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Level of Utilization of Video-Based Lessons in Chemistry during Modular Distance Learning (MDL) In Selected Public High Schools of Lapu-Lapu City

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Abstract:

Video-based lessons have emerged as vital instructional support during Modular Distance Learning (MDL), yet teachers' experiences in developing and delivering such materials for Chemistry instruction remain insufficiently explored. Employing a descriptive–correlational research design, this study involved thirty (30) Chemistry teachers from Mactan National High School and Babag National High School selected through total enumeration. Data were gathered using a structured survey questionnaire covering demographic profile and level of utilization of vide-based lessons in Chemistry across Preparation and Development, Implementation and Instructional Delivery, Alignment with Chemistry Learning Competencies, and Monitoring and Assessment of Learning. Mean, frequency, percentage, Spearman rho, and Rank-Biserial Correlation were used for statistical analysis. Findings revealed that respondents were predominantly young, female, and with graduate units; most had fewer than six years of service and attended a limited number of trainings. Teachers assessed their overall experiences as Very Good, with Monitoring and Assessment of Learning rated highest and Implementation and Instructional Delivery lowest. Correlational analysis showed no significant relationship between profile variables age, sex, educational attainment, teaching experience, and trainings attended and level of utilization of video-based lessons. Results suggest that Chemistry teachers are capable of using video-based lessons regardless of personal or professional background. Recommendations include utilization of video-based lesson exemplar in Chemistry.

Keywords: Babag National High School, Mactan National High School, Modular Distance Learning, Teaching Experiences, Video-Based Lessons

Introduction

The Problem and Its Scope

Rationale

The integration of technology in education has become increasingly important in enhancing teaching and learning processes in the 21st century. Digital tools, such as video-based lessons, are widely recognized for their potential to improve students' understanding, engagement, and academic performance, particularly in complex subjects like Chemistry. Globally, many educational systems have adopted technology-enhanced instruction to support diverse learners and promote more interactive learning environments[1].

In developed countries such as the United States and those in Europe, schools continue to invest in digital infrastructure and teacher training to maximize the use of educational technologies[2][3]. These efforts aim to improve learning outcomes and ensure that students are equipped with the necessary digital skills. Similarly, countries in Asia, including South Korea, Japan, and Thailand, have successfully integrated digital tools into teaching, using video-based and interactive platforms to enhance student engagement and support continuous learning, especially during disruptions like the COVID-19 pandemic and now weather conditions[4][5][6].

In the Philippines, the Department of Education has also promoted the integration of Information and Communication Technology (ICT) in teaching. However, many public schools face challenges such as limited internet connectivity, a lack of devices, and insufficient training for teachers. These challenges became more evident during the implementation of Modular Distance Learning (MDL), where teachers had to rely on alternative strategies, including video-based lessons, to support students' learning[7]. In science subjects like Chemistry, where concepts are often abstract and complex, video-based lessons can serve as an effective tool to simplify content and improve students' academic performance[8][9].

At Mactan National High School and Babag National High School, the implementation of Modular Distance Learning (MDL) is aligned with the policy of the Department of Education (DepEd), which mandates the use of alternative delivery modes such as MDL during emergencies and natural calamities to ensure continuity of learning. In 2025, when classes were frequently disrupted due to earthquake-related cancellations, students relied heavily on self-directed learning through printed modules. During this period, teachers observed that students demonstrated low academic engagement, particularly in completing their modules. Upon checking the outputs, many learners obtained low scores in Chemistry a subject often perceived as difficult due to its abstract concepts. Additionally, a significant number of students showed little interest in answering the modules, resulting in incomplete and poorly understood responses. In response to this concern, science teachers considered the integration of video-based lessons as a more engaging instructional approach. Given that most students at Mactan National High School have access to mobile phones and nearby affordable internet services such as piso WiFi, video lessons offer a practical and accessible way to enhance understanding and stimulate interest. Moreover, promoting academic engagement through active participation, cognitive effort, and emotional involvement is essential in improving learning outcomes.

In adopting video-based lessons, teachers navigate key dimensions of practice: first, in the preparation and development of video-based lessons, where content is planned, created or curated, and aligned with module content to address abstract Chemistry concepts; second, in implementation and instructional delivery, where video materials are distributed, integrated with printed modules, and used to support self-directed learning; third, in ensuring alignment with Chemistry learning competencies, so that video content matches K–12 standards and bridges gaps found in printed module explanations; and fourth, in monitoring and assessment of learning, where teachers track student engagement, check understanding, and evaluate improvements in performance and

completion rates. These four aspects collectively shape how video-based lessons function within the MDL setting.

Despite the increasing use of video-based lessons in education, there is limited empirical evidence on how their integration influences students' academic engagement in Chemistry during Modular Distance Learning (MDL). Most existing studies focus on general technology integration or fully online learning environments, with little attention given to MDL contexts where students rely primarily on printed modules and have limited but emerging access to digital resources. In such settings, understanding how video-based lessons developed and delivered through the above dimensions can enhance students' behavioral, cognitive, and emotional engagement remains underexplored, particularly in subjects like Chemistry that require deeper conceptual understanding.

Furthermore, there is a scarcity of research that systematically examines these four key areas together in MDL: how teachers prepare and develop video lessons suited to modular learning; how they implement and deliver these alongside printed modules; the extent to which video content is aligned with Chemistry competencies; and how teachers carry out monitoring and assessment to measure engagement and progress. This gap makes it difficult to determine whether such instructional strategies lead to meaningful improvements in learners' involvement in the learning process. In particular, limited research examines how video-based lessons influence students' participation in learning tasks, depth of understanding, and level of interest and motivation especially in content-heavy subjects like Chemistry nor which practices in lesson development, delivery, alignment, and assessment yield the best results in self-directed MDL environments.

This study aims to determine the teaching experiences of Chemistry teachers in utilizing video-based lessons during Modular Distance Learning, covering preparation and development, implementation and instructional delivery, alignment with Chemistry learning competencies, and monitoring and assessment of learning. Ultimately, this inquiry will contribute to the existing body of knowledge by providing empirical evidence on how video lessons across these four key stages of use develop students' academic engagement in Chemistry during Modular Distance Learning.

Theoretical Background of the Study

This study on mastering academic engagement in chemistry through video-based lessons in modular distance learning (MDL) was mainly anchored on Technological Pedagogical Content Knowledge (TPACK) Theory by Mishra and Koehler Substitution Augmentation Modification Redefinition (SAMR) Model by Puentedura widely applied in 2020–2026 digital learning studies), Cognitive Theory of Multimedia Learning (CTML) by Richard Mayer extended applications in 2020–2024 studies), and the Online Learning Engagement Framework by Dixson (2015; widely used in 2020–2026 online learning studies).

The Technological Pedagogical Content Knowledge (TPACK) Theory explained that good teaching with technology happens when teachers combine three kinds of knowledge: technology, teaching methods, and subject content. In this study, video-based lessons represented the technology used in teaching, Chemistry topics represented the subject content, and the ways teachers delivered lessons during Modular Distance Learning (MDL) represented pedagogy or teaching methods. The level of integration of video- based lessons in terms of frequency of use, type of video content, duration of video lessons, and accessibility of video materials showed how teachers applied TPACK in real classroom situations. These factors helped determine how effectively students learned Chemistry and how their academic performance was affected.

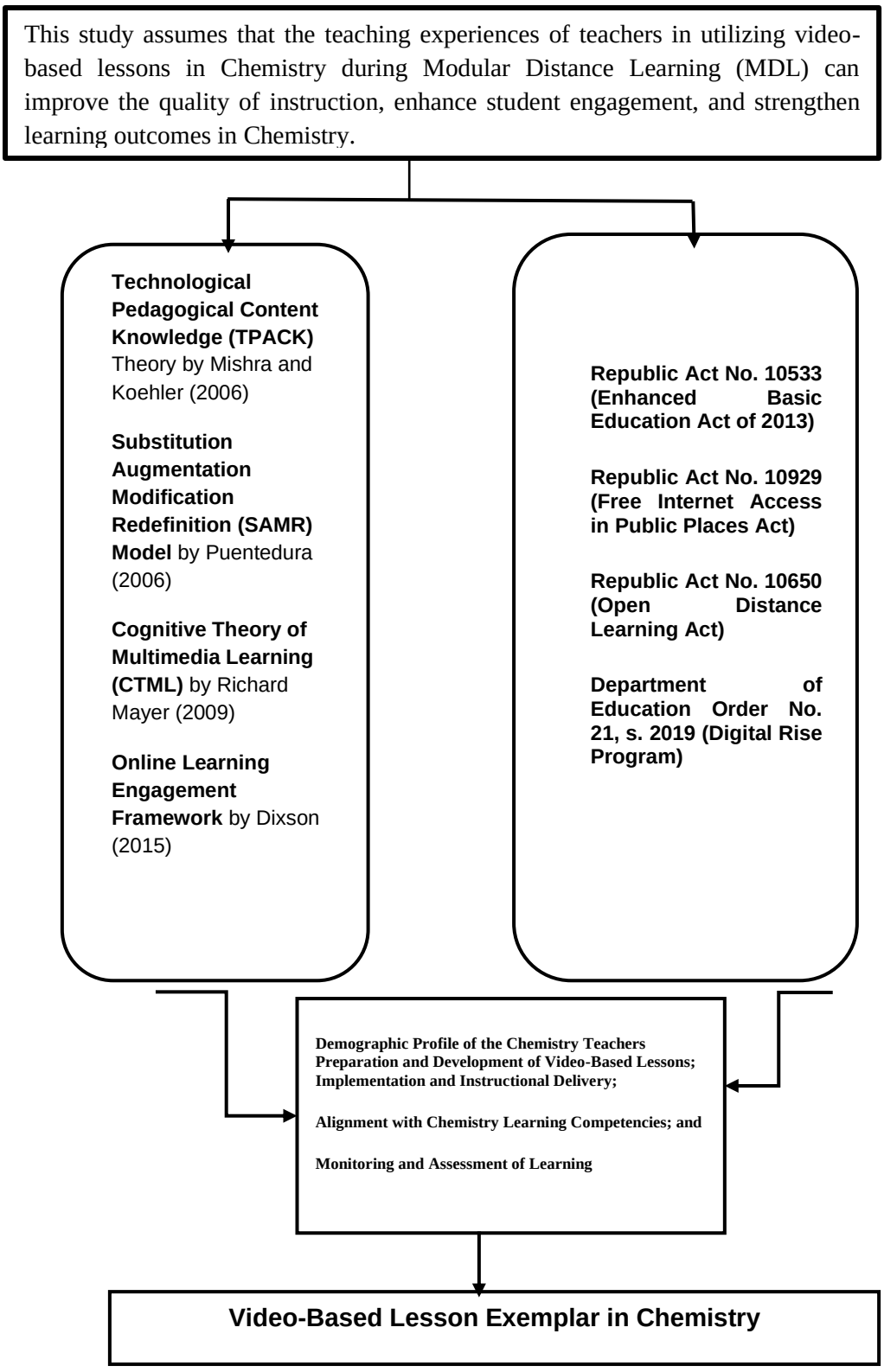


Figure 1. Theoretical and Conceptual Framework of the Study

This theory further anchors the study by clarifying that demographic profile variables such as age and sex, highest educational attainment, years of teaching experience, and number of trainings attended, do not by themselves determine effective technology integration; rather, they serve as contextual factors that may influence how teachers build and combine their technological, pedagogical, and content knowledge. Most importantly, the theory directly underpins the four

dimensions of teaching experiences examined in this study: Preparation and Development of Video-Based Lessons reflects how teachers combine technological skills with Chemistry content knowledge; Implementation and Instructional Delivery demonstrates how technology is applied alongside pedagogical methods during Modular Distance Learning; Alignment with Chemistry Learning Competencies illustrates how video content is matched to prescribed curriculum standards; and Monitoring and Assessment of Learning shows how teachers evaluate the effectiveness of this combined knowledge in improving student understanding. Together, these key variables represent the practical application of TPACK in Chemistry instruction, confirming that effective video-based lessons emerge not from personal attributes alone, but from the successful integration of technology, pedagogy, and subject matter knowledge.

