



# Effects of Video Tutorials on the Academic Performance and Learning Interest of Grade 9 Chemistry Learners

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DOI: <https://dx.doi.org/10.47772/IJRISS.2026.100400437>

Received: 20 April 2026; Accepted: 25 April 2026; Published: 13 May 2026

## INTRODUCTION

In recent years, the integration of technology in education has transformed traditional teaching approaches, offering innovative ways to enhance learners' learning. Among these, video-based learning has emerged as an effective instructional tool that supports learners' understanding of complex concepts and promotes active engagement in science education, particularly in topics such as chemical bonding. Learners often encounter difficulties due to the abstract nature of the content. This highlights the need for instructional strategies that can simplify concepts while maintaining the learner's interest

Learners often prefer multimedia instruction that reflects the technologies they use outside school (Jukes & Schaaf, 2019). Chemical bonding, for instance, is inherently abstract, making it difficult for many learners to grasp (Widarti et al., 2024). The use of visual tools such as videos, images, and simulations can help learners better visualize atomic and molecular processes (Asedillas & Quimbo, 2019). Studies have shown a well-designed video tutorials can enhance learners' engagement and academic performance by addressing diverse learning needs (Whitney & Dallas, 2019; Lopes, 2023). These materials provide a visually engaging and flexible learning environment, allowing learners to process information more effectively.

The effectiveness of video-based learning is supported by established theories. Paivio's Dual Coding Theory (1971) explains that learners process information through both verbal and visual channels, improving comprehension and retention when both are used. This supports the use of video tutorials as a meaningful instructional tool,

In the Philippines context, the importance of educational technology became more evident during the COVID-19 pandemic, when learners faced limited teacher interaction, unstable internet access, and challenges in independent learning (Tria, 2020). In response, the Department of Education (DepEd) emphasized the use of digital learning tools, including teacher-developed video tutorials, to support continuity of learning.

Video tutorials also promote independent learning by allowing learners to control the pace of instruction through pausing, replaying, and reviewing content (Brame, 2016). This is particularly beneficial for learners who need additional time to understand lessons, including non-native English speakers (Mecida et al., 2016). Moreover, learner interest plays a crucial role in effective learning. Learners are more likely to engage in subjects they find relevant and interesting (Lai et al., 2016). Video tutorials can enhance motivation by presenting lessons in an interactive and visually appealing manner, making learning more meaningful and engaging (Breslyn & Green, 2022; Mecida et al., 2023).

Beyond academic performance, learners' interest is crucial to effective learning. Studies indicate that learners are more likely to engage in subjects they find interesting and relevant (Lai et al., 2016). Besides academic performance, student interest is key to effective learning, as research shows that students are more engaged in subjects that they find interesting and relevant. Video tutorials can boost motivation and interest by making lessons more interactive and visually appealing.

Moreover, video tutorials have been found to significantly increase learners' interest and motivation. When lessons are presented in a visually engaging and interactive format, learners are more likely to participate



actively and develop a positive attitude toward the subject (Lai et al., 2016). Research also highlights that technology bn-based instructional materials can make learning more enjoyable, accessible, and meaningful, thereby improving both engagement and academic outcomes (Breslyn & Green, 2022; Mecida et al., 2023).

Despite the advantages of the use of videos, it must be noted that the effectiveness of video tutorials depends on their design, usability, and relevance to learners' needs (Lange et al., 2020). Also, although using visual and auditory media in video lectures is clear, online educators need to be mindful of the potential drawbacks that can arise from their misuse. Lange et al. (2020) stated that information transfer issues can arise when media are presented in ways that restrict viewers' concentration, attention, interest, and engagement. Based on a study by Bullo (2021), most students are less engaged in listening during lectures. This implies that learners who are not actively engaged in lectures may struggle to comprehend and retain information, resulting in lower academic performance. Moreover, his findings suggest that educators should explore and implement teaching strategies that promote active listening and engagement. Despite these promising advantages, gaps remain in existing literature. While many studies emphasize the effectiveness of video tutorials in improving learners' understanding and engagement, there is limited research focusing on their combined impact on both academic performance and learners' interest, particularly in grade 9 chemistry. Additionally, there is a need to explore the effectiveness of researcher-made video tutorials that are specifically designed to align with learners' needs.

Therefore, this study aims to investigate the effect of researcher-made video tutorials in enhancing the academic performance and learning interest of Grade 9 chemistry learners. Specifically, it seeks to determine whether the integration of video tutorials can improve learners' understanding of chemical bonding and increase their engagement in the learning process.

### **Framework of the Study**

This study draws on a range of educational theories to comprehensively examine the effect of video tutorials on both academic performance and learning interest among grade 9 Chemistry learners. Central to this exploration is the combination of Miller's information processing theory (1956) and Mayer's cognitive multimedia learning theory (1990), which provides a strong basis for constructing effective video tutorials that can enhance learning outcomes. Miller's theory focuses on the limited capacity of short-term memory and on chunking information to enhance retention, whereas Mayer's theory explains how multimedia learning involves dual-channel processing and active processing to facilitate understanding. By designing video tutorials with organized content, learners can process and store information more effectively.

Moreover, Paivio (1971) emphasizes the benefits of presenting information across modalities simultaneously in his dual coding theory. This theory, along with Mayer and Moreno's cognitive theory of multimedia learning, underscores how integrating auditory and visual information can enhance learning by providing mutual reinforcement. According to Dual Coding Theory (DCT), combining visual and auditory stimuli can alleviate the cognitive load associated with relying on a single modality, thereby facilitating better understanding and retention of information.

Additionally, Sweller's cognitive load theory, introduced in 1988, emphasizes minimizing germane cognitive load in instructional design. This principle is particularly pertinent when designing video tutorials. By meticulously crafting these tutorials to concentrate on essential content while eliminating extraneous distractions, educators can optimize students' cognitive resources and foster deeper understanding.

