a small-sized division of Central Visayas, Philippines. Descriptive research is designed to observe, describe, and document the characteristics of a phenomenon or situation as they naturally occur (Creswell, 2014). This involves gathering data that accurately reflects the unit of study, and then systematically arranging, summarizing, and analyzing the data to identify patterns or trends.

### Respondents

The respondents in this project were 60 teachers carefully selected by the researcher. This method was used because it allows for choosing individuals likely to offer meaningful insights, aligning with what the research aims to explore. As Palys mentioned back in 2008, targeting certain participants makes sense when they have extensive experience related to the topic being studied. Likewise, according to Etikan and team in 2016, narrowing down choices based on key traits helps gather detailed info worth analyzing.

### Data-gathering Instrument

The instrument underwent rigorous face and content validation by three experts in research and education to ensure its accuracy in measuring the intended demographics. The validation process yielded a final validity score of 4.55, interpreted as excellent. Cronbach's Alpha was used to determine the reliability of the instrument and its internal consistency. The reliability coefficient of 0.952 is considered "acceptable" in most research situations.

### Procedures for Data Collection

The researcher sought permission from the concerned authorities and secured the necessary endorsements before administering the questionnaires to gather the required data. The research title was first approved by the thesis committee headed by the Dean of the School of Graduate Studies of STI West Negros University. After approval, the researcher requested permission through formal letters addressed to the district supervisor and the school heads, asking to conduct the study and distribute the questionnaires to the target respondents.

Upon approval, the questionnaires were distributed to the identified respondents, and the researcher personally facilitated the retrieval of the completed forms to ensure completeness and accuracy

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of the responses. The collected data were carefully organized and subjected to analysis, and the results served as the basis for the formulation of a proposed intervention plan.

### Data Analysis and Statistical Treatment

Objective 1 used the descriptive analytical scheme and mean as a statistical tool to determine the level of ICT utilization in science teaching across instructional delivery, online learning, digital resources, and learning assessment. Objective 2 used the same analytical scheme and statistical tool to determine the level of ICT utilization in science teaching when grouped according to the aforementioned variables. Finally, objectives 3 used the comparative analytical schemes and Mann-Whitney U tests as statistical tools to determine whether significant differences exist in the level of ICT utilization in science teaching when the data were grouped and compared according to the aforementioned variables.

### Ethical Considerations

This study ensured that those who provide data for the research are protected from any risk of harm resulting from the research work, by, among other things, keeping their responses confidential and their identities anonymous throughout the research process. The researcher personally obtains the consent that is free, prior, and informed from the participants and assures them of their right to discontinue their participation in the study at any time if they so wish. No personal data compromising the respondents' identities was collected, in adherence to the Data Privacy Act of 2012, specifically regarding access to the data by both the researcher and the analyst. The respondents were assured that no information that would disclose their identity would be released or published without their consent, except in exceptional circumstances. All collected materials were disposed of appropriately, either by machine shredding or dissolved in water, after the study was submitted. At the same time, soft copies of the data were deleted, ensuring that there was no chance of future retrieval.

## Results and Discussion

### Level of ICT Utilization in Science Teaching in Instructional Delivery, Online Learning and Digital Resources, and Learning Assessment

**Table 1**
*Level of ICT Utilization in Science Teaching in Instructional Delivery*

| **Items** *As a teacher, I …* | **Mean** | **Interpretation** |
|---|---|---|
| 1. use ICT tools (e.g., PowerPoint, simulations, interactive whiteboards) to enhance my science lessons. | 4.60 | Very High |
| 2. integrate multimedia content (videos, animations, simulations) to explain scientific concepts. | 4.45 | High |
| 3. utilize ICT to deliver differentiated instruction that accommodates diverse learners. | 4.53 | Very High |
| 4. encourage students to use ICT for exploring scientific ideas and concepts. | 4.38 | High |
| 5. utilize online collaborative tools (such as Google Docs, Padlet, and Jamboard) for class discussions and group work. | 3.63 | High |

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| | | | |
|---|---|---|---|
| 6. | integrate virtual labs and simulations to enhance students' practical understanding. | 3.95 | High |
| 7. | conduct synchronous and asynchronous discussions using ICT platforms (Google Meet, Zoom, Microsoft Teams). | 3.88 | High |
| 8. | use educational apps and platforms (Kahoot, Quizizz, PhET Simulations) to make learning interactive. | 3.71 | High |
| 9. | implement ICT-based inquiry-based learning strategies in science teaching. | 4.13 | High |
| 10. | provide ICT-based instructional materials to supplement classroom discussions. | 4.31 | High |
| **Mean** | | **4.16** | **High** |

Table 1 presents the level of ICT utilization in science teaching in instructional delivery. The respondents obtained an overall mean score of 4.16, interpreted as a high level. The results indicate that the use of online collaborative tools (Google Docs, Padlet, Jamboard) yielded the lowest mean score of 3.63, although still interpreted as High, implying that teachers and learners may not yet be fully maximizing these platforms in classroom instruction. This may be due to external factors, such as unstable internet connectivity or limited access to devices, or internal factors, including a lack of technical proficiency and confidence in integrating technology into teaching and learning. The results are supported by Carandang and Ortiz (2019), who emphasize the lack of adequate teacher training in rural areas as a significant challenge to ICT integration. Many teachers in rural schools have limited exposure to ICT training programs, and those that are available often fail to address the specific needs of science educators. This lack of training leaves teachers feeling ill-equipped to incorporate technology into their teaching practices, especially when it comes to using digital simulations, virtual laboratories, and interactive platforms that are essential in science education. Without the necessary skills and confidence to use ICT effectively, teachers are unable to maximize the potential benefits of technology for their students.