Lastly, there are studies that reinforce the TPACK framework and its implications for technology integration in instruction. Vijayatheepan[10] examined teaching practices among 142 Tamil-medium school teachers in the Jaffna Educational Division, Sri Lanka, and found that while teachers demonstrated strong pedagogical and content knowledge, their technological knowledge and integration skills were comparatively weaker; all TPACK components were positively linked to teaching effectiveness, with the strongest relationships observed in pedagogical-content knowledge and technological-pedagogical knowledge, while key barriers included lack of resources, limited training, time constraints, and language and cultural challenges, leading to the conclusion that targeted professional development, improved infrastructure, and localized resources are essential for meaningful technology integration in resource-limited contexts. Supporting these findings, a systematic literature review by Kholid[11] analyzed 25 peer-reviewed articles published between 2018 and 2022 on TPACK in mathematics education and identified common barriers such as teachers' lack of confidence, resistance to change, insufficient institutional support, and inadequate resources, recommending active participation in pedagogical technology training to strengthen TPACK competencies and improve instruction. Further reinforcing this perspective, Jiménez Sierra[12] found that collaborative, reflective cycles such as Lesson Study effectively build teachers' TPACK, suggesting that professional development should move beyond individual training toward shared practice a perspective that supports why the present study found no significant relationship between teacher profile and video-based lesson experiences: what matters most is not who the teacher is, but what collaborative support and training they receive to effectively combine technology, pedagogy, and content knowledge.

The Substitution Augmentation Modification Redefinition (SAMR) Model explained how technology changes teaching and learning. In this study, video-based lessons during Modular Distance Learning (MDL) could be used in different ways. At the lowest level, videos could simply replace printed lessons (substitution). At the next level, videos could make lessons clearer through visuals and explanations (augmentation). At a higher level, videos could change how students learn activities, such as watching experiments and answering guided tasks (modification). At the highest level, videos could create new learning experiences that were not possible before, such as self-paced and repeated learning anytime (redefinition). The frequency, content type, duration, and accessibility of video-based lessons affected how far teaching was transformed and how students' academic performance in Chemistry improved.

This theory further anchors the study by showing how the profile variables—age and sex, highest educational attainment, years of teaching experience, and number of trainings attended may influence which level of technology integration teachers are able to reach, suggesting that professional background shapes how deeply they can transform instruction through video lessons. Most importantly, the model directly underpins the four dimensions of teaching experiences explored in this research: Preparation and Development reflects how teachers design video lessons to move beyond simple replacement toward more meaningful enhancements; Implementation and Instructional Delivery demonstrates how videos are used alongside printed modules to improve and

transform the learning process; Alignment with Chemistry Learning Competencies ensures that technology is applied in ways that actually strengthen and redefine how students master required content; and Monitoring and Assessment of Learning reveals how video-based lessons create new opportunities to track progress and support understanding that would not be possible through printed materials alone. Together, these key variables illustrate the progression of video-based instruction across the SAMR levels, showing that the ultimate goal is not merely to substitute lessons, but to redesign Chemistry learning for greater clarity, engagement, and accessibility during Modular Distance Learning.

Lastly there are studies that reinforce the Substitution, Augmentation, Modification, and Redefinition (SAMR) Model by Puentedura as a framework for understanding how technology transforms teaching and learning. Zamri and Mohamad[13] reviewed the model to examine its role in guiding technology integration, particularly amid the shift to distance and online learning, describing its four levels from basic replacement to transformative learning experiences and noting that while SAMR offers a clear practical framework, it should be applied thoughtfully alongside contextual needs and pedagogical goals to move beyond simple substitution toward meaningful integration. Supporting this, Kurt[14] explained that video-based lessons in Chemistry during Modular Distance Learning may begin as simple substitutions for printed explanations but should ideally progress toward higher levels where technology transforms how students explore abstract concepts, emphasizing that progress through these levels depends not on teacher demographic profile but on adequate resources, training, and institutional support consistent with the present study's finding that profile variables showed no significant relationship with teaching experiences. Further reinforcing this perspective, Blundell, Mukherjee, and Nykvist[15] conducted a scoping review of 230 studies and found that SAMR categorizes technology use based on the actions and roles of teachers and students rather than on who the teachers are or what background they bring, confirming that how video-based lessons are used depends more on context, resources, and support than on personal attributes alone.

The Cognitive Theory of Multimedia Learning (CTML)) explained that students learn better when words and pictures are combined. In this study, video-based lessons helped students understand Chemistry better because they showed both visual explanations and spoken instructions at the same time. Complex Chemistry topics became easier to understand through animations, demonstrations, and step-by-step explanations. The effectiveness of video-based lessons depended on their frequency of use, type of content, length, and accessibility. These factors influenced how well students understood and remembered Chemistry lessons during Modular Distance Learning (MDL), which affected their academic performance.

This theory further anchors the study by suggesting that demographic profile variables such as age and sex, highest educational attainment, years of teaching experience, and number of trainings attended may shape how teachers design and present video content, since the skillful combination of words and visuals depends more on acquired instructional knowledge and preparation than on personal characteristics. Most importantly, the theory directly supports the four dimensions of teaching experiences examined in this research: Preparation and Development of Video-Based Lessons reflects how teachers organize content, simplify abstract concepts, and combine narration and visuals to reduce cognitive load; Implementation and Instructional Delivery demonstrates how videos are used alongside printed modules to present information clearly and effectively; Alignment with Chemistry Learning Competencies ensures that multimedia explanations directly target the skills and knowledge students are expected to learn; and Monitoring and Assessment of Learning reveals whether students actually understood and retained the concepts presented through video, confirming that well-designed multimedia materials lead to better learning outcomes. Together, these key variables illustrate that effective video-based lessons are those that follow sound

multimedia design principles, helping students process Chemistry content more deeply and remember it longer.

Lastly, Mayer[16] reviewed the Cognitive Theory of Multimedia Learning (CTML), which explains that students learn best from words and visuals working together through dual processing channels with limited capacity, and Bali[17] further confirmed that lesson design and visual load determine effectiveness rather than teacher characteristics. Anchored by Mayer this theory explains that video-based lessons improved Chemistry understanding by combining spoken and visual explanations, making abstract concepts clearer through animations and demonstrations, with effectiveness depending on how often, what type, how long, and how accessible the videos were during Modular Distance Learning. While profile variables may influence how teachers design and present these materials, CTML directly supports the four dimensions of teaching experiences: preparation and development focuses on organizing content to reduce cognitive load; implementation ensures clear delivery alongside printed modules; alignment matches video content to required competencies; and assessment verifies whether students truly understood and retained the lessons, showing that well-designed multimedia materials lead to deeper learning and better academic performance in Chemistry.

The Online Learning Engagement Framework explained that student learning success in online or digital learning depends on how engaged they are. Engagement includes how students participate, how interested they are, and how much effort they put into learning tasks. In this study, students' academic performance in Chemistry before and after using video-based lessons was influenced by how often teachers used videos, how easy it was to access them, and how clear and appropriate the video content was. These factors helped improve students' engagement in learning Chemistry during Modular Distance Learning (MDL), which led to better academic performance.

This theory further anchors the study by clarifying that demographic profile variables such as age and sex, highest educational attainment, years of teaching experience, and number of trainings attended may influence how teachers design and deliver video lessons to foster engagement, since creating materials that truly motivate learners depends on professional preparation and instructional support rather than on personal attributes alone. Most importantly, the framework directly underpins the four dimensions of teaching experiences examined in this research: Preparation and Development of Video-Based Lessons reflects how teachers create content that is clear, suitable, and interesting enough to capture students' attention; Implementation and Instructional Delivery demonstrates how videos are shared and guided to ensure accessibility and active participation; Alignment with Chemistry Learning Competencies ensures that video content connects directly to required skills so students remain focused on meaningful learning; and Monitoring and Assessment of Learning allows teachers to track engagement, identify difficulties, and provide timely support. Together, these key variables illustrate that the purpose of using video-based lessons is not only to explain Chemistry concepts, but also to sustain student interest, participation, and effort—factors that are essential to achieving better learning outcomes during Modular Distance Learning.

Lastly, Hu and Xiao[18] synthesized 55 empirical studies from 2020 to 2023 and found that learner engagement depends on motivation, digital literacy, and self-direction alongside environmental factors such as platform quality, task design, and instructional support concluding that engagement stems from resources and design rather than teacher background. Supporting this, Wakjira and Bhattacharya[19] identified behavioral, collaborative, and emotional indicators that predict engagement with high accuracy, showing that monitoring participation allows timely intervention and better activity design regardless of teacher profile. Anchored by Dixson's Online Learning Engagement Framework, this study explains that Chemistry performance improved through video-based lessons because accessible, clear, and appropriate content sustained student interest and effort during Modular Distance Learning, with effectiveness shaped by how often and how well videos were used rather than by teacher characteristics. While professional background may influence how

teachers design and deliver these materials to foster engagement, the four teaching experience dimensions show that preparation, implementation, competency alignment, and monitoring directly support participation and understanding confirming that the ultimate goal is not simply to present lessons, but to sustain the active involvement that leads to better Chemistry learning outcomes.

Synthesis. Collectively, the four theoretical frameworks and supporting literature converge on a unified understanding: the effectiveness of video-based lessons in Chemistry during Modular Distance Learning depends primarily on the quality of design, delivery, and support not on teacher demographic profile. The Technological Pedagogical Content Knowledge (TPACK) Theory by Mishra and Koehler establishes that meaningful technology integration arises from the successful combination of technological, pedagogical, and content knowledge rather than from personal attributes alone; reviewed studies confirm that teachers may possess strong subject and teaching knowledge yet lack the specific technological skills and resources needed, pointing to training and institutional support as the critical drivers. Complementing this, the Substitution Augmentation Modification Redefinition (SAMR) Model by Puentedura illustrates how video lessons evolve from simple replacements into transformative learning experiences a progression determined by context, resources, and guidance, not by age, experience, or educational attainment. The Cognitive Theory of Multimedia Learning (CTML) by Mayer further clarifies that learning improves when words and visuals are thoughtfully combined to reduce cognitive load, with effectiveness hinging on how lessons are prepared and presented, not on who prepares them. Finally, Dixson's Online Learning Engagement Framework links improved academic performance to sustained student interest, participation, and effort outcomes produced by accessible, clear, and appropriate content, not by teacher background. Across all perspectives, the four dimensions of teaching experiences examined in this study Preparation and Development, Implementation and Instructional Delivery, Alignment with Chemistry Learning Competencies, and Monitoring and Assessment of Learning represent the decisive factors that determine success. Consequently, the consistent finding of no significant relationship between teacher profile and teaching experiences is not a limitation but a confirmation: what matters most is not who the teacher is, but the quality of the lessons they create, the support they receive, and the care with which video-based instruction is designed to serve learners during distance learning.

On the other hand, there are several legal bases that promote literacy in the Philippines. These include Republic Act No. 10533 (Enhanced Basic Education Act of 2013), Republic Act No. 10929 (Free Internet Access in Public Places Act), Republic Act No. 10650 (Open Distance Learning Act), and Department of Education Order No. 21, s. (Digital Rise Program).

Republic Act No. 10533 (Enhanced Basic Education Act of 2013). Republic Act No. 10533, also known as the Enhanced Basic Education Act of 2013, strengthened the Philippine basic education system by enhancing the curriculum and ensuring that teaching and learning are relevant, responsive, and aligned with global standards. It emphasized the use of innovative teaching strategies and appropriate learning resources to improve learner outcomes. This law is highly relevant to the present study because it supports the integration of technology-based instruction in teaching, including the use of video-based lessons during Modular Distance Learning (MDL). In this study, the integration of video-based lessons in terms of frequency of use, type of video content, duration of video lessons, and accessibility of video materials reflects the law's goal of improving instructional delivery. These indicators are expected to influence students' academic performance in Chemistry before and after the integration of video-based instruction, as teachers adopt more effective and learner-centered strategies.

Republic Act No. 10929 (Free Internet Access in Public Places Act). Republic Act No. 10929 mandates the provision of free internet access in selected public places, including schools and other government facilities, to promote digital inclusion and equitable access to information. This law plays a significant role in supporting technology-enhanced instruction, particularly in the use of

video-based lessons during Modular Distance Learning (MDL). In this study, internet accessibility is directly connected to the variable on accessibility of video materials, which affects how teachers deliver video-based lessons and how students access learning resources in Chemistry. The frequency of use of video-based lessons and the type and duration of video content may also depend on the availability and stability of internet connectivity. As such, this law supports the improvement of students' academic performance before and after the integration of video-based lessons by ensuring that digital learning resources are accessible to both teachers and learners.