This careful design approach not only enhances comprehension but also enables learners to process information more effectively, thereby improving overall academic performance. Moreover, this study's theoretical framework establishes video tutorials as a powerful instructional tool that enhances academic performance by improving cognitive processing and boosting learners' interest through an engaging, technology-driven learning environment. The strategic application of these theories ensures that video tutorials are designed to maximize learning potential, making education more accessible, interactive, and effective for grade 9.



## Statement of the Problem

The purpose of this study is to determine the effect of video tutorials in enhancing learners' academic performance and interest during the school year 2025-2026. Specifically, this sought to answer the following questions:

1. What is the level of academic performance of grade 9 Chemistry learners in the pretest and posttest following the use of video tutorials?
2. What is the level of interest of grade 9 Chemistry learners toward the use of video tutorials in terms of:
  - A. learning satisfaction;
  - B. perceived ease of use; and,
  - C. perceived usefulness
3. Is there a significant difference in the academic performance of grade 9 Chemistry learners before and after exposure to video tutorials?
4. Is there a significant difference in the level of interest of grade 9 Chemistry learners before and after exposure of video tutorials in terms of learning satisfaction, perceived ease of use and perceived usefulness?

## Null Hypothesis

Ho1: There is no significant difference in the academic performance of grade 9 Chemistry learners when taught using video tutorials.

Ho2: There is no significant difference in the level of interest of grade 9 Chemistry learners when taught using video tutorials.

## Significance of the Study

This study aimed to provide valuable insights into how video tutorials effectively affect learners' academic performance and interest. The following are the study's beneficiaries:

For *learners*, this study has significant implications, providing insights into how video tutorials can enhance their academic performance. Through understanding the benefits of this learning method, learners can take advantage of customized learning opportunities that are tailored to their individual learning style and pace. The study can motivate learners to incorporate video tutorials as supporting materials. In general, this study allows learners to become more involved in their learning, which can lead to improved academic performance and a better understanding of the subject.

For the *teachers*, this research serves as a valuable resource for refining pedagogical approaches. By illuminating the relationship between video tutorials and academic performance, teachers can better understand how to integrate these tools into their instructional strategies. The study encourages teachers to explore innovative teaching methods that leverage technology, which have led to more effective classroom practices and improved learners' performance.

For the *parents*, it highlights the role of video tutorials in enhancing their children's academic performance. Understanding the effectiveness of this learning tool enables parents to better support their children's education, particularly in supplementing traditional teaching methods.

For the *school administrators*, the study highlights the importance of adopting modern educational technologies to enhance teaching and learning. Schools can use the insights from this research to incorporate video tutorials into their curriculum, thereby creating a more dynamic and interactive learning environment. This shift not only supports academic achievement but also prepares learners for a technology-driven world.



The findings of this study can advocate for the resources and training needed to enable teachers to effectively use video tutorials in their classrooms.

For the *researchers*, this study provides valuable information on the effectiveness of video-based learning in improving learners' academic performance and interest in chemistry. It may serve as a reference for future studies related to technology-integrated instruction.

For *policymakers*, the findings can inform national or regional curriculum documents, proposing the possible contributions of video tutorials to achieving certain goals and stimulating student interest.

### Delimitations of the Study

The use of a one-group pretest-posttest design limits the ability to attribute improvement solely to the intervention, as factors such as testing effects and prior exposure may have influenced the results. The research was conducted exclusively with a single intact class of 50 grade 9 Chemistry learners at a private comprehensive school in the province of Bukidnon during the second quarter of the academic year 2025-2026. Furthermore, the study's focus was confined to the specific Chemistry topics of ionic, covalent, and metallic bonding, as outlined in the second quarter of the K-12 Basic Education Curriculum, thereby limiting its applicability to other subject matter.

Data collection utilized a 30-item researcher-made multiple-choice test and a survey questionnaire to measure interest. The intervention itself was restricted to researcher-made video tutorials, and the study's timeframe was limited to the period required for pretest, intervention, and posttest, excluding the long-term effects.

### Definition of Terms

The following terms are theoretically and operationally defined for the better understanding of this study. Defining key terms facilitate a common understanding of crucial concepts of the study:

**Academic Performance.** Academic performance is an indicator of a student's mastery of a subject matter, their ability to apply knowledge, and their level of engagement and effort in their study (Proctor Edu, 2024). In this study, it evaluates changes in academic performance using pretest and posttest scores for the selected topics.

**Interest.** Interest refers to a learner's level of attention and motivation toward a subject (*APA Dictionary of Psychology*, 2018). In this study, interest in video tutorials was assessed using Rivera's (2022) instrument, which includes learning satisfaction, perceived ease of use, and perceived usefulness.

**Video Tutorials.** Video tutorials are multimedia resources specifically designed to teach or guide viewers in completing a task (TechSmith, 2024). In this study, a video tutorial refers to the researcher-made materials used to teach science concepts to a group of grade 9 learners. It includes different teaching strategies like dual coding strategy, chunking, microlearning, and guided practice with feedback.

## METHODOLOGY

This chapter discusses the methodology used by the researcher. This chapter includes research design, research locale, study participants, research instrument, development of the lessons, data gathering, research ethics, management of the class, and treatment of the data.

### Research Design

This study utilized a one-group pretest-posttest design (Campbell & Stanley, 1963) to investigate the effectiveness of video tutorials on grade 9 Chemistry learners' academic performance and interest. The one-group pretest-posttest design was employed to gain an initial understanding of the potential effects of the video tutorial intervention, while acknowledging the limitations of the lack of a control group. This design can provide useful initial data that justifies future, more rigorous comparative studies (Knapp, 2016). This design



requires a single group of learners to be assessed before and after the introduction of an intervention material to effectively measure learners' progress, enabling educators to assess knowledge gains and the impact of the video tutorial (Solé-Llussà, A. et al., 2022).