**Table 2**
*Level of ICT Utilization in Science Teaching in Online Learning and Digital Resources*

| **Items** *As a teacher, I …* | | **Mean** | **Interpretation** |
|---|---|---|---|
| 1. | utilize online science resources (e-books, research articles, digital encyclopedias) for lesson preparation. | 4.05 | High |
| 2. | use Learning Management Systems (Google Classroom, Moodle, Edmodo) to manage learning resources. | 3.83 | High |
| 3. | encourage students to access open educational resources for science topics. | 4.38 | High |
| 4. | integrate digital simulations and virtual experiments into my lessons. | 4.11 | High |
| 5. | provide students with links to credible science websites for independent learning. | 4.23 | High |
| 6. | utilize ICT tools for real-time collaboration and knowledge sharing among students. | 4.18 | High |
| 7. | guide students in using search engines effectively to find relevant scientific information. | 4.28 | High |
| 8. | provide digital assessments (quizzes, online assignments, interactive exercises) to reinforce learning. | 4.16 | High |
| 9. | encourage students to create digital presentations and reports for science projects. | 4.28 | High |
| 10. | use social media and science-related forums to engage students in discussions on scientific topics. | 4.23 | High |
| **Mean** | | 4.17 | **High** |

Table 2 presents the level of ICT utilization in science teaching, including online learning and digital resources. The respondents obtained an overall mean score of 4.17, interpreted as a high level. The

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mean score of 3.83, interpreted as *High*, for the use of Learning Management Systems (Google Classroom, Moodle, Edmodo) indicates that teachers are effectively utilizing these platforms to organize and manage learning resources. This suggests that LMS integration has become a regular part of classroom practice, supporting efficient distribution of materials, monitoring of student progress, and facilitation of communication. However, while the result reflects strong adoption, it also implies the need for continuous enhancement of teachers' digital skills to ensure that these systems are not only used for resource management but also maximized for interactive and engaging learning experiences. The result is supported by Zhou et al. (2017), who argued that ICT facilitates differentiated instruction, allowing teachers to tailor lessons and activities to individual student needs. For example, students who struggle with certain concepts can utilize ICT tools to access additional resources, tutorials, or practice exercises, ensuring they receive the support they need to succeed.

**Table 3**
*Level of ICT Utilization in Science Teaching in Learning Assessment*

| **Items** *As a teacher, I …* | **Mean** | **Interpretation** |
|---|---|---|
| 1. use online quizzes and formative assessments to measure students' understanding. | 4.01 | High |
| 2. incorporate ICT tools for real-time feedback and assessment in science classes. | 3.83 | High |
| 3. utilize digital portfolios to track students' progress over time. | 4.08 | High |
| 4. assess students' learning using interactive and gamified online assessments (Quizizz, Kahoot, Socrative). | 3.81 | High |
| 5. design online rubrics to evaluate students' projects and presentations. | 4.18 | High |
| 6. Provide immediate feedback through digital platforms. | 4.16 | High |
| 7. use ICT tools (Google Forms, MS Forms) for gathering and analyzing student responses. | 4.23 | High |
| 8. encourage students to engage in self-assessment using digital platforms. | 4.13 | High |
| 9. implement peer assessment using online collaborative tools. | 4.06 | High |
| 10. analyze student performance using data from ICT-based assessments to inform instruction improvement. | 4.33 | High |
| **Mean** | 4.08 | **High** |

Table 3 presents the level of ICT utilization in science teaching for learning assessment. The respondents obtained an overall mean score of 4.08, interpreted as a high level. For the use of interactive and gamified online assessments such as Quizizz, Kahoot, and Socrative, indicates that teachers recognize the value of technology in making assessments more engaging and motivating for students. This suggests that gamified tools are being integrated into classroom practice, fostering active participation and immediate feedback. However, the result also implies that while teachers are open to such approaches, there may still be limitations in terms of accessibility, familiarity with advanced features, or alignment with deeper learning outcomes. The result is supported by De Guzman and Martinez (2021), who found that students who engaged with ICT resources, such as interactive tutorials and online science platforms, performed better in assessments compared to those taught using traditional methods. The interactive nature of these digital resources encourages active learning, which has been shown to boost comprehension and retention. Additionally, ICT enables teachers to provide personalized learning experiences, allowing students to progress at their own pace and revisit challenging topics as needed.

**Level of ICT Utilization in Science Teaching in Instructional Delivery, Online Learning and Digital Resources, and Learning Assessment when grouped according to Age, Highest Educational Attainment, Length of Service, and Number of ICT-Related Trainings**

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**Table 4**
*Level of ICT Utilization in Science Teaching in Instructional Delivery when grouped according to Age*

| Items | Younger Mean | Interpretation | Older Mean | Interpretation |
|---|---|---|---|---|
| ***As a teacher, I ...*** | | | | |
| 1. use ICT tools (e.g., PowerPoint, simulations, interactive whiteboards) to enhance my science lessons. | 4.55 | Very High | 4.64 | Very High |
| 2. integrate multimedia content (videos, animations, simulations) to explain scientific concepts. | 4.34 | High | 4.54 | Very High |
| 3. utilize ICT to deliver differentiated instruction that accommodates diverse learners. | 4.37 | High | 4.67 | Very High |
| 4. encourage students to use ICT for exploring scientific ideas and concepts. | 4.27 | High | 4.48 | High |
| 5. utilize online collaborative tools (such as Google Docs, Padlet, and Jamboard) for class discussions and group work. | 3.65 | High | 3.61 | High |
| 6. integrate virtual labs and simulations to enhance students' practical understanding. | 4.20 | High | 3.70 | High |
| 7. conduct synchronous and asynchronous discussions using ICT platforms (Google Meet, Zoom, Microsoft Teams). | 3.93 | High | 3.83 | High |
| 8. use educational apps and platforms (Kahoot, Quizizz, PhET Simulations) to make learning interactive. | 3.79 | High | 3.64 | High |
| 9. implement ICT-based inquiry-based learning strategies in science teaching. | 4.20 | High | 4.06 | High |
| 10. provide ICT-based instructional materials to supplement classroom discussions. | 4.31 | High | 4.32 | High |
| **Mean** | 4.16 | **High** | 4.15 | **High** |

Table 4 presents the data on the level of ICT utilization in science teaching during instructional delivery, grouped by age. Younger respondents obtained an overall mean of 4.16, indicating a high level, while older respondents obtained an overall mean of 4.15, also indicating a high level. The result implies that both younger and older respondents seldom use online collaborative tools for class discussions and group work. Besides the lack of gadgets for learners, some teachers also lack confidence in using online collaborative tools to deliver instructions in science subjects. This hesitation may hinder the potential for enhancing engagement and collaboration among students. Addressing these barriers through targeted training and resources could lead to more effective integration of technology in the classroom. The result relates to that of Santos and Cruz (2020), revealing that a significant number of science educators in the country lack the necessary skills and confidence to fully utilize ICT tools for teaching scientific concepts. Although many teachers are familiar with basic technology, they often struggle to incorporate it meaningfully into their lessons, particularly when it comes to the more specialized applications needed in science education. This gap in teacher preparedness can hinder the potential benefits of ICT in enhancing student learning outcomes in science.