Republic Act No. 10650 (Open Distance Learning Act). Republic Act No. 10650, also known as the Open Distance Learning Act, institutionalizes and promotes open and distance learning in the Philippines as a flexible and accessible mode of education. It recognizes the importance of using technology and alternative learning delivery modalities to expand access to quality education, especially for learners in different contexts. This law is closely related to Modular Distance Learning (MDL), where printed modules are supplemented with digital resources such as video-based lessons. In this study, the integration of video-based lessons in terms of frequency of use, type of video content, duration of video lessons, and accessibility of video materials serves as an important instructional strategy to support learning continuity in Chemistry. These variables are expected to affect students' academic performance before and after exposure to video-based instruction, particularly in understanding complex scientific concepts.

Department of Education Order No. 21, s. 2019 (Digital Rise Program). Department of Education Order No. 21, s. 2019, also known as the Digital Rise Program, was designed to strengthen the integration of digital technologies in Philippine basic education through infrastructure development, teacher training, and the promotion of digital literacy. This policy supports the effective use of technology in teaching and learning, including the integration of video-based lessons during Modular Distance Learning (MDL). In this study, the Digital Rise Program provides strong policy support for examining the level of integration of video-based lessons in terms of frequency of use, type of video content, duration of video lessons, and accessibility of video materials. These indicators reflect how teachers implement digital strategies in teaching Chemistry and how such integration affects students' academic performance before and after the use of video-based instruction. The policy further emphasizes the need for continuous improvement in teaching practices to enhance student learning outcomes in a technology-supported learning environment.

Many studies have shown the challenges in integrating technology in teaching, especially in public schools. For example, educational technology can help make learning more engaging and personalized, and provide access to many resources, but teachers and schools often face challenges when using it. Some of these challenges include limited access to devices or the internet, resistance to using new methods, and concerns about fairness for all students. Therefore, to overcome these problems, schools need professional development for teachers, careful planning, and ongoing support to make sure technology is used effectively in teaching. Similarly, teachers face many obstacles when using technology in classrooms, such as a lack of knowledge, limited support, and school policies[20].

Moreover, even with a lot of investment in educational technology, schools still face many challenges in using it effectively. For instance, experts in Turkey found that the biggest problems were not the hardware, but lack of training for teachers before and during their careers, limited support for lesson content, and weak incentive systems[21]. In addition, integrating technology into classroom learning has become important for improving students' thinking and learning skills. Research shows that using technology in lessons can help students develop higher-order thinking skills and make learning more engaging[22].

Furthermore, when developing classrooms that use ICT (Information and Communication Technology), it is important to consider the environment, resources, and needs of each country. In

developing countries, factors like government policies, technical infrastructure, teaching methods, and available educational materials affect how well technology can be integrated into lessons [23]. Likewise, teachers have many problems when trying to use integrated thematic learning in elementary schools. They find it hard to prepare learning materials, connect ideas between different subjects, and check students' work. They also struggle to choose the right teaching methods that fit all subjects and help all students learn well, especially when lessons take a lot of time[24].

In addition, rural schools face many challenges when trying to use technology in teaching. Problems include lack of resources, poor internet access, and the gap between urban and rural schools. These issues make it harder for students in rural areas to learn and keep up. Researchers have suggested solutions like better training for teachers, improved infrastructure, and careful planning to use technology in ways that work for these schools. By understanding these challenges and solutions, schools can find good ways to use technology and help students learn better[25].

Moreover, teachers see technology as a helpful tool for making lessons more interactive and motivating for students. They believe using technology improves how they teach and makes learning more interesting. However, teachers also face problems like slow internet, power outages, lack of equipment, and limited training. To fix these issues, schools and authorities should provide better policies, more budget, proper technology tools, and opportunities for teachers to improve their skills. This support helps teachers use technology more effectively in their classrooms[26].

Similarly, teachers have different opinions about using technology in the classroom. Some think it helps students learn better, while others face challenges and feel unsure about using it. These opinions depend on where the school is, the resources available, and global trends in education. Therefore, professional development programs are very important because they help teachers learn how to use technology effectively. Understanding these teacher perceptions can guide schools to provide better support and improve the use of technology in teaching [27].

Additionally, teachers generally have positive views about using technology in early childhood classrooms, including for children with special needs. They believe technology can make lessons more engaging and help students learn better. However, teachers also face challenges, such as finding apps that are suitable for young children and keeping their attention while using devices. Understanding these perceptions can help schools support teachers and improve technology use in early childhood education[28].

Synthesis. Technology boosts engagement and thinking skills, but effective integration requires more than infrastructure. Teacher readiness and school support matter greatly, especially in resourced-limited settings while alignment with curriculum and learner needs also challenges implementation[29]. This justifies exploring Mactan National High School science teachers' experiences to identify strategies, barriers, and support for effective use.

The Problem

Statement of the Problem

This study aimed to determine the level of utilization of video-based lessons in Chemistry during Modular Didstance Learning (MDL) in two of the very large schools in Lapu-Lapu City Division, Babag National High School and Mactan National High School for the school year 2025-2026 as basis for a video-based lesson exemplar in Chemistry.

Specifically, this study sought to answer the following questions:

1. What is the demographic profile of the Chemistry teacher-respondents in terms of:

1.1 Age and Sex;

1.2 Highest Educational Attainment;

1.3 Years of Teaching Experience; and

1.4 Number of Trainings Attended related to Chemistry teaching and video-based lesson utilization?

2. What is the level of utilization of video-based lessons in Chemistry among teachers during Modular Distance Learning (MDL) in terms of:

2.1 Preparation and Development of Video-Based Lessons;

2.2 Implementation and Instructional Delivery;

2.3 Alignment with Chemistry Learning Competencies; and

2.4 Monitoring and Assessment of Learning?

3. Is there a significant relationship between the profile of the Chemistry teachers and their level of utilization of video-based lessons in Chemistry during MDL?

4. Based on the findings of the study, what video-based lesson exemplar in Chemistry can be proposed?

Statement of the Null Hypothesis

Based on the objectives of the study, the following null hypotheses were tested at a 0.05 level of significance:

H_o: There is no significant relationship between the profile of the Chemistry teachers and their level of utilization of video-based lessons in Chemistry during MDL.

Significance of the Study

This study is significant to the following stakeholders:

Department of Education (DepEd). Provides empirical evidence on video-based lessons' effectiveness in boosting Chemistry engagement in MDL, informing policies and guidelines for technology integration and distance learning.

School Heads. Informs decisions on supervision and resource allocation, supporting interventions to improve Chemistry instruction in MDL.

Chemistry Teachers. Identifies effective video-based lesson integration, guiding design of materials that increase participation, understanding, and interest in Chemistry.

Researcher. Deepens understanding of video-based instruction's role and builds skills in quantitative research and tech-aligned instructional design.

Future Researchers. Serves as reference for studies on video-based learning, MDL, and academic engagement across varied subjects, levels, and contexts.

Methodology

This section presents the methodologies used in the study, including the research design, research respondents, research locale, research instruments, ethical considerations, data gathering procedures, and statistical treatment

Design

This study utilized a descriptive–correlational research design, which was appropriate because it allowed the researcher to describe variables as they naturally occurred and determine the relationships between them without manipulation of conditions. According to Creswell and

Creswell[30] descriptive correlational designs are commonly used in educational research to identify patterns and relationships among variables as they exist in real-life settings.

The descriptive component of the design was used to present the demographic profile of Chemistry teachers in terms of age and sex, highest educational attainment, years of teaching experience, and number of trainings attended related to Chemistry teaching and video-based lesson utilization. It also determined the extent of their teaching experiences in utilizing video-based lessons during Modular Distance Learning, specifically in terms of Preparation and Development of Video-Based Lessons, Implementation and Instructional Delivery, Alignment with Chemistry Learning Competencies, and Monitoring and Assessment of Learning.

On the other hand, the correlational component of the design was used to determine whether there was a significant relationship between the teachers' demographic profile and their teaching experiences in utilizing video-based lessons. Through appropriate statistical analysis, the study examined whether variables such as age, sex, educational attainment, years of teaching experience, and number of trainings attended were significantly related to how teachers utilize video-based lessons in Chemistry instruction.

Overall, the use of a descriptive–correlational design was suitable for this study because it provided a systematic way to describe the current profile and teaching experiences of Chemistry teachers while also examining relationships among key variables. The findings serve as a basis for recommending professional development programs and support strategies aimed at improving the use of video-based lessons to enhance Chemistry instruction during Modular Distance Learning.

Flow of the Study

The flow of the study was anchored on the Input-Process-Output (IPO) model, which provided a systematic representation of how data were gathered**,** analyzed**,** and transformed into meaningful outputs. According to McGregor the IPO model was a useful framework in research as it clearly illustrated the relationship between variables, research procedures, and expected outcomes in a structured manner.

The **input** of the study consisted of the demographic profile of the teachers in terms of age and sex; highest educational attainment; years of teaching experience; and number of trainings attended related to Chemistry teaching and video-based lesson utilization and the teaching experiences of Chemistry teachers in utilizing video-based lessons in Chemistry during Modular Distance Learning (MDL) in terms of Preparation and Development of Video-Based Lessons; Implementation and Instructional Delivery; Alignment with Chemistry Learning Competencies; and Monitoring and Assessment of Learning.

Subsequently, the **process** involved the use of a Quantitative Descriptive–Correlational Research Design. It included securing approval from the concerned authorities, seeking informed consent from respondents, preparing and validating the research instrument, administering the questionnaire, retrieving completed questionnaires, conducting statistical analysis of data including tests of significant relationship and and formulating conclusions based on the findings.

Consequently, the **output** of the study was a proposed teacher training program on video-based instruction designed to enhance teachers' capacity in integrating video-based lessons in Modular Distance Learning. This program aimed to improve students' academic engagement in Chemistry by strengthening instructional strategies that promoted participation, understanding, and motivation in learning.