### **Research Locale**

The study was conducted within the basic education department of a private comprehensive college in the province of Bukidnon. It is a private educational institution situated in Valencia City that offers a comprehensive curriculum spanning kindergarten through college, encompassing junior high school, senior high school, and various undergraduate programs. Established 36 years ago, the institution remains dynamic.

The school provides training and seminars for teachers' professional growth, including InSeT programs. Each teacher has a personal laptop for completing various reports. However, designing video tutorials for their lessons remains beyond their current capacity.

The school has a computer laboratory with sufficient functional units for digital learning, stable internet connectivity, classroom monitors for video presentations, and a science laboratory for lesson reinforcement. Teachers have their own laptops for instructional preparation and have experience in integrating ICT into teaching. These infrastructures ensure that researcher-made video tutorials can be delivered, accessed, and evaluated effectively in controlled classroom settings.

### **Participants of the Study**

A purposive sampling method was used to select the study participants. The inclusion criteria comprised of 50 grade 9 learners enrolled in the intact class, aged 14-16 years, who were present for the full intervention period during the pretest, video tutorials, and posttest; and who provided written assent along with the parental or guardian consent. Exclusion criteria were on learners absent for more than 20% of intervention sessions; those who refuse assent or consent, or individuals with pre-existing medical conditions that prevent effective participation in the video tutorial.

These criteria ensure data integrity by including only fully participating learners capable of completing all assessments; while excluding those whose incomplete involvement could introduce bias into the pretest-posttest comparisons and compromise the study's validity. Since there is only one class per grade level, this number of learners provides a good balance between useful information and manageable data collection (Etikan & Bala, 2017). By studying a whole class, the researcher can gather data within their normal learning environment.

Focusing on the specific grade 9 learners ensures that the study is directly relevant to the institution and can provide valuable insights into how well video tutorials work for the group. The findings are limited in generalizability because only one intact class was studied; future research should include more schools or classes. A sample size of 50 is sufficient for t-test analysis, though larger samples are recommended for stronger generalization.

### **Research Instrument**

The researcher used the following tools in this study to collect the necessary data to answer the study's problem. The researcher utilized a 30-item researcher-made multiple-choice test for the second quarter of grade 9 Science under the K-to-12 basic education curriculum. The instrument underwent pilot testing that validated and assessed its reliability. The pretest assessed learners' prior knowledge of the specific learning content on chemical bonding, including the different types: ionic, covalent, and metallic bonding.

The test follows the score range and grading scale, with the corresponding descriptors, as per DepEd Order No. 8, s. 2015. The test was also validated by three experts based on content accuracy, appropriateness, clarity, and grammar.

### Scoring Guide for Academic Performance Test

Performance level	Grading Scale	Score Range	Qualifying Statement
Outstanding	90-100	26-30	Exceeds the core requirements in terms of knowledge, skills and understanding and can transfer them automatically and flexibility through an authentic task.
Very Satisfactory	85-89	21-25	Develops the fundamental knowledge, skills and understanding and can transfer them automatically and flexibility through an authentic task.
Satisfactory	80-84	16-20	Develops the fundamental knowledge, skills and understanding and can transfer them automatically and flexibility through an authentic task.
Fairly Satisfactory	75-79	11-15	Possesses the minimum of knowledge, skills and understanding but needs help throughout the authentic task.
Did Not Meet Expectations	Below 75	10 below	Struggles with understanding the prerequisite and fundamental knowledge and skills.

The learning content, technical design, and the presentation and organization of the researcher's video tutorial were evaluated for content technology validity by subject matter experts. This ensured that the content aligns with established learning objectives and effectively covers key concepts. Additionally, the survey questionnaire developed by Rivera (2022) was used in this study and distributed to assess students' level of interest. This helped gauge learners' interest in using video tutorials as a resource for learning science lessons. It included the learning satisfaction, perceived ease of use, and perceived usefulness.

### Scoring Guide for Learner’s Interest

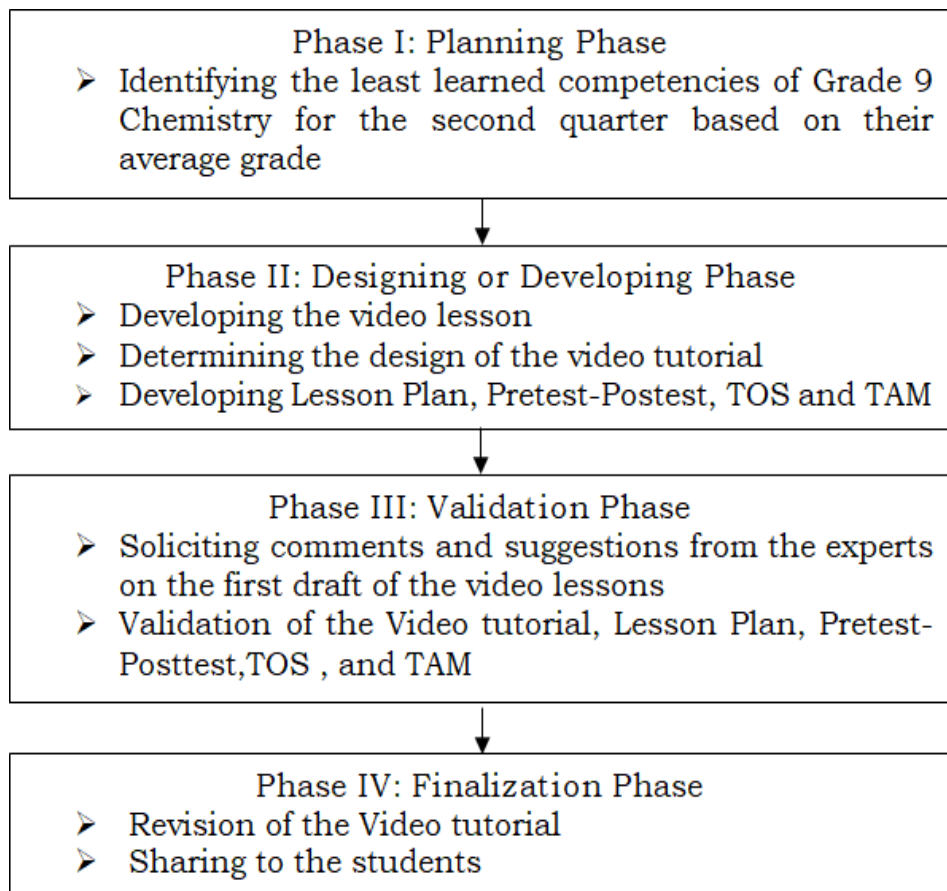
To clarify the scoring for the survey questionnaires, the five-point Likert scale is presented, along with the mean score ranges and how they are interpreted.