**Table 5**
*Level of ICT Utilization in Science Teaching in Instructional Delivery when grouped according to the Highest Educational Attainment*

| Items | Lower Mean | Interpretation | Higher Mean | Interpretation |
|---|---|---|---|---|
| ***As a teacher, I ...*** | | | | |
| 1. use ICT tools (e.g., PowerPoint, simulations, interactive whiteboards) to enhance my science lessons. | 4.53 | Very High | 4.76 | Very High |

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|---|---|---|---|---|
| 2. integrate multimedia content (videos, animations, simulations) to explain scientific concepts. | 4.34 | High | 4.70 | Very High |
| 3. utilize ICT to deliver differentiated instruction that accommodates diverse learners. | 4.46 | High | 4.70 | Very High |
| 4. encourage students to use ICT for exploring scientific ideas and concepts. | 4.32 | High | 4.52 | Very High |
| 5. utilize online collaborative tools (such as Google Docs, Padlet, and Jamboard) for class discussions and group work. | 3.69 | High | 3.47 | Moderate |
| 6. integrate virtual labs and simulations to enhance students' practical understanding. | 4.11 | High | 3.52 | High |
| 7. conduct synchronous and asynchronous discussions using ICT platforms (Google Meet, Zoom, Microsoft Teams). | 3.81 | High | 4.05 | High |
| 8. use educational apps and platforms (Kahoot, Quizizz, PhET Simulations) to make learning interactive. | 3.53 | High | 4.17 | High |
| 9. implement ICT-based inquiry-based learning strategies in science teaching. | 4.09 | High | 4.23 | High |
| 10.provide ICT-based instructional materials to supplement classroom discussions. | 4.27 | High | 4.41 | High |
| **Mean** | 4.12 | **High** | 4.25 | **High** |

Table 5 presents the data on the level of ICT utilization in science teaching during instructional delivery, grouped by highest educational attainment. Respondents with lower educational attainment had an overall mean of 4.12, indicating a high level of ICT utilization. In comparison, respondents with higher educational attainment had an overall mean of 4.25, also interpreted as a high level. The results imply that respondents with lower educational backgrounds were less likely to utilize educational apps and platforms as didactic tools in teaching science. In comparison, respondents with higher educational backgrounds showed less confidence in using online collaborative tools for classroom discussions and group learning activities. A lack of ICT proficiency among educators is another critical barrier to the integration of technology in science education. As UNESCO (2015) highlights, many teachers in developing countries have limited training in using ICT tools effectively, which undermines their ability to incorporate technology into their teaching practices. Teachers who lack confidence in their technological skills may avoid using ICT altogether, opting instead for traditional teaching methods. This lack of ICT proficiency also extends to the development of digital content and resources, which requires both technical expertise and pedagogical knowledge. Without sufficient training and professional development opportunities, teachers may struggle to maximize the impact of ICT on student learning.

**Table 6**

*Level of ICT utilization in Science Teaching in Instructional Delivery when grouped according to Length of Service*

| Items | Shorter Mean | Interpretation | Longer Mean | Interpretation |
|---|---|---|---|---|
| ***As a teacher, I ...*** | | | | |
| 1. use ICT tools (e.g., PowerPoint, simulations, interactive whiteboards) to enhance my science lessons. | 4.57 | Very High | 4.62 | Very High |
| 2. integrate multimedia content (videos, animations, simulations) to explain scientific concepts. | 4.39 | High | 4.5 | Very High |
| 3. utilize ICT to deliver differentiated instruction that accommodates diverse learners. | 4.39 | High | 4.65 | Very High |

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| 4. encourage students to use ICT for exploring scientific ideas and concepts. | 4.39 | High | 4.37 | High |
| 5. utilize online collaborative tools (such as Google Docs, Padlet, and Jamboard) for class discussions and group work. | 3.60 | High | 3.65 | High |
| 6. integrate virtual labs and simulations to enhance students' practical understanding. | 4.10 | High | 3.81 | High |
| 7. conduct synchronous and asynchronous discussions using ICT platforms (Google Meet, Zoom, Microsoft Teams). | 3.96 | High | 3.81 | High |
| 8. use educational apps and platforms (Kahoot, Quizizz, PhET Simulations) to make learning interactive. | 3.71 | High | 3.71 | High |
| 9. implement ICT-based inquiry-based learning strategies in science teaching. | 4.03 | High | 4.21 | High |
| 10. provide ICT-based instructional materials to supplement classroom discussions. | 4.32 | High | 4.31 | High |
| **Mean** | 4.15 | **High** | 4.16 | **High** |

Table 6 presents the data on the level of ICT utilization in science teaching during instructional delivery, grouped by length of service. Respondents with shorter years of service obtained an overall mean of 4.15, interpreted as a high level. In comparison, respondents with longer years of service obtained an overall mean of 4.16, also interpreted as a high level. The finding implies that both novice and tenured teachers showed less mastery in the use of online collaborative tools for class discussions and group work activities. This suggests that there may be a gap in training or resources available to teachers at all experience levels, highlighting the importance of professional development in effectively utilizing technology for collaborative learning. Addressing this issue could enhance the overall educational experience for both teachers and learners. According to Soriano (2018), the integration of ICT, particularly in science education, provides students with opportunities to engage in hands-on simulations and utilize digital resources that enhance their understanding of complex scientific concepts. These technological tools not only make learning more interactive but also offer new avenues for students to explore scientific principles in ways that traditional teaching methods cannot.