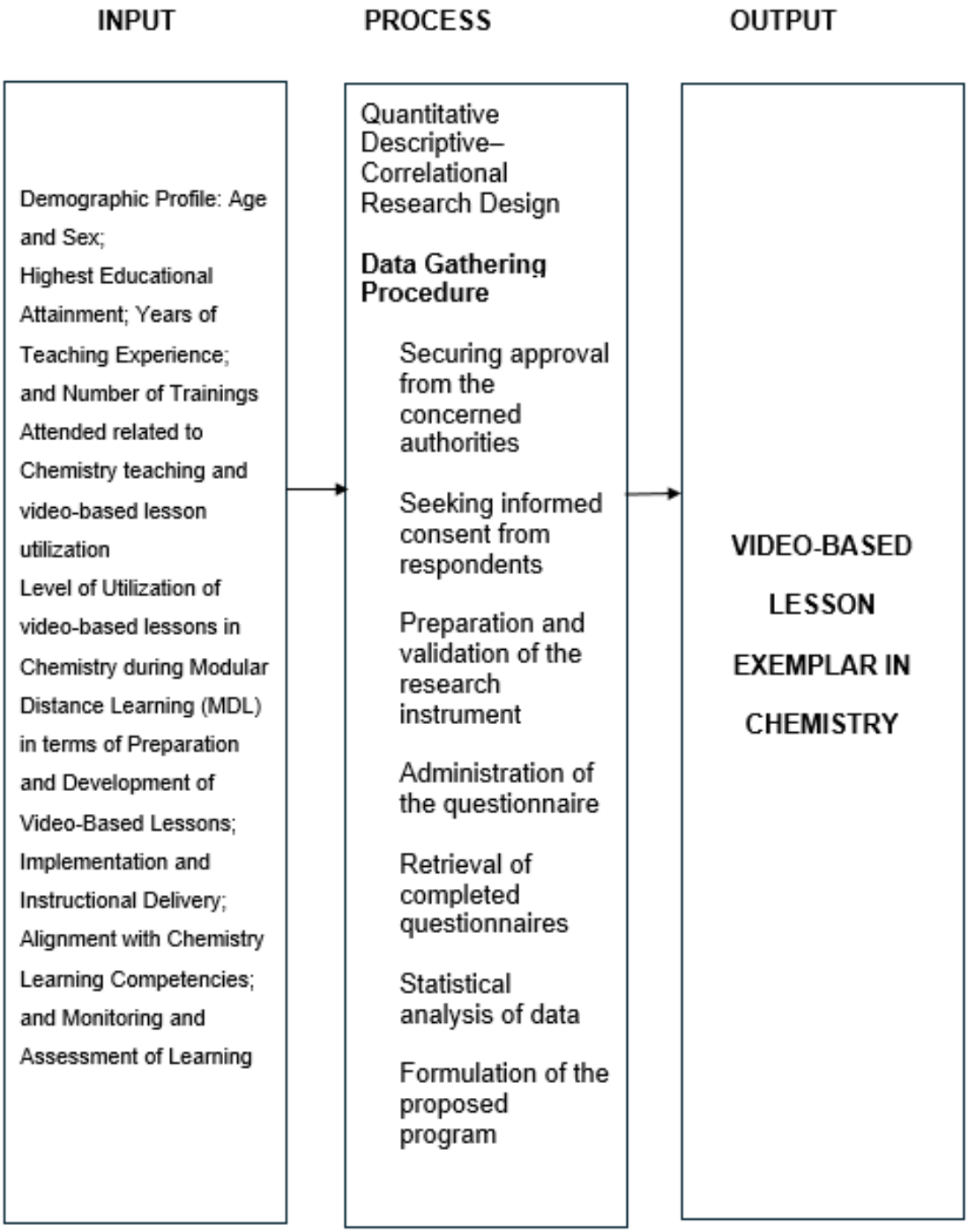


Figure 2. The Flow of the Study

Environment

The study was conducted at Mactan National High School, located in Puso, Mactan, Lapu-Lapu City, and Babag National High School, located in Babag, Lapu-Lapu City. Both schools are under the jurisdiction of the Department of Education Schools Division of Lapu-Lapu City and are classified as very large public secondary schools catering to both Junior High School and Senior High School learners. These schools were selected because they serve a large and diverse student population and fully implement Modular Distance Learning (MDL) as their primary alternative delivery mode, providing the actual setting where video-based lessons are utilized alongside printed modules to address learning needs. As major institutions in the division, they have experienced

firsthand the challenges of teaching abstract Chemistry concepts through self-directed modules, making the integration of video-based lessons a timely and relevant intervention. Furthermore, both schools adhere to uniform DepEd standards and curriculum guidelines, ensuring consistency in how video-based lessons are designed, delivered, and aligned with prescribed Chemistry learning competencies, while the inclusion of two separate campuses strengthens the representativeness and applicability of the findings across similar public-school settings.

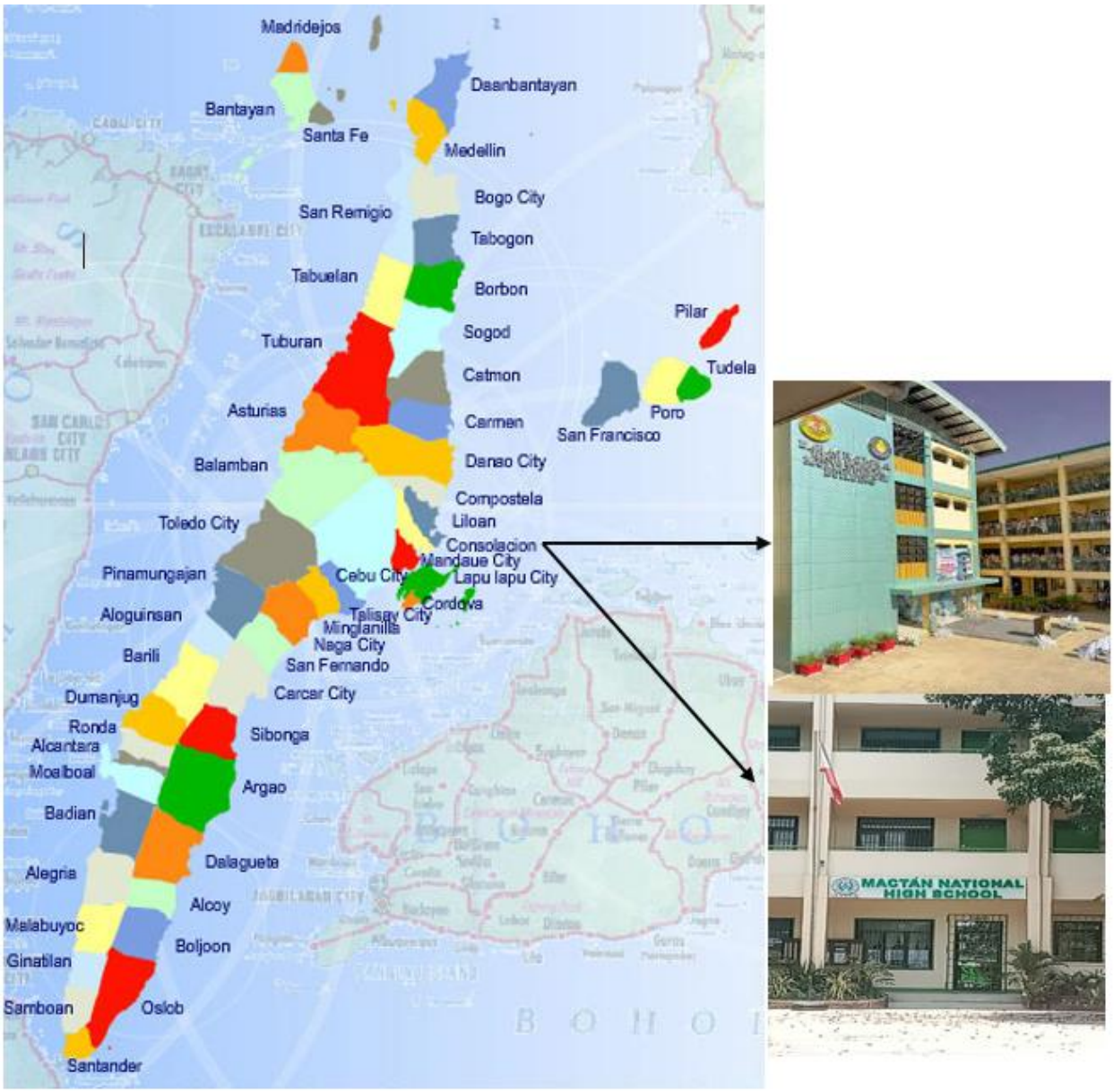


Figure 3. Location Map of the Research Environment

Respondents

The respondents of this study were the 15 Grade 9 Chemistry teachers of Mactan National High School, located in Puso, Mactan, Lapu-Lapu City, Cebu, Philippines, and 15 Grade 9 Chemistry teachers of Babag National High School, located in Babag, Lapu-Lapu City, Cebu, Philippines both under the Schools Division of Lapu-Lapu City of the Department of Education for a total of 30 teacher-respondents. These respondents were selected through total enumeration, which means all Grade 9 Chemistry teachers handling the subject during the conduct of the study were included.

Total enumeration was chosen because the target population is relatively small and manageable, ensuring that every teacher with direct experience in utilizing video-based lessons for Grade 9

Chemistry during Modular Distance Learning is represented; this approach eliminates sampling error, provides complete and reliable data, and strengthens the study's validity since the entire group of eligible teachers participated.

The participants were chosen based on the following criteria: they must be currently teaching Grade 9 Chemistry, they must have utilized or integrated video-based lessons alongside printed modules during Modular Distance Learning, and they must be officially assigned at either Mactan National High School or Babag National High School at the time of the study qualifications that ensure all respondents possess firsthand and relevant experience relevant to the focus of this research.

Table 1. Presents the distribution of respondents

School	Female	Male
Mactan National High School	12	3
Babag National High School	10	5
Total	**22**	**8**

Instrument

The instrument used in this study was a researcher-made questionnaire which can be found in the appendices. This was designed to gather relevant data on the demographic profile and teaching experiences of Chemistry teachers. The questionnaire was developed based on the objectives of the study.

The questionnaire consisted of two parts. Part I focused on the demographic profile of the respondents, including age, sex, years of teaching experience, educational attainment, and number of video-based lesson related training sessions attended. This part contained five (5) items intended to gather background information about the respondents.

Part II measured the respondents' level of utilization of video-based lessons in Chemistry during Modular Distance Learning (MDL) in terms of Preparation and Development of Video-Based Lessons; Implementation and Instructional Delivery; Alignment with Chemistry Learning Competencies; and Monitoring and Assessment of Learning. Each consisted of ten (10) items. Respondents were asked to indicate the extent to which each statement described their teaching experiences in integrating video lessons in instruction during MDL. Responses were rated using a five-point Likert scale: 5 – Excellent, 4 – Very Good, 3 – Good, 2 – Fair, and 1 – Poor.

Since the instrument was researcher-made, it underwent validation and reliability testing before the actual data collection. The content validity of the questionnaire was evaluated by three experts: two Master Teachers and one Doctor of Philosophy major in IT Management. They assessed the instrument in terms of clarity, relevance, appropriateness, and alignment with the research objectives. Their comments and recommendations were incorporated in the revision of the questionnaire.

After the validation process, the instrument was pilot-tested among 6 teachers in Marigondon National High School, which corresponds to 20% of the total sample size of 30 respondents. According to Isaac and Michael (1995) that the pilot sample should be between 10% to 20% of the actual participants. At the same time these teachers possessed characteristics similar to the target respondents but were not included in the actual study. The data obtained from the pilot testing were subjected to reliability analysis using Cronbach's Alpha. The computed reliability coefficient was 0.60 , indicating that the instrument possessed a high level of internal consistency and was suitable for use in the conduct of the study.

Ethical Considerations

This study was reviewed and approved by the Research Committee of the Graduate School, Cebu Technological University. All participants were fully informed about the purpose, objectives, and

nature of the study prior to their involvement, and informed consent was secured through a signed consent form clearly stating that participation was entirely voluntary. Respondents were further assured that they retained the right to withdraw from the study at any time without penalty or adverse consequence.

The **confidentiality and privacy** of all participants were strictly upheld throughout the research process. Personal information and collected data were treated as highly confidential and stored securely by the researcher; only the researcher had access to the raw materials, which were used exclusively for academic purposes. All identifying details were removed or coded to preserve anonymity in all reports, presentations, and publications resulting from this work.

Use of Artificial Intelligence. In the conduct of this study, artificial intelligence tools were utilized solely for the purposes of literature organization, grammar refinement, and clarity of expression. AI assistance was applied as a supportive aid to enhance the quality and consistency of the writing, not to generate content, analyze data, or formulate conclusions. All substantive work including the research design, data gathering, analysis, interpretation, and original writing remained the independent product of the researcher. Where AI tools contributed to language or formatting refinement, the researcher reviewed, verified, and assumed full responsibility for the final content, ensuring accuracy, integrity, and adherence to ethical academic standards.

Regarding collaborative terms of reference, this study was submitted in partial fulfillment of the academic requirements of the university and was conducted independently by the researcher. All expenses incurred in the conduct of the study were personally shouldered by the researcher. Publication rights reside primarily with the researcher; the thesis adviser may co-publish the work, provided that the researcher is listed as a co-author to acknowledge the primary contribution and ownership of the study.

Data Gathering Procedure

The data-gathering process for this study was divided into three major stages: Preliminary Stage, Data Gathering Stage, and Post-Data Gathering Stage. Each stage outlined the systematic steps undertaken to ensure the credibility and rigor of the research process in determining the teaching experiences of Chemistry teachers in utilizing video-based lessons during Modular Distance Learning (MDL).

During the **Preliminary Stage**, the researcher secured permission and approval from the concerned authorities, including the School Principals of Mactan National High School and Babag National High School. The researcher-made questionnaire was then prepared and reviewed to ensure alignment with the study's objectives regarding teachers' experiences in utilizing video-based lessons in Chemistry. Since the instrument was researcher-made, it underwent content validation by three experts to evaluate its clarity, relevance, and appropriateness for the target respondents. In addition, coordination with Chemistry teachers was conducted to identify the qualified respondents and to properly schedule the distribution and retrieval of the questionnaires, ensuring the orderly implementation of data gathering procedures in accordance with school protocols.