Weight/ Scale	Mean Score Range	Qualitative Description	Qualifying Statements
5	4.21-5.00	Strongly Agree	The learners show very high interest in using video tutorials in chemistry.
4	3.41-4.20	Agree	The learners show a positive interest in using video tutorials in chemistry.
3	2.61-3.40	Neutral	The learners show a moderate or uncertain interest in using video tutorials in chemistry.
2	1.81-2.60	Disagree	The learners show low interest in using video tutorials in chemistry.
1	1.00-1.80	Strongly disagree	The learners show a very low or no interest in using video tutorials in chemistry.

## Development of the Lessons

The researcher adapted a modified lesson development framework from Jeremias and Carreto (2022) to ensure a structured, effective instructional design. The process followed is presented in Figure 2.

Figure 2 Procedural Framework in Developing the Lesson



### Planning Phase

In the planning phase, a comprehensive analysis of academic performance data was conducted, and based on the teacher's feedback, chemical bonding topics were identified as one of the least learned competencies. As seen in the grade 9 Chemistry topics, chemical bonding requires more time to discuss with learners, so they are well-acquainted with the topic. Moreover, it was observed that the learners received low marks in the second grading period, during which chemical bonding topics were discussed. To address these challenges, the study aims to integrate video tutorials as a supplementary instructional tool that focuses on chemical bonding.

### Designing or Developing Phase

In this phase, the focus is on creating and organizing all the necessary materials for the video lesson. This includes developing the video lesson content and determining the overall design and structure to make it engaging and easy to understand. The video's design included understanding key topics in chemical bonding, namely ionic, covalent, and metallic bonds. The video tutorial was incorporated into one of the components of the 7Es's lesson plan model, the Elicit, Engage, Explore, Explain, Elaborate, Evaluate, and Extend, which is officially recognized by the Department of Education (DepEd) in the Philippines as an effective framework for improving teaching and learning outcomes.

A 3–5-minute video tutorial served as a flexible and self-paced learning tool that allows learners to visualize complex concepts. This length of time is an effective way to chunk learning content, aiding comprehension of complex subjects by managing cognitive load (Brame, 2017). Using visual elements such as diagrams and



animations, paired with clear auditory narration, was the application of the dual coding strategy. The content was structured into short, focused segments that explain each bonding type, followed by examples and summaries to reinforce learning. Additionally, the video incorporated guided practice with feedback, where learners' answers were embedded with questions and received immediate feedback, helping to correct misconceptions and promote deeper understanding (Wong et. al., 2024). Additionally, a pretest and posttest were prepared to assess learners' learning progress, along with a table of specifications (TOS) and task analysis matrix to ensure that the assessments align with the lesson objectives.

### **Validation Phase**

To ensure the validity and reliability of the instruments used in this study, several measures were undertaken. The 30-item researcher-made test, designed to assess grade 9 learners' prior knowledge of chemical bonding under the K-12 basic education curriculum, was evaluated for content validity by subject-matter experts. These experts reviewed the test items to ensure alignment with established learning objectives and coverage of key concepts. Subject-matter experts also evaluated the researcher-made video tutorial to confirm that its content effectively aligned with the learning objectives.

For the learners' interest questionnaire, developed by Rivera (2022), construct validity was established by evaluating whether the instrument accurately measured constructs such as learning satisfaction, perceived ease of use, and perceived usefulness. Furthermore, this study ensured that its instruments were valid and reliable for measuring learners' academic performance and their interest in using video tutorials for learning science.

### **Finalization Phase**

In this phase, the focus is on finalizing the video tutorial to ensure it is polished and effective. This included revising the video based on feedback and making any necessary improvements. Once the revisions were complete, the finalized video tutorial was shared with learners, providing them with a valuable learning resource.