**Table 7**
*Level of ICT Utilization in Science Teaching in Instructional Delivery when grouped according to the Number of ICT-related Trainings*

| **Items** | **Fewer Mean** | **Interpretation** | **More Mean** | **Interpretation** |
|---|---|---|---|---|
| ***As a teacher, I ...*** | | | | |
| 1. use ICT tools (e.g., PowerPoint, simulations, interactive whiteboards) to enhance my science lessons. | 4.56 | Very High | 4.64 | Very High |
| 2. integrate multimedia content (videos, animations, simulations) to explain scientific concepts. | 4.40 | High | 4.5 | Very High |
| 3. utilize ICT to deliver differentiated instruction that accommodates diverse learners. | 4.43 | High | 4.63 | Very High |
| 4. encourage students to use ICT for exploring scientific ideas and concepts. | 4.40 | High | 4.35 | High |
| 5. utilize online collaborative tools (such as Google Docs, Padlet, and Jamboard) for class discussions and group work. | 3.65 | High | 3.60 | High |

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|---|---|---|---|---|
| 6. integrate virtual labs and simulations to enhance students' practical understanding. | 4.12 | High | 3.75 | High |
| 7. conduct synchronous and asynchronous discussions using ICT platforms (Google Meet, Zoom, Microsoft Teams). | 3.93 | High | 3.82 | High |
| 8. use educational apps and platforms (Kahoot, Quizizz, PhET Simulations) to make learning interactive. | 3.71 | High | 3.71 | High |
| 9. implement ICT-based inquiry-based learning strategies in science teaching. | 4.12 | High | 4.14 | High |
| 10. provide ICT-based instructional materials to supplement classroom discussions. | 4.31 | High | 4.32 | High |
| **Mean** | 4.16 | **High** | 4.15 | **High** |

Table 7 presents the data on the level of ICT utilization in science teaching during instructional delivery, grouped by the number of ICT-related trainings. Respondents who received few ICT training sessions obtained an overall mean of 4.16, indicating a high level of utilization. In contrast, respondents who received many ICT training sessions obtained an overall mean of 4.15, also indicating a high level. The result implies that both groups of respondents, regardless of the number of ICT-related trainings they received, were less likely to use online collaborative tools for class discussions and group work. This is because some teachers find it challenging to integrate online tools into lessons and learning activities in science subjects that primarily require hands-on approaches. The integration of ICT into the classroom supports the development of 21st-century skills among students, such as critical thinking, problem-solving, and digital literacy. According to the Department of Education (DepEd) Philippines (2020), incorporating technology into teaching not only improves academic performance but also prepares students for the digital demands of the workforce. By utilizing ICT tools, students can engage in interactive lessons, conduct online research, and collaborate with peers through digital platforms, thereby fostering a more collaborative and active learning approach. This approach is particularly valuable in science education, where hands-on experiments, data analysis, and collaborative problem-solving are essential components of the learning process.

**Table 8**
*Level of ICT Utilization in Science Teaching in Online Learning and Digital Resources when grouped according to Age*

| Items | Younger Mean | Interpretation | Older Mean | Interpretation |
|---|---|---|---|---|
| ***As a teacher, I ...*** | | | | |
| 1. utilize online science resources (e-books, research articles, digital encyclopedias) for lesson preparation. | 4.06 | High | 4.03 | High |
| 2. use Learning Management Systems (Google Classroom, Moodle, Edmodo) to manage learning resources. | 3.89 | High | 3.77 | High |
| 3. encourage students to access open educational resources for science topics. | 4.41 | High | 4.35 | High |
| 4. integrate digital simulations and virtual experiments into my lessons. | 4.24 | High | 4 | High |
| 5. provide students with links to credible science websites for independent learning. | 4.40 | High | 4.06 | High |
| 6. utilize ICT tools for real-time collaboration and knowledge sharing among students. | 4.27 | High | 4.09 | High |
| 7. guide students in using search engines effectively to find relevant scientific information. | 4.31 | High | 4.25 | High |
| 8. provide digital assessments (quizzes, online assignments, interactive exercises) to reinforce learning. | 4.31 | High | 4.03 | High |

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|---|---|---|---|---|
| 9. encourage students to create digital presentations and reports for science projects. | 4.34 | High | 4.22 | High |
| 10. use social media and science-related forums to engage students in discussions on scientific topics. | 4.24 | High | 4.22 | High |
| **Mean** | 4.25 | **High** | 4.10 | **High** |

Table 8 presents the data on the level of ICT utilization in science teaching in online learning and digital resources, grouped by age. Younger respondents obtained an overall mean of 4.25, indicating a high level, while older respondents obtained an overall mean of 4.10, also indicating a high level. The result implies that both younger and older respondents seldom use learning management systems to manage learning resources. The reason is that some learning activities in science subjects are not suitable for use in learning management systems, but rather are better suited to traditional teaching methods. The result relates to that of Rutten et al. (2014), who argue that digital simulations engage students in the scientific process by allowing them to make decisions, observe results, and refine their understanding through trial and error. Unlike traditional teaching methods, which often rely on passive learning, simulations encourage students to take an active role in their education. This interactive approach fosters critical thinking and problem-solving skills, as students must analyze data, draw conclusions, and adjust variables to observe the effects of their actions in real-time. This hands-on experience is essential for developing a deeper understanding of science.