During the **Data Gathering Stage**, the researcher administered the validated questionnaire to the 30 Grade 9 Chemistry teachers selected through total enumeration from both schools. Before the distribution of the instrument, informed consent was obtained, and the purpose and objectives of the study were clearly explained to the respondents to ensure their voluntary participation and understanding of the research. Upon completion, all questionnaires were retrieved, and the responses were carefully collected, checked, and recorded systematically to ensure accuracy, completeness, and reliability of the data gathered for analysis.

During the **Post-Data Gathering Stage**, the collected data were organized, tabulated, and analyzed using appropriate statistical tools based on the research questions of the study. The profile of the

teacher-respondents was described in terms of age and sex, highest educational attainment, years of teaching experience, and number of trainings attended. The extent of teaching experiences was determined across four domains: Preparation and Development of Video-Based Lessons, Implementation and Instructional Delivery, Alignment with Chemistry Learning Competencies, and Monitoring and Assessment of Learning. Furthermore, a test of significant relationship was conducted to determine whether there was a meaningful association between the teachers' profile and their teaching experiences in utilizing video-based lessons. Finally, the findings served as the basis for drawing conclusions and for proposing a Teacher Training Program on Video-Based Instruction in Chemistry.

Statistical Treatment

The following statistical tools were used to analyze and interpret the data gathered in this study:

Frequency and Percentage. These were used to describe the demographic profile of the Chemistry teacher-respondents in terms of age and sex, highest educational attainment, years of teaching experience, and number of trainings attended related to Chemistry teaching and video-based lesson utilization.

Weighted Mean. This was used to determine the extent of teaching experiences of Chemistry teachers in utilizing video-based lessons during Modular Distance Learning (MDL) across the following dimensions: preparation and development, implementation and instructional delivery, alignment with Chemistry learning competencies, and monitoring and assessment of learning. It was computed to interpret the respondents' collective perceptions and presented together with the Standard Deviation (SD) to show homogeneity or spread of responses.

Standard Deviation. This measured the dispersion of individual scores from the mean; low SD values indicate consistency in the respondents' perceptions regarding their teaching experiences, while higher values suggest variability in their responses.

Spearman Rank-Order Correlation (Spearman rho). This non-parametric test was used to determine the significant relationship between the profile variables of the Chemistry teachers (age, highest educational attainment, years of teaching experience, and number of trainings attended) and their teaching experiences in utilizing video-based lessons during MDL. It measures the strength and direction of association between ranked variables.

Rank-Biserial Correlation / Mann-Whitney U Test. This was used specifically for sex (binary grouping) to determine whether there is a significant difference in teaching experiences between female and male Chemistry teachers.

Chi-Square / Cross-Tabulation. This was used to tabulate the distribution of respondents by age group and sex, showing both frequency and percentage distribution across categories.

Scoring Procedure

This part of the study presents the scoring procedure that was used to treat all data gathered on the teaching experiences of Chemistry teachers in utilizing video-based lessons during Modular Distance Learning (MDL).

Scoring Procedure for Preparation and Development of Video-Based Lessons

Scale	Numerical Rating	Verbal Description	Descriptive Interpretation
5	4.20 – 5.00	Excellent	The teacher systematically plans, simplifies abstract Chemistry concepts, verifies content accuracy, and prepares video lessons that match module topics with full consideration for students' device and internet access.

4	3.40 – 4.19	Very Good	The teacher plans, organizes, and develops video-based lessons that match module topics, simplify concepts, and are generally suitable to students' learning conditions and resources.
3	2.60 – 3.39	Good	The teacher prepares and develops video-based lessons with basic organization and content alignment, but with some limitations in concept simplification, verification, or consideration of student resources.
2	1.81 – 2.59	Fair	The teacher prepares video-based lessons with limited organization, partial alignment to module topics, and little attention to simplifying abstract concepts or checking student accessibility.
1	1.00 – 1.80	Poor	The teacher rarely prepares or organizes video-based lessons; content is not simplified, not verified, and does not match module topics or student learning conditions.

Scoring Procedure for Implementation and Instructional Delivery

Scale	Numerical Rating	Verbal Description	Descriptive Interpretation
5	4.20 – 5.00	Excellent	The teacher distributes video lessons through accessible platforms with clear instructions, integrates them with printed modules, releases them on schedule, and guides students to connect video content with module activities at their own pace.
4	3.40 – 4.19	Very Good	The teacher shares video lessons through accessible means, provides instructions, integrates them with printed modules, and guides students to use video content alongside their learning tasks.
3	2.60 – 3.39	Good	The teacher implements video lessons with basic distribution and instructions, but guidance, scheduling, or connection to printed modules is only partially provided.
2	1.81 – 2.59	Fair	The teacher distributes video lessons with limited instructions, irregular timing, and little guidance on how to connect video content to printed module activities.
1	1.00 – 1.80	Poor	The teacher rarely distributes video lessons, provides no clear instructions, and does not connect video content to printed module activities or learning schedules.

Scoring Procedure for Alignment with Chemistry Learning Competencies

Scale	Numerical Rating	Verbal Description	Descriptive Interpretation
5	4.20 – 5.00	Excellent	Video lessons fully correspond to K–12 Chemistry standards and MELCs, reinforce required skills, explain difficult competencies, and directly bridge gaps found in printed module explanations.
4	3.40 – 4.19	Very Good	Video lessons align with K–12 Chemistry standards and MELCs, reinforce expected skills, and explain most competencies that are difficult to understand through printed modules alone.
3	2.60 – 3.39	Good	Video lessons generally align with Chemistry competencies,

			but some topics or performance standards are only partially covered or insufficiently explained.
2	1.81 – 2.59	Fair	Video lessons align with only a few Chemistry competencies, do not consistently match MELCs, and rarely provide further explanation for difficult topics.
1	1.00 – 1.80	Poor	Video lessons do not correspond to prescribed Chemistry learning competencies, do not match curriculum standards, and do not support required learning outcomes.

Scoring Procedure Monitoring and Assessment of Learning

Scale	Numerical Rating	Verbal Description	Descriptive Interpretation
5	4.20 – 5.00	Excellent	The teacher tracks access and viewing, checks understanding through follow-up tasks, compares outputs for improvement, gathers feedback, and provides timely support using results to refine future video lessons.
4	3.40 – 4.19	Very Good	The teacher monitors access and engagement, checks understanding, evaluates outputs, gathers feedback, and identifies students needing additional support.
3	2.60 – 3.39	Good	The teacher monitors and assesses learning with basic checks, but follow-up, feedback, and instructional adjustments are limited or inconsistent.
2	1.81 – 2.59	Fair	The teacher rarely tracks student access or engagement, seldom checks understanding, and provides little feedback or follow-up assistance.
1	1.00 – 1.80	Poor	The teacher does not monitor access, check understanding, evaluate outputs, gather feedback, or provide follow-up support.

Definition Of Terms

To create a similar understanding, the following terms are defined operationally:

Alignment with Chemistry Learning Competencies. This refers to how closely the content, examples, and activities in the video lessons match the required K–12 Chemistry standards, Most Essential Learning Competencies (MELCs), and learning outcomes set by the Department of Education. It ensures that video lessons teach exactly what students are expected to learn in their Chemistry modules.

Challenges Encountered. These refer to the difficulties, problems, and barriers that Chemistry teachers face while using video-based lessons. These may include technical problems, lack of resources, limited time, or difficulties in making lessons easy for students to understand.

Demographic Profile. This refers to the personal and professional background of the Chemistry teacher-respondents. In this study, it includes age and sex, highest educational attainment, years of teaching experience, and number of trainings attended related to Chemistry teaching and video-based lessons.

Implementation and Instructional Delivery. This refers to how teachers share, distribute, and explain video lessons to students. It includes how videos are released, how instructions are given, how videos are used alongside printed modules, and how students are guided to learn from the lessons.

Modular Distance Learning (MDL). This refers to a way of teaching where students learn at home using printed modules provided by the school. In this study, video-based lessons are used together with these modules to help students understand Chemistry lessons better without attending face-to-face classes.

Monitoring and Assessment of Learning. This refers to how teachers check whether students have watched, understood, and learned from the video lessons. It includes tracking student participation, checking outputs, giving feedback, and measuring improvements in students' work.

Preparation and Development of Video-Based Lessons. This refers to the work teachers do before sharing video lessons with students. It includes planning the content, recording or creating videos, simplifying difficult Chemistry concepts, editing the videos, and checking if the content is correct and easy to understand.

Significant Relationship. This means that the connection between two sets of variables is not caused by chance. In this study, it determines whether teachers' profile (age, experience, training, etc.) affects their teaching experiences in using video-based lessons. The result is considered significant if the p-value is less than 0.05.

Video-Based Lessons in Chemistry. These are short educational videos created or used by Chemistry teachers to explain lessons, demonstrate concepts, or clarify topics that are hard to understand from printed modules alone. In this study, these videos are used to support students' learning during Modular Distance Learning.

RESULTS AND DISCUSSION

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

This chapter presents the teaching experiences of teachers in utilizing video-based lessons in Chemistry during Modular Distance Learning (MDL) in two of the very large schools categories in Lapu-Lapu City Division, Babag National High School and Mactan National High School for the school year 2025-2026.The presentation of data follows the sequence of the statement of the problem. The findings are organized systematically through tables, statistical treatment, analysis, and interpretation to provide a clearer understanding of the respondents' teaching experiences.

Demographic Profile of Chemistry Teachers

These profile variables such as age, sex, educational attainment, teaching experience, and trainings attended were included because they may influence teachers' readiness and ability to use video-based lessons in Modular Distance Learning. They provide essential background information to describe the respondents and determine whether personal and professional attributes relate to their teaching experiences with video-based instruction in Chemistry.

Age and sex

Age and sex serve as essential demographic indicators that may shape teachers' experiences and practices in utilizing video-based lessons during Modular Distance Learning.

Table 2 presents the distribution of respondents across age groups and by sex, to provide a clear profile of the Chemistry teachers in this study.

Table 2. Cross-Tabulation Matrix of Age and sex

Age Group	Female		Male		Total	
	f	%	*f*	%	*f*	%
35 to 39 years old	1	3.33	0	0.00	1	3.33
30 to 34 years old	8	26.67	3	10.00	11	36.67

25 to 29 years old	13	43.33	5	16.67	18	60.00
Sub-Total	**22**	73.33	**8**	26.67	**30**	100.00

Table 2 reveals the Cross-Tabulation Matrix of Age and Sex. The highest concentration of respondents belongs to the 25 to 29 years age group, comprising 18 or 60.00 percent of the total, while the lowest proportion falls in the 35 to 39 years age group with only 1 or 3.33 percent. In terms of sex, females represent the larger share at 22 or 73.33 percent, whereas males form the smaller share at 8 or 26.67 percent.

This implies that professional development and technology training should be offered equally to all teachers regardless of age or sex, since personal characteristics alone do not determine the ability to use video-based lessons effectively. This is backed by the Technological Pedagogical Content Knowledge (TPACK) Theory by Mishra and Koehler which explains that effective technology integration depends not on personal characteristics such as age or sex, but on the combination of content knowledge, teaching skills, and technical understanding. Even though the majority of respondents belong to the younger age group and are female, the theory suggests that being younger or female does not automatically guarantee better skills in using video-based lessons; rather, competence grows through acquired knowledge and practice, meaning that age and sex do not define how well teachers can integrate technology into instruction.

Lastly, several related literature sources provide empirical evidence supporting these findings. Ranbir stated that educational technology can help make learning more engaging and personalized, and provide access to many resources, but teachers and schools often face challenges when using it. Some of these challenges include limited access to devices or the internet, resistance to using new methods, and concerns about fairness for all students. Similarly, Baronia noted that teachers face many obstacles when using technology in classrooms, such as a lack of knowledge, limited support, and school policies. Abel also explained that teachers have different opinions about using technology in the classroom, and these opinions depend on where the school is, the resources available, and global trends in education rather than personal profile. Likewise, Bailey found that teachers feel that training and working with other teachers give them the skills and confidence to use technology in lessons not their age or sex. These studies provide empirical evidence consistent with the findings of this study, confirming that age and sex do not significantly influence teachers' experiences in utilizing video-based lessons.

Educational Attainment

Educational attainment reflects the professional preparation and academic background that may shape teachers' approaches to designing and delivering video-based lessons in Chemistry.

Table 3 presents the distribution of respondents by highest educational attainment to illustrate the academic qualifications of the Chemistry teachers in this study.