### **Data Gathering Procedure**

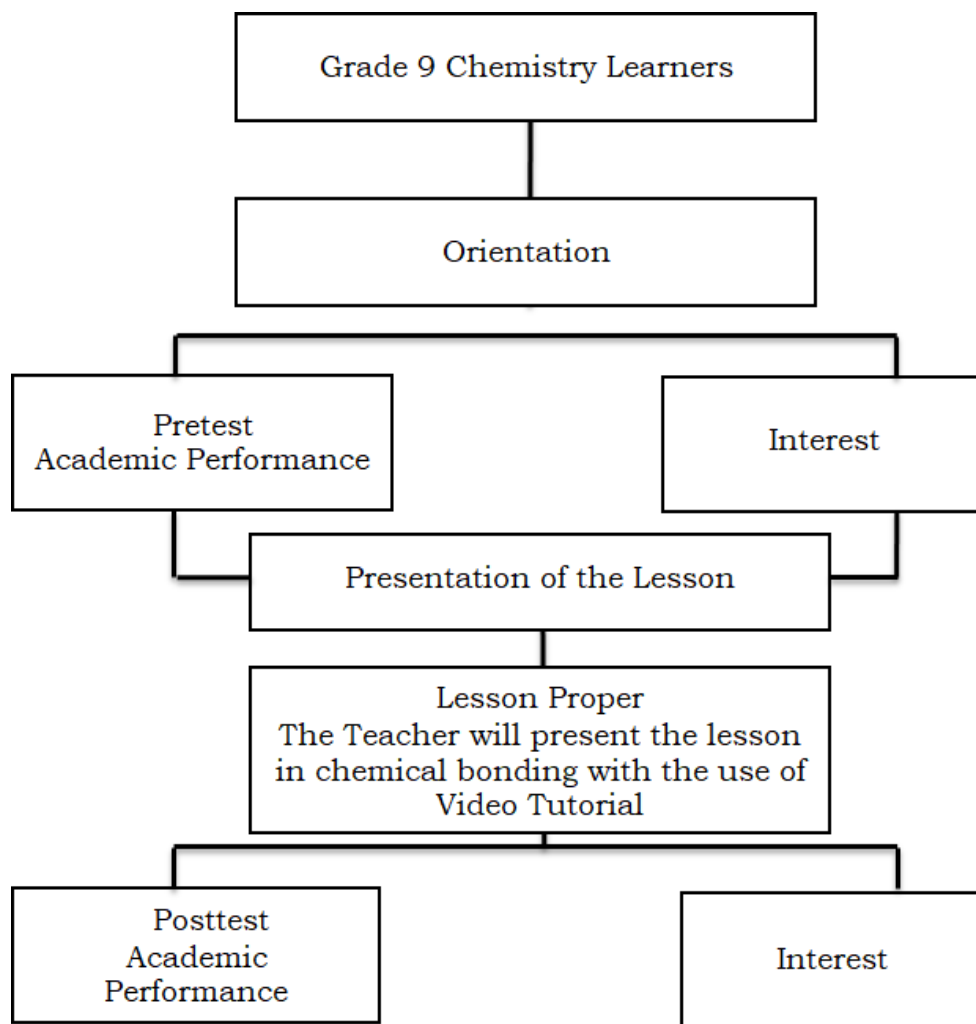
The study was conducted over two weeks, from the date of orientation through completion of the posttest and survey. The sequence was designed to minimize disruption to regular classes and to limit participant burden. The activities were scheduled as follows : (1) Orientation and distribution/collection of parental consent and participant assent; (2) Administration of the pretest and baseline interest survey; (3) Implementation of the researcher-made video tutorials integrated with the 7Es lesson plan delivered in 3-5 minute segments during regular class period; and (4) Administration of the posttest and the Interest. During the data collection phase, the researcher provided formal letters to the school principal outlining the research's purpose and scope. Before the commencement of the study, all participants received letters of consent to ensure that they fully understand their involvement.

To uphold ethical standards, only learners who presented these letters were allowed to participate in the study and were officially enrolled in the College. Furthermore, all data collected during this process were treated with the utmost confidentiality. Learners were informed about these measures before the experiment, reinforcing transparency and trust throughout the research. Written assent from minors and parental consent were secured. Participants' data were anonymized, and they retain the right to withdraw at any time without consequences. To strengthen confidentiality and participant protection, the data were stored securely in password-protected files and deleted after the study. Only the researcher could access the data. Minimal physical, psychological, social, and economic risks were acknowledged, and respect for community values and vulnerable groups was ensured throughout the study.

The researcher possesses sufficient experience and competence to manage the risks that may arise during the study and is a licensed teacher who has been creating instructional video tutorials since the COVID-19 pandemic. The researcher has firsthand experience in developing digital learning materials tailored to the needs of junior high school learners. This experience has strengthened her ability to anticipate and address

potential learning, technical, and classroom management issues associated with video-based instruction. The researcher also attended several training courses and seminars for teachers' professional growth, including In-Service Training (INSET) programs, and workshops on ICT integration in teaching. These professional development activities have equipped the researcher with the necessary knowledge and practical skills to manage classroom-based risks, ensure learner safety and ethical compliance, and implement technology-enhanced instruction responsibly. Class management is illustrated in Figure 3.

Figure 3 Process Outline of the Management of the Class



The lesson began with an orientation to introduce the topic and learning expectations. A pretest was conducted to assess prior knowledge, followed by an evaluation of learners' interest before watching the video tutorial. The teacher then presented the lesson using video tutorial to enhance understanding through visual learning. Afterward, learners took the posttest to measure their learning progress, and their interest was reassessed to determine the effectiveness of the video tutorial in improving their academic performance.

### Ethical Consideration

To ensure the integrity and objectivity of the research, the research protocol was properly observed before the study was conducted. The researcher committed to managing any potential conflicts of interest. Another grade 9 science teacher administered the pretest and posttest and supervise them to avoid bias and unfair influence. A formal letter was made to secure a letter of authorization from the school principal for the research. The participants were recruited through coordination with the school administrators. Learners were informed of the study's purpose and objectives before participation, so they were well informed about their roles in the research process. Their participation was conducted in a safe setting, posing minimal risk, as it involved only classroom-based activities such as viewing short video tutorials and taking written tests.



To further minimize risks, the researcher ensured that screen time per session did not exceed 30-40 minutes and allowed learners to take short breaks to avoid eye strain. To address psychological risk, as some learners may experience mild test anxiety during the pretest and posttest, the researcher emphasized that the test was for research purposes only and do not affect their grades. To prevent social risks, such as peer comparison or embarrassment, individual test scores and survey responses were not disclosed publicly; codes instead of names were used in all data records. To address economic risks, the study imposed no financial burden on participants.

All materials, including printed tests and video resources, were provided by the researcher. Participation did not require any expenses for learners or their families. Minor participants were provided with a written assent form that allowed them to indicate their willingness to participate in the study by signing it. Informed consent from parents/guardians from learners were obtained prior to the data collection and before the participation in the study. The participants also were informed of their right to withdraw if they experienced discomfort or distress during the study.