**Table 9**

*Level of ICT Utilization in Science Teaching in Online Learning and Digital Resources when grouped according to Highest Educational Attainment*

| Items | Lower Mean | Interpretation | Higher Mean | Interpretation |
|---|---|---|---|---|
| ***As a teacher, I ...*** | | | | |
| 1. utilize online science resources (e-books, research articles, digital encyclopedias) for lesson preparation. | 4 | High | 4.17 | High |
| 2. use Learning Management Systems (Google Classroom, Moodle, Edmodo) to manage learning resources. | 3.83 | High | 3.82 | High |
| 3. encourage students to access open educational resources for science topics. | 4.37 | High | 4.42 | High |
| 4. integrate digital simulations and virtual experiments into my lessons. | 4.06 | High | 4.23 | High |
| 5. provide students with links to credible science websites for independent learning. | 4.27 | High | 4.11 | High |
| 6. utilize ICT tools for real-time collaboration and knowledge sharing among students. | 4.13 | High | 4.29 | High |
| 7. guide students in using search engines effectively to find relevant scientific information. | 4.23 | High | 4.41 | High |
| 8. provide digital assessments (quizzes, online assignments, interactive exercises) to reinforce learning. | 4.18 | High | 4.11 | High |
| 9. encourage students to create digital presentations and reports for science projects. | 4.23 | High | 4.41 | High |
| 10.use social media and science-related forums to engage students in discussions on scientific topics. | 4.20 | High | 4.29 | High |
| **Mean** | 4.15 | **High** | 4.22 | **High** |

Table 9 presents the data on the level of ICT utilization in science teaching in online learning and digital resources, grouped by highest educational attainment. Respondents with lower educational

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attainment had an overall mean of 4.15, indicating a high level of ICT utilization. In comparison, respondents with higher educational attainment had an overall mean of 4.22, also interpreted as a high level. The result implies that both groups of respondents, regardless of their educational background, were less likely to use learning management systems in teaching science topics. Some instructional materials for science lessons are not compatible with learning management systems. Additionally, some teachers lack the knowledge to administer and navigate an online classroom effectively. The finding relates to that of Carandang and Ortiz (2019), who emphasize the lack of adequate teacher training in rural areas as a significant challenge to ICT integration. Many teachers in rural schools have limited exposure to ICT training programs, and those that are available often fail to address the specific needs of science educators. This lack of training leaves teachers feeling ill-equipped to incorporate technology into their teaching practices, especially when it comes to using digital simulations, virtual laboratories, and interactive platforms that are essential in science education. Without the necessary skills and confidence to use ICT effectively, teachers are unable to maximize the potential benefits of technology for their students.

**Table 10**

*Level of ICT Utilization in Science Teaching in Online Learning and Digital Resources when grouped according to Length of Service*

| Items | Shorter Mean | Interpretation | Longer Mean | Interpretation |
|---|---|---|---|---|
| ***As a teacher, I ...*** | | | | |
| 1. utilize online science resources (e-books, research articles, digital encyclopedias) for lesson preparation. | 4.10 | High | 4 | High |
| 2. use Learning Management Systems (Google Classroom, Moodle, Edmodo) to manage learning resources. | 3.82 | High | 3.84 | High |
| 3. encourage students to access open educational resources for science topics. | 4.39 | High | 4.37 | High |
| 4. integrate digital simulations and virtual experiments into my lessons. | 4.17 | High | 4.06 | High |
| 5. provide students with links to credible science websites for independent learning. | 4.25 | High | 4.21 | High |
| 6. utilize ICT tools for real-time collaboration and knowledge sharing among students. | 4.21 | High | 4.15 | High |
| 7. guide students in using search engines effectively to find relevant scientific information. | 4.25 | High | 4.31 | High |
| 8. provide digital assessments (quizzes, online assignments, interactive exercises) to reinforce learning. | 4.32 | High | 4.03 | High |
| 9. encourage students to create digital presentations and reports for science projects. | 4.38 | High | 4.18 | High |
| 10.use social media and science-related forums to engage students in discussions on scientific topics. | 4.17 | High | 4.28 | High |
| **Mean** | 4.21 | **High** | 4.14 | **High** |

Table 10 presents the data on the level of ICT utilization in science teaching in online learning and digital resources, grouped by length of service. Respondents with shorter years of service had an overall mean of 4.21, indicating a high level of utilization. In comparison, respondents with longer years of service had an overall mean of 4.14, also interpreted as a high level. The results imply that both novice and tenured teachers were less likely to utilize learning management systems in their teaching. This is because some teachers have less mastery over administering and navigating the learning management system for teaching. Santos and Cruz (2020) note that the lack of specific training programs tailored to

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science educators is a significant factor contributing to this issue. While general ICT training is often available, it does not always address the unique needs of science teachers who require specialized knowledge on how to apply technology to their subject area. For example, science educators require training in the use of digital simulations, virtual laboratories, and interactive models, which are essential for teaching complex scientific concepts.

**Table 11**

*Level of ICT Utilization in Science Teaching in Online Learning and Digital Resources when grouped according to the Number of ICT-related Trainings*

| Items | Fewer Mean | Interpretation | More Mean | Interpretation |
|---|---|---|---|---|
| ***As a teacher, I ...*** | | | | |
| 1. utilize online science resources (e-books, research articles, digital encyclopedias) for lesson preparation. | 4.03 | High | 4.07 | High |
| 2. use Learning Management Systems (Google Classroom, Moodle, Edmodo) to manage learning resources. | 3.81 | High | 3.85 | High |
| 3. encourage students to access open educational resources for science topics. | 4.41 | High | 4.35 | High |
| 4. integrate digital simulations and virtual experiments into my lessons. | 4.21 | High | 4 | High |
| 5. provide students with links to credible science websites for independent learning. | 4.28 | High | 4.17 | High |
| 6. utilize ICT tools for real-time collaboration and knowledge sharing among students. | 4.25 | High | 4.10 | High |
| 7. guide students in using search engines effectively to find relevant scientific information. | 4.28 | High | 4.28 | High |
| 8. provide digital assessments (quizzes, online assignments, interactive exercises) to reinforce learning. | 4.31 | High | 4 | High |
| 9. encourage students to create digital presentations and reports for science projects. | 4.40 | High | 4.14 | High |
| 10. use social media and science-related forums to engage students in discussions on scientific topics. | 4.21 | High | 4.25 | High |
| **Mean** | 4.22 | **High** | 4.12 | **High** |

Table 11 presents the data on the level of ICT utilization in science teaching, including online learning and digital resources, grouped by the number of ICT-related trainings. Respondents who received few ICT training sessions obtained an overall mean of 4.22, indicating a high level of utilization. In contrast, respondents who received many ICT training sessions obtained an overall mean of 4.12, also indicating a high level. The finding implies that both groups of respondents, regardless of the number of ICT trainings they have received, seldom use learning management systems to manage learning resources in teaching and learning. The result aligns with that of Carandang and Ortiz (2019), highlighting the challenges that rural schools face in implementing ICT, which include inadequate infrastructure, unreliable internet connectivity, and insufficient device availability. These limitations significantly affect the ability of both teachers and students to benefit from the potential of ICT in science teaching fully. Without reliable internet access and the necessary hardware, rural schools struggle to integrate digital tools into their curricula, which puts students at a disadvantage compared to their urban counterparts.