Table 3. Educational Attainment

Category	*f*	%
Doctorate Degree (units only)	2	6.67
Master's Degree (graduate)	1	3.33
Master's Degree (units only)	27	90.00
Total	30	100.00

Table 3 reveals the distribution of respondents by highest educational attainment. The highest proportion of respondents belongs to the Master's Degree (units only) category, comprising 27 or 90.00 percent of the total, while the lowest proportion falls in the Master's Degree (graduate) category with only 1 or 3.33 percent. Those with Doctorate Degree (units only) make up 2 or 6.67 percent of the total.

This implies that professional development should prioritize building technological knowledge and skills alongside academic advancement, since educational attainment alone does not guarantee the ability to design and deliver effective video-based lessons. This is backed by the Technological Pedagogical Content Knowledge (TPACK) Theory by Mishra and Koehler which explains that educational background builds strong content and pedagogical knowledge, but additional technological knowledge is still required to fully integrate video-based lessons into teaching. This means that while the teachers' graduate studies provide a solid academic foundation, their ability to effectively use video lessons depends on the combined knowledge of content, teaching methods, and technology not educational attainment alone.

Lastly, several related literature sources provide empirical evidence supporting these findings. Ranbir stated that educational technology can help make learning more engaging and personalized, and provide access to many resources, but teachers and schools often face challenges when using it. Similarly, Baronia noted that teachers face many obstacles when using technology in classrooms, such as a lack of knowledge, limited support, and school policies. Atabek also found that even with a lot of investment in educational technology, the biggest problems were not the hardware, but lack of training for teachers before and during their careers, limited support for lesson content, and weak incentive systems. In addition, Chander & Arora emphasized that integrating technology into classroom learning has become important for improving students' thinking and learning skills. These studies provide empirical evidence consistent with the findings of this study, confirming that educational attainment alone does not significantly determine teachers' experiences in utilizing video-based lessons.

Years of Teaching Experience

Years of teaching experience represent professional expertise and familiarity with Chemistry instruction that may influence how teachers develop and utilize video-based lessons.

Table 4 presents the distribution of respondents by years of teaching experience to show the experience profile of the Chemistry teachers in this study.

Table 4. Years of Teaching Experience

Category	*f*	%
10 or more years	1	3.33
7 to 9 years	7	23.33
4 to 6 years	10	33.33
1 to 3 years	12	40.00
Total	30	100.00

Table 4 reveals the distribution of respondents by years of teaching experience. The highest proportion of respondents belongs to the 1 to 3 years category, comprising 12 or 40.00 percent of the total, while the lowest proportion falls in the 10 or more years category with only 1 or 3.33 percent. The 4 to 6 years group accounts for 10 or 33.33 percent, and the 7 to 9 years group makes up 7 or 23.33 percent.

This implies that professional development should focus on multimedia design and video lesson structure for all teachers, regardless of experience level, since teaching seniority does not automatically translate to effective technology integration. This is backed by the Cognitive Theory of Multimedia Learning (CTML) by Richard Mayer which explains that effective video lessons depend on how well information is organized and presented not simply on how long a teacher has been teaching. This means that while experienced teachers may know Chemistry content very well, their ability to create clear, easy-to-follow, and effective video lessons comes from understanding

how students learn from visual and auditory media together, rather than from years of teaching alone.

Lastly, several related literature sources provide empirical evidence supporting these findings. Ranbir stated that educational technology can help make learning more engaging and personalized, and provide access to many resources, but teachers and schools often face challenges when using it. Similarly, Baronia noted that teachers face many obstacles when using technology in classrooms, such as a lack of knowledge, limited support, and school policies. Atabek also found that even with a lot of investment in educational technology, the biggest problems were not the hardware, but lack of training for teachers before and during their careers, limited support for lesson content, and weak incentive systems. Likewise, Bailey revealed that teachers feel that training and working with other teachers give them the skills and confidence to use technology in lessons. These studies provide empirical evidence consistent with the findings of this study, confirming that years of teaching experience do not significantly determine teachers' experiences in utilizing video-based lessons.

Number of Trainings attended on Video Lessons

Number of trainings attended on video lessons reflect professional development exposure that may shape teachers' skills and confidence in utilizing video-based lessons.

Table 5 presents the distribution of respondents by the number of video lessons-related trainings attended to illustrate the professional development profile of the Chemistry teachers in this study.

Table 5. Number of Trainings attended on Technology

Category	*f*	%
4 training attended	4	13.33
3 training attended	10	33.33
2 training attended	9	30.00
1 training attended	7	23.33
Total	30	100.00

Table 5 reveals the distribution of respondents by the number of video lessons-related trainings attended. The highest proportion of respondents belongs to the 3 trainings attended category, comprising 10 or 33.33 percent of the total, while the lowest proportion falls in the 4 trainings attended category with 4 or 13.33 percent. Those who attended 2 trainings account for 9 or 30.00 percent, and those who attended 1 training make up 7 or 23.33 percent.

This implies that limited training exposure may keep teachers at basic levels of technology use, and more comprehensive professional development is needed to help them advance toward meaningful transformation of Chemistry lessons. This is backed by the Substitution Augmentation Modification Redefinition (SAMR) Model by Puentedura which explains that technology integration progresses through four levels from simple replacement to full redesign and that advancing through these stages requires intentional learning, practice, and guidance. This means that with only around two trainings on average, most teachers may still be using videos as basic substitutes rather than creating powerful, redesigned learning experiences that fully leverage the potential of multimedia instruction.

Lastly, several related literature sources provide empirical evidence supporting these findings. Ranbir stated that educational technology can help make learning more engaging and personalized, and provide access to many resources, but teachers and schools often face challenges when using it. Similarly, Baronia noted that teachers face many obstacles when using technology in classrooms, such as a lack of knowledge, limited support, and school policies. Atabek also found that even with a lot of investment in educational technology, the biggest problems were not the hardware, but lack of training for teachers before and during their careers, limited support for lesson content, and weak

incentive systems. Likewise, Bailey revealed that teachers feel that training and working with other teachers give them the skills and confidence to use technology in lessons. These studies provide empirical evidence consistent with the findings of this study, confirming that the number of trainings attended matters and that more comprehensive professional development is essential for advancing teachers' experiences in utilizing video-based lessons.

Level of Utilization of Video-Based Lessons in Chemistry During Modular Distance Learning (MDL)

These four dimensions: Preparation and Development, Implementation and Instructional Delivery, Alignment with Chemistry Learning Competencies, and Monitoring and Assessment of Learning were selected to comprehensively capture the complete instructional cycle of video-based lesson utilization. They cover every essential stage from initial planning and creation to delivery, curriculum alignment, and evaluation, ensuring a holistic understanding of how teachers integrate video-based lessons into Chemistry instruction during Modular Distance Learning.

Preparation and Development

Preparation and Development cover the foundational phase of creating video-based lessons, an essential stage that directly influences the quality, clarity, and suitability of learning materials for Chemistry instruction.

Table 6 presents preparation and development of video-based lesson.

Table 6. Preparation and Development of Video-Based Lessons

S/N	Indicators	$\bar{x}$	SD	VD
1	I plan and organize Chemistry content systematically before creating video-based lessons.	3.27	0.45	Good
2	I simplify abstract Chemistry concepts to make them suitable and clear for video presentation.	3.10	0.31	Good
3	I develop or adapt video lessons that match the topics and lessons in the printed modules.	3.80	0.41	Very Good
4	I ensure that the language, examples, and visuals in the video lessons are easy for students to understand.	3.77	0.43	Very Good
5	I consider my students' internet connectivity and device availability when developing video lessons.	3.30	0.47	Good
6	I invest sufficient time in editing and organizing video lessons to ensure logical flow and coherence.	4.17	0.38	Very Good
7	I integrate clear explanations and demonstrations to clarify difficult Chemistry topics found in the modules.	3.60	0.50	Very Good
8	I verify the accuracy of Chemistry content, formulas, and examples used in the video lessons.	3.70	0.47	Very Good
9	I ensure that the length and pace of the video lessons are appropriate for self-directed learning.	3.83	0.38	Very Good
10	I prepare simple guides or prompts alongside video lessons to help students follow the content easily.	3.77	0.43	Very Good
	Overall	3.63	0.52	Very Good

Legend: 4.20-5.00 Excellent; 3.40-4.19 Very Good; 2.60-3.39 Good; 1.80-2.59 Fair; 1.00-1.79 Poor

Table 6 reveals the extent of teachers' experiences in the Preparation and Development of Video-Based Lessons. The highest rated indicator is investing sufficient time in editing and organizing video lessons to ensure logical flow and coherence, with a mean of 4.17 described as Very Good, while the lowest rated indicator is simplifying abstract Chemistry concepts to make them suitable and clear for video presentation, with a mean of 3.10 described as Good. The overall weighted mean is 3.63 with a standard deviation of 0.52, described as Very Good.

This implies that while teachers generally prepare video-based lessons well, they find it most challenging to simplify abstract Chemistry concepts for video presentation, indicating a specific area where targeted guidance and training are needed to improve lesson quality. This is backed by the Cognitive Theory of Multimedia Learning (CTML), which explains that effective multimedia materials require carefully combining words and visuals to reduce unnecessary mental effort and help learners grasp complex ideas. This means that investing time in editing and organization is valuable, but teachers also need clear principles on how to transform abstract concepts into clear, visual, and easy-to-understand presentations so students can truly understand difficult Chemistry topics.

Lastly, several related literature sources provide empirical evidence supporting these findings. Ranbir stated that educational technology can help make learning more engaging and personalized, and provide access to many resources, but teachers and schools often face challenges when using it. Similarly, Baronia noted that teachers face many obstacles when using technology in classrooms, such as a lack of knowledge, limited support, and school policies. Chander & Arora emphasized that integrating technology into classroom learning has become important for improving students' thinking and learning skills. Isnaini also explained that teachers find it hard to prepare learning materials, connect ideas, and choose the right teaching methods that fit all subjects and help all students learn well. These studies provide empirical evidence consistent with the findings of this study, confirming that preparing and developing clear, high-quality video lessons is a critical challenge requiring guidance, support, and skill-building in multimedia design.

Implementation and Instructional Delivery

Implementation and Instructional Delivery address the actual sharing, distribution, and instructional use of video-based lessons alongside printed modules, directly influencing how students access and engage with Chemistry content during Modular Distance Learning.

Table 7 presents the extent of teachers' experiences in implementation and instructional delivery.

Table 7. Implementation and Instructional Delivery

S/N	Indicators	$\bar{x}$	SD	VD
1	I share video lessons through accessible platforms that students can easily open and use.	3.37	0.49	Good
2	I provide clear instructions on how and when students should watch and use the video lessons.	3.57	0.50	Very Good
3	I integrate video lessons as supportive tools alongside printed modules in Modular Distance Learning.	4.17	0.75	Very Good
4	I guide students on how to connect video content with the activities and tasks in their modules.	3.43	0.57	Very Good
5	I release video lessons on time so they match the schedule and pacing of the printed modules.	3.57	0.68	Very Good
6	I use video lessons to introduce topics, explain concepts, or summarize lessons as needed.	3.70	0.47	Very Good
7	I make sure video lessons can be viewed repeatedly so students can review at their own pace.	3.57	0.50	Very Good

8	I encourage students to ask questions or clarify difficulties they encounter while watching the videos.	3.67	0.48	Very Good
9	I consider students' limited internet data and connectivity when sharing video lessons.	3.33	0.48	Good
10	I observe students' responses and adjust how I use video lessons to better suit their needs.	3.63	0.49	Very Good
	Overall	3.60	0.58	Very Good

Legend: 4.20-5.00 Excellent; 3.40-4.19 Very Good; 2.60-3.39 Good; 1.80-2.59 Fair; 1.00-1.79 Poor

Table 7 reveals the extent of teachers' experiences in Implementation and Instructional Delivery. The highest rated indicator is integrating video lessons as supportive tools alongside printed modules in Modular Distance Learning, with a mean of 4.17 described as Very Good, while the lowest rated indicator is considering students' limited internet data and connectivity when sharing video lessons, with a mean of 3.33 described as Good. The overall weighted mean is 3.60 with a standard deviation of 0.58, described as Very Good.