If there are Indigenous Peoples (IP) learners, learners with disabilities (PWDs), or other groups with heightened vulnerability, additional care and respect for cultural and individual differences was observed. These measures guaranteed that the dignity, rights, and welfare of all participants were safeguarded throughout the research process. The study is expected to benefit participants by improving their academic performance and learning interest through innovative, technology-enhanced instruction. Learners may gain increased motivation and a deeper understanding of abstract Chemistry concepts. All participants also received tokens of appreciation for their involvement in the study. These tokens did not influence participation and were distributed equally to all participants after data collection.

Furthermore, the study recognizes the importance of respecting community beliefs, customs, and traditions. All activities were conducted in accordance with the school's rules and the community's cultural norms. The researcher coordinated with the school administration, teachers, and parents to ensure that the research process aligns with the community's expectations and values. Community involvement was maximized by informing parents and guardians of the study objectives. This collaborative approach ensured that the research not only benefits the academic participants but also contributes positively to the broader school and community environment. All these precautions were taken to ensure ethical practices and transparency in the research process.

### **Treatment of Data**

The data were analyzed using appropriate statistical tools. For problem 1, the mean and standard deviation were used to determine the academic performance of grade 9 chemistry learners when taught before and after using video tutorials.

For problem 2, the mean and standard deviation were used to determine the interest of grade 9 learners when taught before and after using the video tutorial in terms of learning satisfaction, perceived ease of use, and perceived usefulness.

For problem 3, the t-test was used to analyze the data to determine the academic performance of grade 9 Chemistry learners when taught using video tutorials.

For problem 4, the t-test was used to analyze the data to determine the level of interest of Grade 9 Chemistry learners when taught using video tutorial.

## **RESULTS, ANALYSIS AND DISCUSSION**

This chapter presents, analyzes, and interprets the data gathered in this study on the effectiveness of video tutorials in enhancing learners' academic performance and interest in learning chemistry. The presentation parallels the sequence of the research problem posed in chapter 1.



## Academic Performance of Grade 9 Chemistry Learners

Table 1 presents the academic performance of grade 9 learners in their Chemistry class. As shown in the Table, the pretest mean indicates a *fairly satisfactory* performance. Relative to a 30-point test, it indicates that learners began with limited mastery of the target chemistry competencies. After the use of video tutorials, the posttest mean increased and can be interpreted as *satisfactory*. The mean gain of 5.88 points suggests a clear improvement in performance level following exposure to the video-tutorial approach. The improvement suggests that video tutorials served as effective instructional support in enhancing learners' comprehension of Chemistry concepts.

Table 1 Mean and Standard Deviation of the Academic Performance of Grade 9 Chemistry Learners in the Pretest and Posttest Following the Use of Video Tutorials

Variable	N	Pretest			Posttest		
		Mean	SD	Descriptive Level	Mean	SD	Descriptive Level
Academic Performance	50	11.58	3.195	Fairly Satisfactory	17.46	4.077	Satisfactory
Perfect Score: 30							

The increase in mean scores demonstrates that learners gained a better understanding of the lessons when video tutorials were used in instruction. The video tutorials allowed learners to replay explanations, visualize complex scientific processes, and learn at their own pace, which may have contributed to improved performance. These results were also reported by Bohloko et al. (2019), who mentioned that learners who use instructional videos demonstrate better comprehension of chemistry concepts than those who rely solely on traditional classroom instruction.

Similarly, Riyanto et al. (2022) and Yahaya et al. (2021) reported that video tutorials significantly enhance learners' academic performance by presenting scientific concepts through visual demonstrations that clarify and make learning more meaningful. This improvement in academic performance can be explained through the dual coding theory proposed by Paivio (1971), which suggests that learners process information through both verbal and visual channels. The use of video tutorials, which combine narration and visual representation such as diagrams and animations, enables learners to better understand abstract chemistry concepts like chemical bonding.

Previous studies attest to this result. For instance, the study of Tomcyk (2019) emphasized that video-assisted learning enhances learners' retention and comprehension. Similarly, Lapitan et al. (2021) found that the use of video tutorials in science education significantly improves learners' academic performance, particularly in topics that require visualization, such as chemistry. Also, Lopez (2023) emphasized that dynamic visualization in video tutorials can help learners simplify complex concepts, making them easier to understand, particularly in Chemistry, where abstract concepts such as chemical bonding require visual representation for better understanding. In addition, Njs et al. (2020) reported that multimedia instructional materials help bridge learning gaps by allowing learners to revisit complex concepts. This may also explain the significant increase in posttest scores in this study.

In practical terms, the pattern in Table 1 supports using video tutorials alongside brief guided activities, such as embedded questions, so that a larger proportion of learners can consistently benefit from the intervention (Brame, 2016; Mayer et al., 2020). The findings imply that video tutorials can serve as an effective supplementary instructional tool to improve learners' academic performance in chemistry. Similarly, Teng (2015) found that video tutorials enhance self-efficacy and task performance, which may have contributed to the improved posttest scores.



## Interest of Grade 9 Chemistry Learners toward the Use of Video Tutorials

Table 2 includes six indicators of satisfaction and an overall sub-mean representing learners' general satisfaction across all items. The overall pretest sub-mean is interpreted as *high*, indicating that learners already had a favorable perception of the video tutorial before the intervention. After implementing the video tutorial, the posttest sub-means increased and can be interpreted as *very high*.

### Interest of Grade 9 Chemistry Learners: Learning Satisfaction

Item-level patterns reinforce the overall sub-mean trend. Learners' enjoyment of video tutorials was already *very high* at pretest and further improved at posttest. Perceptions that video tutorials contributed to acquiring relevant science knowledge increased from *high* to *very high*. Likewise, ratings that video tutorials effectively meet learning objectives rose from *high* to *very high*, and ratings of video tutorials as highly interesting increased from *high* to *very high*.