**Table 12**

*Level of ICT Utilization in Science Teaching in Learning Assessment when grouped according to Age*

| Items | Younger | Older |
|---|---|---|

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| | Mean | Interpretation | Mean | Interpretation |
|---|---|---|---|---|
| ***As a teacher, I ...*** | | | | |
| 1. use online quizzes and formative assessments to measure students' understanding. | 4.13 | High | 3.90 | High |
| 2. incorporate ICT tools for real-time feedback and assessment in science classes. | 3.86 | High | 3.80 | High |
| 3. utilize digital portfolios to track students' progress over time. | 4.10 | High | 4.06 | High |
| 4. assess students' learning using interactive and gamified online assessments (Quizizz, Kahoot, Socrative). | 3.93 | High | 3.70 | High |
| 5. design online rubrics to evaluate students' projects and presentations. | 4.27 | High | 4.09 | High |
| 6. provide immediate feedback through digital platforms. | 4.27 | High | 4.06 | High |
| 7. use ICT tools (Google Forms, MS Forms) for gathering and analyzing student responses. | 4.41 | High | 4.06 | High |
| 8. encourage students to engage in self-assessment using digital platforms. | 4.20 | High | 4.06 | High |
| implement peer assessment using online collaborative tools. | 4.37 | High | 3.77 | High |
| 9. analyze student performance using data from ICT-based assessments to inform instruction improvement. | 4.48 | High | 4.19 | High |
| **Mean** | 4.20 | **High** | 3.97 | **High** |

Table 12 presents the data on the level of ICT utilization in science teaching and learning assessment, grouped by age. Younger respondents obtained an overall mean of 4.20, indicating a high level, while older respondents obtained an overall mean of 3.97, also indicating a high level. The result suggests that younger respondents were less likely to utilize ICT tools for real-time feedback on learner performance. In comparison, older respondents seldom implemented interactive and gamified assessment activities to determine learners' performance in science. This signifies a generational disparity in the adoption of innovative teaching methods, underscoring the need for targeted professional development that encourages all educators to effectively incorporate technology. Addressing these disparities could enhance the overall effectiveness of science education across different age groups. According to a study by Ertmer and Ottenbreit-Leftwich (2014), the integration of ICT helps educators to adopt constructivist teaching methods, where students actively construct their knowledge through exploration and hands-on learning. These methods, supported by technology, encourage students to engage in inquiry-based learning, allowing them to ask questions, test hypotheses, and analyze results interactively. As a result, the use of ICT in science education not only makes lessons more engaging but also promotes critical thinking and problem-solving skills.

**Table 13**

*Level of ICT Utilization in Science Teaching in Learning Assessment when grouped according to the Highest Educational Attainment*

| Items | Lower Mean | Interpretation | Higher Mean | Interpretation |
|---|---|---|---|---|
| ***As a teacher, I ...*** | | | | |
| 1. use online quizzes and formative assessments to measure students' understanding. | 4.02 | High | 4 | High |
| 2. incorporate ICT tools for real-time feedback and assessment in science classes. | 3.81 | High | 3.88 | High |
| 3. utilize digital portfolios to track students' progress over time. | 4.02 | High | 4.23 | High |

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| | | | | |
|---|---|---|---|---|
| 4. assess students' learning using interactive and gamified online assessments (Quizizz, Kahoot, Socrative). | 3.86 | High | 3.70 | High |
| 5. design online rubrics to evaluate students' projects and presentations. | 4.23 | High | 4.05 | High |
| 6. provide immediate feedback through digital platforms. | 4.1 | High | 4.11 | High |
| 7. use ICT tools (Google Forms, MS Forms) for gathering and analyzing student responses. | 4.27 | High | 4.11 | High |
| 8. encourage students to engage in self-assessment using digital platforms. | 4.09 | High | 4.22 | High |
| 9. implement peer assessment using online collaborative tools. | 4.13 | High | 3.88 | High |
| 10. analyze student performance using data from ICT-based assessments to inform instruction improvement. | 4.37 | High | 4.23 | High |
| **Mean** | 4.10 | **High** | 4.04 | **High** |

Table 13 presents the data on the level of ICT utilization in science teaching and learning assessment, grouped by highest educational attainment. Respondents with lower educational attainment had an overall mean of 4.10, indicating a high level of utilization. In comparison, respondents with higher educational attainment had an overall mean of 4.04, also interpreted as a high level. The results suggest that respondents with lower educational backgrounds exhibited less confidence in incorporating ICT tools for providing better real-time feedback on learners' performance, with an overall mean of 4.15, which is interpreted as a high level of utilization. In contrast, respondents with longer years of service had more activities to determine learners' performance in science. This suggests that individuals with higher education may be aware of how to utilize advanced assessment methods. Still, they may not do so as frequently due to a preference for traditional methods. Despite their potential to improve feedback, people with lower education may lack the confidence to use modern ICT tools. As noted by Hennessy et al. (2014), such real-time assessments enable a more personalized learning experience, as teachers can offer targeted support and resources to students based on their specific needs. Additionally, digital tools allow for immediate feedback, helping students understand their mistakes and make improvements in their learning process.