This implies that while teachers effectively integrate video lessons to support printed modules, they face notable challenges in addressing students' limited internet connectivity and data, calling for alternative delivery strategies that ensure all learners can access the content. This is backed by the Online Learning Engagement Framework by Dixson which explains that effective distance learning depends on ensuring accessibility, responsiveness, and ongoing support so that students can meaningfully engage with the material. This means that simply providing video lessons is not enough; teachers must also consider students' actual circumstances and adjust how content is shared so that connectivity limitations do not become a barrier to learning.

Lastly, several related literature sources provide empirical evidence supporting these findings. Ranbir stated that educational technology can help make learning more engaging and personalized, and provide access to many resources, but teachers and schools often face challenges when using it. Some of these challenges include limited access to devices or the internet, resistance to using new methods, and concerns about fairness for all students. Cha also explained that in developing countries, factors like government policies, technical infrastructure, teaching methods, and available educational materials affect how well technology can be integrated into lessons. Similarly, Mustafa, Nguyen, & Gao noted that rural schools face many challenges when trying to use technology in teaching, including lack of resources, poor internet access, and the gap between urban and rural schools. Akram further stated that teachers also face problems like slow internet, power outages, lack of equipment, and limited training. These studies provide empirical evidence consistent with the findings of this study, confirming that limited internet connectivity and resource accessibility remain key challenges in the effective implementation and delivery of video-based lessons.

Alignment with Chemistry Learning Competencies

Alignment with Chemistry Learning Competencies ensures that video-based lessons match prescribed curriculum standards and learning outcomes, making instructional materials relevant and purposeful for student achievement.

Table 8 presents the extent of teachers' experiences in aligning video-based lessons with Chemistry learning competencies.

Table 8. Alignment with Chemistry Learning Competencies

S/N	Indicators	$\bar{x}$	SD	VD
1	I ensure that every video lesson corresponds to the prescribed K–12 Chemistry learning competencies.	3.57	0.50	Very Good

2	I use video lessons to explain and reinforce specific skills and knowledge required in each Chemistry competency.	3.73	0.45	Very Good
3	I carefully match video content to the curriculum standards and learning outcomes set by DepEd.	3.33	0.48	Good
4	I use video lessons to explain Chemistry competencies that are difficult to understand through printed modules alone.	3.77	0.43	Very Good
5	I verify that concepts, examples, and activities in video lessons align with the official Chemistry curriculum scope.	3.83	0.38	Very Good
6	I use video lessons to help students achieve the specific performance standards indicated in the Chemistry curriculum guide.	3.83	0.38	Very Good
7	I ensure that video lessons cover the same topics and competencies assigned in the printed modules.	3.87	0.35	Very Good
8	I use video lessons to fill gaps or provide further explanation when module content is insufficient or unclear.	4.33	0.55	Excellent
9	I align video content with the Most Essential Learning Competencies (MELCs) in Chemistry.	3.63	0.49	Very Good
10	I regularly review video lessons to ensure they remain relevant and aligned with required Chemistry standards.	3.87	0.43	Very Good
	Overall	3.78	0.50	Very Good

Legend: 4.20-5.00 Excellent; 3.40-4.19 Very Good; 2.60-3.39 Good; 1.80-2.59 Fair; 1.00-1.79 Poor

Table 8 reveals the extent of teachers' experiences in aligning video-based lessons with Chemistry learning competencies. The highest rated indicator is using video lessons to fill gaps or provide further explanation when module content is insufficient or unclear, with a mean of 4.33 described as Excellent, while the lowest rated indicator is carefully matching video content to the curriculum standards and learning outcomes set by DepEd, with a mean of 3.33 described as Good. The overall weighted mean is 3.78 with a standard deviation of 0.50, described as Very Good.

This implies that teachers effectively use video lessons to clarify and supplement difficult topics, yet they find it more challenging to systematically align content with formal DepEd curriculum standards and outcomes, indicating a need for clearer curriculum guides and alignment tools. This is backed by the Technological Pedagogical Content Knowledge (TPACK) Theory by Mishra and Koehler which explains that effective technology integration requires a clear understanding of how content, standards, and digital tools work together. This means that while teachers successfully use videos to explain specific Chemistry concepts, stronger guidance and familiarity with official curriculum frameworks are still needed to ensure every video lesson fully reflects prescribed educational standards.

Lastly, several related literature sources provide empirical evidence supporting these findings. Chander & Arora stated that integrating technology into classroom learning has become important for improving students' thinking and learning skills, and that using technology in lessons can help students develop higher-order thinking skills and make learning more engaging. Isnaini noted that teachers find it hard to prepare learning materials, connect ideas between different subjects, and choose the right teaching methods that fit all subjects and help all students learn well. Cha also explained that factors like government policies, technical infrastructure, teaching methods, and available educational materials affect how well technology can be integrated into lessons. Atabek further found that limited support for lesson content remains a major challenge even when hardware is available. These studies provide empirical evidence consistent with the findings of this study, confirming that while teachers effectively use video lessons to clarify difficult topics, aligning video

content with official curriculum standards and learning outcomes remains a significant challenge requiring clearer guidance and support.

Monitoring and Assessment of Learning

Monitoring and Assessment of Learning allows teachers to track student progress, check understanding, and measure the effectiveness of video-based lessons in improving Chemistry learning outcomes.

Table 9 presents the extent of teachers' experiences in monitoring and assessing learning through video-based lessons.

Table 9. Monitoring and Assessment of Learning

S/N	Indicators	$\bar{x}$	SD	VD
1	I keep track of which students are able to access and view the video lessons provided.	4.13	0.43	Very Good
2	I include simple activities or questions to check whether students understood the video lessons.	4.00	0.59	Very Good
3	I compare students' outputs to see if their understanding improved after using the video lessons.	3.73	0.45	Very Good
4	I monitor student engagement by checking the completeness, quality, and timeliness of their submitted work.	3.20	0.41	Good
5	I gather feedback from students regarding the clarity, length, and usefulness of the video lessons.	3.73	0.45	Very Good
6	I assess whether students can apply concepts explained in the video lessons to their Chemistry tasks.	3.80	0.41	Very Good
7	I use students' scores and performance in module activities to evaluate the effectiveness of video lessons.	3.10	0.31	Good
8	I identify students who still experience difficulties and provide additional support or follow-up assistance.	4.23	0.43	Excellent
9	I observe changes in students' interest, participation, and motivation after using video-based lessons.	4.70	0.47	Excellent
10	I use monitoring results to improve the quality, clarity, and relevance of future video lessons.	3.43	0.50	Very Good
	Overall	3.81	0.64	Very Good

Legend: 4.20-5.00 Excellent; 3.40-4.19 Very Good; 2.60-3.39 Good; 1.80-2.59 Fair; 1.00-1.79 Poor

Table 9 reveals the extent of teachers' experiences in monitoring and assessing learning through video-based lessons. The highest rated indicator is observing changes in students' interest, participation, and motivation after using video-based lessons, with a mean of 4.70 described as Excellent, while the lowest rated indicator is using students' scores and performance in module activities to evaluate the effectiveness of video lessons, with a mean of 3.10 described as Good. The overall weighted mean is 3.81 with a standard deviation of 0.64, described as Very Good.

This implies that while teachers readily observe improved student engagement and provide timely support, they find it challenging to systematically use assessment results and performance data to measure and demonstrate the actual effectiveness of video-based lessons. This is backed by the Online Learning Engagement Framework by Dixson which explains that meaningful online learning requires not only observing interest and participation but also systematically measuring progress and outcomes to guide improvement. This means that recognizing positive changes in motivation is valuable, but teachers also need clearer guidance and tools to link video lesson use with actual

student performance so they can more confidently evaluate and strengthen their instructional practices.

Lastly, several related literature sources provide empirical evidence supporting these findings. Chander & Arora stated that integrating technology into classroom learning has become important for improving students' thinking and learning skills, and that using technology in lessons can help students develop higher-order thinking skills and make learning more engaging. Akram noted that teachers see technology as a helpful tool for making lessons more interactive and motivating for students, and believe using technology improves how they teach and makes learning more interesting. Ranbir explained that educational technology can help make learning more engaging and personalized, but teachers and schools often face challenges such as limited access, resistance to new methods, and concerns about fairness. Baronia also stated that teachers face many obstacles when using technology in classrooms, such as a lack of knowledge, limited support, and school policies. These studies provide empirical evidence consistent with the findings of this study, confirming that while technology effectively boosts student interest and engagement, systematically measuring its actual impact on learning outcomes through assessment and performance data remains a key challenge for teachers.

Test of Significant Between The Profile of The Chemistry Teachers and Their Level of Utilization of Video-Based Lessons in Chemistry

This correlative probe is included to determine whether personal and professional characteristics, such as age, sex, educational attainment, years of teaching experience, and number of trainings attended relate to or influence the teaching experiences of Chemistry teachers in utilizing video-based lessons during Modular Distance Learning. Identifying any significant relationship between profile variables and teaching experiences provides evidence on whether certain groups of teachers require more targeted support or intervention, thereby guiding the development of appropriate capacity-building programs and instructional policies that are responsive to the actual needs of the teachers.

Table 11 presents the significant difference between the profile of the chemistry teachers and their teaching experiences.

Table 11. Profile of Chemistry Teachers and their Teaching Experience

Variables under inference	Comp. value	Strength of Correlation	p-value	Decision	Remarks
Age and Teaching Experience	0.044	Very weak	0.818	Fail to reject H_o	No significant relationship
Sex (at birth) and Teaching Experience	-0.074	Very weak	0.697	Fail to reject H_o	No significant relationship
Educational Attainment and Teaching Experience	0.102	Very weak	0.592	Fail to reject H_o	No significant relationship
Years of Teaching Experience and Teaching Experience	-0.068	Very weak	0.720	Fail to reject H_o	No significant relationship
Number of Training Attended and Teaching Experience	0.159	Very weak	0.402	Fail to reject H_o	No significant relationship

Significant at $p < 0.05$ (two-tailed); *value represents the Rank-Biserial Correlation effect size derived from the Mann-Whitney U test; all other values represent computed Spearman rho coefficients.

Table 10 reveals the significant relationship between the profile of the Chemistry teachers and their teaching experiences in utilizing video-based lessons. All computed correlation values indicate very weak relationships, with all p-values exceeding the 0.05 level of significance. Consequently, the decision for all variables is to fail to reject the null hypothesis, leading to the conclusion that there is no significant relationship between the profile of the Chemistry teachers and their teaching experiences in utilizing video-based lessons.

This implies that teachers' age, sex, educational attainment, years of experience, and number of trainings attended do not significantly influence their teaching experiences in utilizing video-based lessons, meaning effective technology integration depends on factors beyond these personal and professional characteristics. This is backed by the Technological Pedagogical Content Knowledge (TPACK) Theory by Mishra and Koehler which explains that technology competence grows from the intersection of content knowledge, pedagogical skill, and technological understanding not from demographic or profile attributes alone. This means that professional development should focus directly on building the essential knowledge and skills needed to design and deliver video-based lessons, rather than targeting groups based on age, gender, experience, or educational background.

Lastly, several related literature sources provide empirical evidence supporting these findings. Ranbir stated that educational technology can help make learning more engaging and personalized, and provide access to many resources, but teachers and schools often face challenges when using it. Baronia noted that teachers face many obstacles when using technology in classrooms, such as a lack of knowledge, limited support, and school policies. Atabek found that even with a lot of investment in educational technology, the biggest problems were not the hardware, but lack of training for teachers before and during their careers, limited support for lesson content, and weak incentive systems. Bailey also revealed that teachers feel that training and working with other teachers give them the skills and confidence to use technology in lessons, not their personal or professional profile. These studies provide empirical evidence consistent with the findings of this study, confirming that there is no significant relationship between teachers' profile characteristics and their experiences in utilizing video-based lessons, and that effective technology integration depends on acquired knowledge, training, and support rather than on demographic or professional attributes.

Summary, Results, Conclusion and Recommendation

This chapter presented the summary, findings, conclusion and recommendation which may serve as guide for the researcher in crafting a Proposed Teacher Training Program on Video-Based Instruction in Chemistry.