Two indicators that can be interpreted as engagement-related also strengthened notably: "*Video tutorials make me spend more time studying to acquire knowledge and learn concepts in science,*" which increased from *high* to *very high*, and "*I am satisfied with my learning from the video tutorials,*" increased from *high* to *very high*. Collectively, the posttest results indicate that all satisfaction indicators reached *very high* levels, suggesting that learners found the video tutorials engaging, useful, and supportive of achieving learning goals.

Table 2 Mean and Standard Deviation of the Interest of Grade 9 Chemistry Learners toward the use of video tutorials in Terms of Satisfaction Towards the Use of Video-Tutorials

Indicator	Pre-exposure			Postexposure		
	Mean	SD	Descriptive Level	Mean	SD	Descriptive Level
I find video tutorials enjoyable.	4.26	0.751	Very High	4.46	0.646	Very High
The video tutorials have contributed greatly to my acquisition of relevant knowledge in Science	3.92	0.566	High	4.30	0.614	Very High
I find video tutorials to be effective in meeting learning objectives.	4.14	0.833	High	4.36	0.663	Very High
I would describe video tutorials as being highly interesting.	4.16	0.710	High	4.40	0.670	Very High
Video tutorials make me spend more time studying to acquire knowledge and learn concepts in science.	3.92	0.804	High	4.44	0.644	Very High
I am satisfied with my learning from the video tutorials.	3.86	0.783	High	4.44	0.611	Very High
<b>Sub-mean</b>	4.04	0.755	High	4.40	0.639	Very High

This satisfaction profile is consistent with evidence showing that instructional videos are more likely to elicit strong learner approval when they are focused, structured, and intentionally designed to support



comprehension and reduce unnecessary processing demands (Brame, 2016; Fiorella & Mayer, 2018). Instructional-video research also emphasizes that design features such as clear signaling of key ideas, segmentation, and coherence can strengthen learners perceived usefulness and satisfaction by making learning feel more manageable and goal-directed (Mayer et al., 2020; Rey et al., 2019).

These principles are particularly relevant in science learning contexts, where students often benefit from explanations that coordinate verbal guidance with meaningful visuals and step-by-step representations; when students experience these supports as clear and helpful, satisfaction tends to increase alongside perceived learning value (Bétrancourt & Benetos, 2018; Choe et al., 2019).

In addition, Shao et al. (2024) highlighted that video tutorials can produce learning outcomes, particularly when designed to support conceptual learning. Therefore, the improvement in learners' satisfaction observed in this study may be attributed to the engaging, flexible, and visually supportive features of video tutorials, which enhance learners' learning experiences and overall interest in the subject. The high level of satisfaction observed among learners may also be attributed to the video tutorials' ability to cater to diverse learning styles.

Abdulrahman et.al. (2020) also emphasized that multimedia instructional tools can enhance both visual and auditory learning. It can lead to increased engagement and satisfaction. Acedo and Robles (2019) also highlighted that well-structured video tutorials designed for 21st-century learners can foster a more interactive, learner-centered environment. Syntheses and meta-analytic evidence further suggest that video can support learning in formal education settings, especially when it complements instruction and encourages active processing rather than passive viewing (Noetel et al., 2021).

In this study, the shift from a *high* to *very high* satisfaction sub-mean, coupled with more consistent posttest ratings, indicates that learners increasingly experienced video tutorials as an effective and engaging medium for learning grade 9 Chemistry content.

### Interest of Grade 9 Chemistry Learners: Perceived Ease of Use

In terms of the material's ease of use, among the indicators, the statement "*I use video tutorials regularly in learning lessons and concepts in science*" obtained the highest posttest mean, suggesting that learners were highly willing to integrate video tutorials into their regular study routines. This finding indicates that the learners recognized the usefulness and convenience of video tutorials as a learning resource. Meanwhile, the statement "*I find it easy to get the video tutorials to learn science lesson,*" obtained the lowest posttest. Although it received the lowest mean among the indicators, the value still falls under the very high descriptive level, indicating that learners generally experienced minimal difficulty in accessing and using the video tutorials.

Table 3 Mean and Standard Deviation of the Interest of Grade 9 Chemistry Learners when Taught Using Video Tutorials in Terms of Learners Perception of the Ease Use of Video Tutorial

Indicator	Pre-exposure			Post-exposure		
	Mean	SD	Descriptive Level	Mean	SD	Descriptive Level
I find video tutorial easy to operate.	3.88	0.659	High	4.34	0.557	Very High
I find it easy to get the video tutorials to learn science lesson.	4.10	0.735	High	4.26	0.487	Very High
It was easy for me to become knowledgeable and skillful in science with the use of video tutorial.	3.80	0.535	High	4.32	0.551	Very High



I intend to use video lectures regularly in learning concepts and lessons in science.	3.88	0.746	High	4.30	0.580	Very High
I use video tutorial regularly in learning lessons and concepts in science.	4.00	0.700	High	4.58	0.538	Very High
<b>Sub-mean</b>	3.93	0.682	High	4.36	0.551	Very High

This strengthening of perceived ease-of-use is consistent with technology-acceptance evidence showing that when learners perceive a learning technology as easy to use, they are more likely to develop stronger intentions to use it and to report higher levels of actual or sustained use. Systematic reviews of technology acceptance in education highlight perceived ease of use as a core contributor to acceptance across learning technologies (Granić & Marangunić, 2019; Granić, 2022). Meta-analytic evidence in educational contexts likewise supports the central role of perceived ease of use in shaping intentions and usage-related outcomes (Scherer et al., 2019).

Learners expressed a generally favorable perception of the ease of using video tutorials even prior to the intervention. After the use of video tutorials in instruction, the sub-mean increased and can be interpreted as *very high*, indicating stronger endorsement that the video tutorials were easy to use and requiring less effort overall. The lower posttest variability further suggests that learners' perceptions became more consistent, implying that ease-of-use was not confined to a small subgroup but was more widely experienced across the class.