**Table 14**

*Level of ICT Utilization in Science Teaching in Learning Assessment when grouped according to Length of Service*

| Items | Shorter | | Longer | |
|---|---|---|---|---|
| | Mean | Interpretation | Mean | Interpretation |
| ***As a teacher, I ...*** | | | | |
| 1. use online quizzes and formative assessments to measure students' understanding. | 4.10 | High | 3.93 | High |
| 2. incorporate ICT tools for real-time feedback and assessment in science classes. | 3.89 | High | 3.78 | High |
| 3. utilize digital portfolios to track students' progress over time. | 3.96 | High | 4.18 | High |
| 4. assess students' learning using interactive and gamified online assessments (Quizizz, Kahoot, Socrative). | 3.88 | High | 3.75 | High |
| 5. design online rubrics to evaluate students' projects and presentations. | 4.25 | High | 4.12 | High |
| 6. provide immediate feedback through digital platforms. | 4.21 | High | 4.12 | High |
| 7. use ICT tools (Google Forms, MS Forms) for gathering and analyzing student responses. | 4.42 | High | 4.06 | High |

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| | | | | |
|---|---|---|---|---|
| 8. encourage students to engage in self-assessment using digital platforms. | 4.10 | High | 4.15 | High |
| 9. implement peer assessment using online collaborative tools. | 4.25 | High | 3.90 | High |
| 10. analyze student performance using data from ICT-based assessments to inform instruction improvement. | 4.42 | High | 4.25 | High |
| **Mean** | 4.15 | **High** | 4.02 | **High** |

Table 14 presents the data on the level of ICT utilization in science teaching during learning assessment, grouped by length of service. Respondents with shorter years of service had an overall mean of 4.15, indicating a high level of utilization. In comparison, respondents with longer years of service had an overall mean of 4.02, also interpreted as a high level. The results imply that both groups of respondents, regardless of their years of service, were less likely to utilize interactive and gamified online assessments. This is because there were only a few gamified online assessments for specific lessons or topics in science education. Hence, some teachers prefer to conduct traditional assessment activities. Due to a lack of resources or familiarity with interactive tools, educators may prefer conventional assessment methods. The lack of gamified assessments in science education may contribute to their underuse. According to Adebayo et al. (2024) that a comparative study on the impact of ICT integration in classrooms, students in technology-enhanced learning environments demonstrated significantly higher academic performance than those in traditional classrooms, with means showing greater improvements in test scores and engagement when ICT tools were used to support instruction and learning activities. This suggests that interactive digital tools and online learning platforms can enhance understanding, motivation, and learning outcomes compared to traditional methods.

**Table 15**

*Level of ICT Utilization in Science Teaching in Learning Assessment when grouped according to the Number of ICT-related Trainings*

| Items | Fewer Mean | Interpretation | More Mean | Interpretation |
|---|---|---|---|---|
| ***As a teacher, I ...*** | | | | |
| 1. use online quizzes and formative assessments to measure students' understanding. | 4.06 | High | 3.96 | High |
| 2. incorporate ICT tools for real-time feedback and assessment in science classes. | 3.90 | High | 3.75 | High |
| 3. utilize digital portfolios to track students' progress over time. | 4.00 | High | 4.17 | High |
| 4. assess students' learning using interactive and gamified online assessments (Quizizz, Kahoot, Socrative). | 3.96 | High | 3.64 | High |
| 5. design online rubrics to evaluate students' projects and presentations. | 4.25 | High | 4.10 | High |
| 6. provide immediate feedback through digital platforms. | 4.25 | High | 4.07 | High |
| 7. use ICT tools (Google Forms, MS Forms) for gathering and analyzing student responses. | 4.46 | High | 3.96 | High |
| 8. encourage students to engage in self-assessment using digital platforms. | 4.18 | High | 4.07 | High |
| 9. implement peer assessment using online collaborative tools. | 4.34 | High | 3.75 | High |
| 10.analyze student performance using data from ICT-based assessments to inform instruction improvement. | 4.50 | High | 4.14 | High |
| **Mean** | 4.19 | **High** | 3.96 | **High** |

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Table 15 presents the data on the level of ICT utilization in science teaching during learning assessments, grouped by the number of ICT-related training sessions. Respondents who received few ICT training sessions obtained an overall mean of 4.19, which is interpreted as a high level. In contrast, respondents who had attended many ICT training sessions obtained an overall mean of 3.96, which is also interpreted as a high level of utilization. The finding implies that both groups of respondents were less likely to incorporate ICT tools for easier real-time feedback on learners' performance in science, as well as in the preparation of assessment activities using ICT. This is because some teachers lack mastery in the use of computer applications and software. The result relates to that of Lubuva et al. (2022). The findings revealed that low knowledge of ICT signifies the low application of ICT-pedagogical competencies in teaching across subjects. This suggests that teachers need more hands-on training in applying ICT-pedagogical competencies in their classroom practice. In comparison, Dondofema and Shumba (2018) concluded that the lack of pedagogical training on how to use ICT in the classroom and the lack of training on the use of technologies in specific areas were obstacles to the adoption of new technologies in classroom practice.

**Comparative Analysis in the Level of ICT Utilization in Science Teaching in Instructional Delivery, Online Learning and Digital Resources, and Learning Assessment when grouped according to Age, Highest Educational Attainment, Length of Service, and Number of ICT Related Trainings**

**Table 16**

*Difference in the Level of ICT Utilization in Science Teaching in Instructional Delivery when grouped and compared according to the Aforementioned Variables*

| Variable | Category | N | Mean Rank | Mann-Whitney U | p-value | *Sig. Level* | Interpretation |
|---|---|---|---|---|---|---|---|
| Age | Younger<br>Older | 29<br>31 | 30.17<br>30.81 | 440.000 | 0.888 | 0.05 | Not Significant |
| Highest Educational Attainment | Lower<br>Higher | 43<br>17 | 28.74<br>34.94 | 290.000 | 0.213 | | Not Significant |
| Length of Service | Shorter<br>Longer | 28<br>32 | 28.88<br>31.92 | 402.500 | 0.498 | | Not Significant |
| Number of ICT-Related Trainings | Fewer<br>More | 32<br>28 | 29.75<br>31.36 | 424.000 | 0.721 | | Not Significant |