Summary

This study on the teaching experiences of teachers in utilizing video-based lessons in Chemistry during Modular Distance Learning (MDL) aimed to determine the profile of Chemistry teachers in terms of age and sex, highest educational attainment, years of teaching experience, and number of trainings attended; the extent of their teaching experiences in utilizing video-based lessons specifically in terms of Preparation and Development, Implementation and Instructional Delivery, Alignment with Chemistry Learning Competencies, and Monitoring and Assessment of Learning; and whether a significant relationship exists between their profile and teaching experiences. Conducted at Mactan National High School and Babag National High School for School Year 2025–2026, the study employed a descriptive–correlational research design involving 30 Grade 9

Chemistry teachers selected through total enumeration. Data were gathered using a researcher-made questionnaire validated by three experts and pilot-tested for reliability, and were analyzed using frequency and percentage, weighted mean and standard deviation to describe the profile and extent of teaching experiences, and Spearman Rank-Order Correlation (Spearman rho) to determine the significant relationship between the variables.

Results

Demographic Profile of Chemistry Teacher-Respondents in terms of age and sex, the majority of respondents belong to the younger age range, indicating relatively young professional service overall, while females formed the larger portion and males the smaller share. Regarding highest educational attainment, nearly all respondents have pursued graduate studies, though only a few have completed a full master's degree or earned doctorate units. As to years of teaching experience, most respondents are early in their profession, with only a few having served for a decade or more. Concerning number of trainings attended related to Chemistry teaching and video-based lesson utilization, most teachers have attended only a modest number of relevant activities, reflecting limited opportunities for specialized preparation.

The general level of utilization across all dimensions was rated Very Good. Among the assessed areas, Monitoring and Assessment of Learning obtained the highest rating, showing that teachers are most capable of tracking engagement and providing support, though measuring effectiveness through performance outcomes remains difficult. Alignment with Chemistry Learning Competencies ranked second, demonstrating that video lessons effectively clarify difficult topics, yet matching content to official curriculum standards proved less consistent. Preparation and Development followed next, indicating generally strong material quality and organization, but translating abstract concepts into clear presentations remained a challenge. Implementation and Instructional Delivery received the lowest rating, revealing that while teachers successfully integrate videos with printed modules, ensuring equitable access despite limited connectivity remains the most significant concern. Collectively, performance across all areas was rated Very Good.

Significant Relationship Between Profile Attributes and Utilization Level mshowed no significant relationship between teacher profile attributes and their level of utilization of video-based lessons. All computed correlation values indicated very weak relationships, with results exceeding the chosen level of significance. Specifically, age, sex, educational attainment, years of teaching experience, and number of trainings attended showed no significant relationship with utilization level. Accordingly, the null hypothesis was not rejected, confirming that these personal and professional characteristics do not significantly influence utilization of video-based lessons. This implies that effective technology integration depends on factors beyond profile attributes, such as acquired skills, specific training, instructional support, and professional development opportunities.

Output of The Study

VIDEO-BASED LESSON EXEMPLAR IN CHEMISTRY

Schools: Mactan National High School | Babag National High School

Grade Level: 9 | Term: 2 | Week: 3

Subject: Science (Chemistry) | **Topic:** Chemical Bonding – Ionic and Covalent Bonds

Mode of Delivery: Modular Distance Learning (MDL) with Video-Based Lessons

Duration: 60 Minutes | Developed: Aligned with DepEd Learning Competencies

I. Objectives

At the end of the video-assisted lesson and accompanying activities, the learners should be able to:

1. Cognitive: Differentiate ionic bonding from covalent bonding by explaining how valence electrons are transferred or shared between atoms, and relate these processes to the Octet Rule;
2. Psychomotor: Use information presented in the video lesson to classify common compounds as ionic or covalent based on composition, formation model, and observable physical properties;
3. Affective: Recognize the importance of chemical bonding in the formation of everyday substances and appreciate how atomic-level interactions determine the properties of materials used in daily life.

DepEd Competency Alignment: Differentiate ionic from covalent compounds based on properties (e.g., melting point, solubility, electrical conductivity).

II. Subject Matter

Component	Details
Topic	Chemical Bonding – Ionic and Covalent Bonds
References	DepEd Grade 9 Science Learner's Material (Unit 2: Matter), pp. 164–175; DepEd Grade 9 Science Teacher's Guide, Quarter 2; Chemistry learning competencies and curriculum guide
Instructional Materials	Video-based lesson (6–8 minutes), printed learning module, simplified periodic table of elements, activity and assessment sheets, visual summary chart
Video Lesson Features	Animated illustrations of electron transfer and sharing; real-life examples; clear voice narration; on-screen key terms; embedded guide questions; downloadable low-bandwidth version; printed transcript included
Values Integration	Accuracy in observation, appreciation of scientific patterns, resourcefulness under limited connectivity conditions

III. Procedure

A. Preparatory Activities (5 Minutes)

- Review: The video opens with a 90-second recap of valence electrons and the Octet Rule. Learners review how elements seek stability by gaining, losing, or sharing electrons to achieve a full outer energy level. This connects prior knowledge to the new lesson and prepares the foundation for understanding bond formation.
- Motivation: The video presents familiar substances table salt, table sugar, and water and asks: *"These everyday materials are all made of atoms joined together. Why do atoms combine? How they are joined differently gives each substance its own properties?"* This question sets the purpose of the lesson and links abstract Chemistry concepts to learners' daily experiences.

B. Lesson Proper (30 Minutes Video Viewing + Guided Activities)

1. Presentation and Exploration

- Learners view the video lesson in sections or continuously. The video introduces ionic bonding through the example of sodium chloride (table salt), clearly showing how sodium transfers one valence electron to chlorine. Animated diagrams illustrate the formation of ions and the electrostatic attraction that bonds them together.

- Next, the video introduces covalent bonding using water (H_2O) as the primary example, showing how hydrogen and oxygen atoms share electrons to achieve stability. Visual comparisons highlight that no electrons are transferred only shared.
- The video then systematically contrasts key properties: state at room temperature, melting point, solubility in water, and ability to conduct electricity. Real-world footage demonstrates these differences to reinforce understanding.

2. Analysis and Guided Inquiry

- At designated pause points in the video, learners respond to embedded guide questions found both on-screen and in their printed modules:
- "Which type of element typically transfers electrons? Which type shares them?"
- "Why do ionic compounds generally have higher melting points than covalent compounds?"
- "If a compound dissolves in water and conducts electricity, is it more likely ionic or covalent?"
- These questions direct learners to actively process information rather than passively watch, supporting engagement and comprehension.

3. Abstraction and Concept Building

- Following the video, learners consolidate key ideas using the summary section in their modules. The core generalizations are emphasized:
- Ionic bonds form between metals and nonmetals through the complete transfer of electrons, producing ions that attract one another.
- Covalent bonds form between nonmetals through the sharing of electron pairs.
- Differences in bonding directly explain differences in physical and chemical properties.
- The video's closing segment reinforces these points with a concise comparison table, helping learners organize their understanding.

4. Application and Independent Practice

- Learners complete a classification activity in the printed module: eight common compounds are listed, and learners classify each as ionic or covalent using the patterns and examples presented in the video. They also provide one supporting property as justification.
- This activity allows learners to apply what they observed, assess their own understanding, and identify areas requiring further review.

C. Assessment and Feedback (15 Minutes)

- Formative Assessment: A 5-item self-check quiz aligned with the video content: 3 items require identification of bond type from formula or description; 2 items relate bond type to observed properties. Answer key and brief explanations are provided so learners receive immediate feedback.
- Performance Task Option: Learners identify three substances in their own home, predict bond type based on what they learned, and record one observable property that supports their prediction.
- Teacher Monitoring: Teachers review completed activity sheets and quiz responses to track progress. Common misconceptions such as assuming all bonds are purely one type or confusing physical state with bond category are noted and addressed in follow-up guidance.

D. Enrichment and Remediation (Optional)

- For Advanced Learners: Extension segment in the video introduces polar versus nonpolar covalent bonding as an advanced preview.
- For Learners Needing Support: Simplified summary diagrams, keyword lists, and the video transcript are provided so learners can review at their own pace, especially when internet access limits repeated viewing.

IV. Teacher's Guidance and Implementation Notes

- Video Design and Quality: The lesson video is kept concise (6–8 minutes) to maintain engagement and accommodate limited data or storage capacity. Visuals focus on atomic-level animations rather than complex footage to ensure clarity and smaller file size. Key terms appear on-screen and are spoken aloud to reinforce learning.
- Connectivity and Accessibility: Recognizing that limited internet connectivity is a major challenge in Modular Distance Learning, the video is provided in a compressed, low-bandwidth format that can be downloaded once and shared offline. A complete printed transcript, simplified diagrams, and summary charts are included in every module so learners without reliable internet access are not disadvantaged. This directly addresses the lowest-rated area from the study Implementation and Instructional Delivery related to equitable access.
- Curriculum Alignment: All content, examples, activities, and assessment items are purposefully matched to DepEd learning competencies, ensuring that video content consistently supports curriculum standards. The exemplar serves as a reliable tool to improve alignment between video lessons and official Chemistry learning competencies.
- Monitoring and Assessment: The exemplar integrates clear, observable indicators of learning progress. Teachers can systematically track which learners are mastering concepts and which need additional support, strengthening the Monitoring and Assessment of Learning the highest-rated strength identified in the study. Answer keys and performance indicators are standardized so assessment is consistent across both Mactan and Babag National High Schools.
- Preparation and Development Support: This exemplar provides a ready-made, structured template that Chemistry teachers may adapt to other topics throughout the school year. It reduces the burden of designing materials from scratch, demonstrates how abstract Chemistry concepts may be visually simplified, and offers a consistent quality standard especially valuable for teachers with fewer years of experience or limited specialized training.

V. Reflection and Continuous Improvement

After implementing this lesson, teachers are encouraged to reflect on the following questions and record observations for future improvement:

- Did the video animations and examples effectively clarify the difference between electron transfer and electron sharing? Which part of the concept remained unclear to learners?
- Were the video format, file size, and delivery method accessible to all learners? How many experienced difficulty accessing or viewing the material?
- Did the activities and assessment successfully measure mastery of the learning objectives? What common errors or misconceptions appeared in student work?
- How may the exemplar be improved or adapted to better support diverse learning needs, limited resources, and varying levels of internet connectivity?

Conclusion

Based on the findings of the study, it is concluded that Chemistry teachers demonstrate positive and capable experiences in utilizing video-based lessons as instructional support during Modular Distance Learning, regardless of their personal and professional backgrounds. Video-based lessons serve as valuable tools to clarify difficult concepts, reinforce learning competencies, and sustain student engagement, though effective implementation is shaped primarily by the quality of guidance, resources, and infrastructure rather than by teachers' age, sex, educational attainment, years of experience, or previous training exposure. Consequently, developing meaningful technology integration in Chemistry instruction depends less on who the teachers are and more on the support they receive specifically through targeted professional development, improved connectivity and accessibility, clearer curriculum alignment tools, and practical strategies that help them design, deliver, and assess video-based lessons more effectively. As such, strengthening these enabling conditions will better equip teachers to harness the full educational potential of video-based instruction and improve student learning outcomes in distance learning environments, Based on the findings showing an overall Very Good utilization rating, Chemistry teachers at both Mactan National High School and Babag National High School are encouraged to adopt the Video-Based Lesson Exemplar in Chemistry as a standardized instructional guide. Since Monitoring and Assessment of Learning ranked highest, teachers may use the exemplar's frameworks to further strengthen tracking of student engagement and outcomes, while applying its structured design to better align video content with Chemistry learning competencies and improve clarity when presenting abstract concepts. The exemplar serves as a reliable reference to address inconsistencies in curriculum alignment and help translate difficult topics into clear visual presentations, regardless of differences in teacher background or experience, Particular attention should be directed toward Implementation and Instructional Delivery, the lowest-rated area, where limited connectivity remains the primary barrier. Teachers at both schools are advised to adapt the Video-Based Lesson Exemplar in Chemistry to design simplified, low-bandwidth versions of lessons and supplementary materials that ensure equitable access for all learners under Modular Distance Learning. By integrating video content with printed modules following the exemplar's structure, teachers can maintain consistent instructional quality while mitigating access challenges caused by infrastructure limitations, Notably, findings revealed no significant relationship between teacher profile attributes and utilization level, indicating that age, sex, educational attainment, years of experience, or prior training do not strongly influence effective use. Consequently, all teachers especially those with fewer years of service or limited specialized training can confidently implement the Video-Based Lesson Exemplar in Chemistry with equal likelihood of success. The exemplar thus compensates for gaps in preparation, enabling teachers across both schools to achieve and sustain high-quality technology-integrated instruction regardless of personal or professional background.

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