Table 16 presents the computed p-values for the variables age, highest educational attainment, length of service, and number of ICT-related trainings are 0.888, 0.213, 0.498, and 0.721, respectively, which are greater than the 0.05 level of significance and are thus interpreted as not significant. Therefore, the hypothesis that there is no significant difference in the level of ICT utilization in science teaching in instructional delivery when grouped and compared according to age, highest educational attainment, length of service, and number of ICT-related trainings is accepted. The result implies that the level of ICT utilization in science instruction does not vary based on the demographic backgrounds of the respondents. Most respondents demonstrated similar competencies in the use of ICT in teaching science. This suggests that all demographic groups surveyed possess identical skills and familiarity with ICT tools, indicating uniformity in the integration of technology into science education. Therefore, the respondents' backgrounds may not influence the effectiveness of ICT in teaching science. The result relates to the study conducted by De la Fuente and Biñas (2020) to determine and describe the level of teachers' ICT competence in different skill sets, which revealed no significant difference according to age, educational achievement, years in service, and teaching positions.

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**Table 17**
*Difference in the Level of ICT Utilization in Science Teaching in Online Learning and Digital Services when grouped and compared according to the Aforementioned Variables*

| Variable | Category | N | Mean Rank | Mann-Whitney U | p-value | *Sig. Level* | Interpretation |
|---|---|---|---|---|---|---|---|
| Age | Younger<br>Older | 29<br>31 | 32.41<br>28.71 | 394.000 | 0.410 | 0.05 | Not Significant |
| Highest Educational Attainment | Lower<br>Higher | 43<br>17 | 29.78<br>32.32 | 334.500 | 0.609 | | Not Significant |
| Length of Service | Shorter<br>Longer | 28<br>32 | 31.02<br>30.05 | 433.500 | 0.829 | | Not Significant |
| Number of ICT-Related Trainings | Fewer<br>More | 32<br>28 | 31.70<br>29.13 | 409.500 | 0.567 | | Not Significant |

Table 17 presents the computed p-values for the variables age, highest educational attainment, length of service, and number of ICT-related trainings are 0.410, 0.609, 0.829, and 0.567, respectively, which are greater than the 0.05 level of significance and are thus interpreted as not significant. Therefore, the hypothesis that there is no significant difference in the Level of ICT utilization in science teaching in online learning and digital resources when grouped and compared according to age, highest educational attainment, length of service, and number of ICT-related trainings is accepted. The result implies that the level of ICT utilization in science instruction does not differ based on the demographic backgrounds of the respondents. The respondents demonstrated the same level of competency in utilizing online learning and digital resources for teaching science. This suggests that factors such as age, gender, or educational background may not significantly influence teachers' abilities to integrate technology into their science lessons. Consequently, professional development programs could focus on enhancing ICT skills uniformly across all demographic groups. The result aligns with that of Gelacio (2020), whose study on teachers’ utilization of ICT resources in the school system revealed no significant difference when comparing teachers according to their demographic variables.

**Table 18**
*Difference in the Level of ICT Utilization in Science Teaching in Learning Assessment when grouped and compared according to the Aforementioned Variables*

| Variable | Category | N | Mean Rank | Mann-Whitney U | p-value | *Sig. Level* | Interpretation |
|---|---|---|---|---|---|---|---|
| Age | Younger<br>Older | 29<br>31 | 33.21<br>27.97 | 371.000 | 0.244 | 0.05 | Not Significant |
| Highest Educational Attainment | Lower<br>Higher | 43<br>17 | 30.20<br>31.26 | 352.500 | 0.831 | | Not Significant |
| Length of Service | Shorter<br>Longer | 28<br>32 | 31.05<br>30.02 | 432.500 | 0.818 | | Not Significant |
| Number of ICT-Related Trainings | Fewer<br>More | 32<br>28 | 32.16<br>28.61 | 395.000 | 0.431 | | Not Significant |

Table 18 presents the computed p-values for age, highest educational attainment, length of service, and number of ICT-related trainings are 0.244, 0.831, 0.818, and 0.431, respectively. These values are greater than the 0.05 level of significance and are thus interpreted as not significant. Therefore, the hypothesis that there is no significant difference in the Level of ICT utilization in science teaching in learning assessment when grouped and compared according to age, highest educational attainment, length of service, and number of ICT-related trainings is accepted. The finding implies that the level of ICT

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utilization in science teaching, in terms of learning assessment, varies regardless of their profile backgrounds. The respondents demonstrated similar skills in using ICT to conduct assessment activities that provide better real-time feedback on learners' performance in science. This suggests that, despite differences in their backgrounds, the respondents are equally adept at leveraging ICT tools for assessment purposes. Consequently, they can effectively enhance the feedback process for students' performance in science. The result aligns with that of Zhang and Eslabon (2024), which revealed that teachers' levels of competence in ICT were all high, and their levels of compliance were all excellent. There was no significant difference in the teachers' level of competence and Level of compliance in ICT when grouped and compared according to their profile variables.

## Conclusion

Based on the findings, the level of ICT utilization in science teaching across instructional delivery, online learning and digital resources, and learning assessment is generally high. In instructional delivery, the lowest mean score of 3.63 was observed for the use of online collaborative tools such as Google Docs, Padlet, and Jamboard, suggesting that teachers and students are not yet fully maximizing these platforms for classroom collaboration. In online learning and digital resources, the lowest mean score of 3.83 corresponded to the use of Learning Management Systems (Google Classroom, Moodle, Edmodo), indicating that while these platforms are regularly used for resource organization, their potential for interactive and engaging learning experiences could be further enhanced. In learning assessment, the lowest mean of 3.81 was associated with the use of gamified online assessment tools such as Quizizz, Kahoot, and Socrative, implying that teachers may still face challenges in fully leveraging these tools to promote active learning and deeper engagement. These results highlight specific areas where teacher ICT integration can be strengthened. It is recommended that professional development programs focus on enhancing teachers' skills and confidence in utilizing collaborative tools, learning management systems, and gamified assessment platforms to maximize student engagement and learning outcomes.

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