The perceived ease of use of the video tutorials is consistent with the findings of Mecida (2020), who reported that learners are more likely to engage with digital instructional materials when they are simple, accessible, and user-friendly. Similarly, Fontana (2019) emphasized that clear navigation and structured presentation in video-based learning environments significantly enhance usability, making it easier for learners to follow and understand the lesson. In the present findings, the posttest increase in the indicators on intended regular use and actual regular use aligns with this established pathway: once learners experienced the video tutorials as easier to operate and access, they were more inclined to use them consistently as a learning support.

From an instructional-design perspective, increases in ease-of-use ratings are also plausible when video tutorials are designed in ways that reduce unnecessary complexity and allow learners to regulate pacing. Evidence-based guidance on instructional video emphasizes features such as clear structure, manageable segments, and learner control, which can make video-based learning feel less effortful and more navigable for students (Brame, 2016; Mayer et al., 2020).

Related evidence indicates that segmenting multimedia instruction into coherent, learner-paced parts can reduce processing demands and improve the overall learning experience conditions that can indirectly support perceptions of ease and encourage continued use (Rey et al., 2019). Taken together, the shift from *high* to *very high* ease-of-use perceptions supports the practical conclusion that the video tutorials were not only acceptable but also increasingly perceived as effortless enough to become a regular learning tool for Grade 9 chemistry learners. Moreover, the findings suggest that learners perceived the video tutorials as convenient and user-friendly instructional tools.

Preradovic et al. (2020) also supported those interactive elements in video tutorials, such as embedded activities and guided navigation could enhance the learners' ability to use and engage with the video-based materials effectively. Furthermore, Liu and Elms (2019) noted that a well-designed instructional video can also improve learners' overall experience, contributing to a higher perception of ease of use.

### Interest of Grade 9 Chemistry Learners: Perceived Usefulness

Table 4 presents that all the usefulness indicators improved from *high* to *very high*. Perceptions that video tutorials improve performance in science activities increased, as did beliefs that video tutorials improve the acquisition of scientific skills. Ratings that video tutorials enhance effectiveness in performing science



activities also. The largest gain occurred in the item describing video tutorials as useful for acquiring knowledge and scientific skills, indicating that learners most strongly recognized their value as a direct support for building both conceptual understanding and skill-related learning outcomes.

Among the indicators, the statement “*I find the video tutorials useful in acquiring knowledge and scientific skills about science*” obtained the highest posttest mean, suggesting that learners strongly believed that video tutorials helped them understand Chemistry concepts and develop relevant learning skills. Moreover, the statement “*Video tutorials enhance my effectiveness in performing different activities in science*” obtained the lowest posttest mean.

Table 4 Mean and Standard Deviation of the Interest of Grade 9 Chemistry Learners when Taught Using Video Tutorial in Terms of Perceived Usefulness of Video Tutorials

Indicator	Pre-exposure			Post-exposure		
	Mean	SD	Descriptive Level	Mean	SD	Descriptive Level
Video tutorials improve my performance in doing activities in science.	4.08	0.634	High	4.42	0.609	Very High
Video tutorials improve acquisition of scientific skills.	3.90	0.580	High	4.32	0.513	Very High
Video tutorials enhances my effectiveness in performing different activities in Science.	4.00	0.728	High	4.30	0.580	Very High
I find video tutorials useful in acquiring knowledge and scientific skills about science.	3.94	0.652	High	4.52	0.544	Very High
<b>Sub-mean</b>	3.98	0.649	High	4.39	0.565	Very High

Although the indicator is the lowest, the value is still classified as *very high*, indicating that learners recognized the contribution of video tutorials to improving their ability to perform science-related tasks. The learner’s strong perception of the usefulness of video tutorials is further supported by Calubayan et al. (2021), who found that video-assisted instruction improves both academic performance and knowledge retention.

This strengthened perception of usefulness is consistent with research on educational technology acceptance, which identifies perceived usefulness as a central factor shaping learners’ positive attitudes toward a learning tool and their willingness to continue using it. Reviews of technology acceptance in educational settings show that when students perceive a learning technology as improving learning productivity and outcomes, their overall acceptance and sustained use tend to increase (Granić & Marangunić, 2019; Scherer et al., 2019). In the present findings, the shift from *high* to *very high* across all usefulness indicators suggests that learners increasingly saw the video tutorials not only as engaging resources but as tools that meaningfully support performance, skill development, and effectiveness in completing science tasks.

Costley and Lange (2017) reported that video tutorials not only improve learning outcomes but also enhance learners’ engagement. From the standpoint of instructional design and learning sciences, perceived usefulness is likely reinforced when videos are structured to make learning more efficient and goal-aligned. Evidence-based guidance emphasizes that effective instructional videos are typically designed to be coherent, focused on essential content, and supportive of active processing, features that can make learners feel that videos “help them learn better” and “perform better” (Brame, 2016; Fiorella & Mayer, 2018; Mayer et al., 2020).



More broadly, syntheses of video-based learning report that video can improve learning outcomes when integrated well into instruction and when it complements other learning activities rather than functioning as passive viewing alone (Noetel et al., 2021). Thus, the *very high* posttest usefulness ratings plausibly reflect learners' experience that the video tutorials supported their understanding of chemistry content and their ability to apply that understanding in science activities, consistent with contemporary evidence on how instructional videos can contribute to learning gains and stronger learner acceptance. The result implies that video tutorials served as valuable instructional materials that supported learners' understanding of complex chemistry concepts. Video tutorials often combine visual and auditory explanations, helping learners visualize scientific processes that may be difficult to convey through traditional teaching methods.

### Overall Interest of Grade 9 Chemistry Learners

Learners' overall interest in using video tutorials for grade 9 Chemistry is shown in Table 5. It shows that the overall interest was rated *high* at pretest and increased to *very high* at posttest. This increase indicates that, after the video-tutorial exposure, learners expressed a stronger and more favorable disposition toward learning chemistry through this modality.

Table 5 Grand Mean and Standard Deviation of the Interest of Grade 9 Chemistry Learners when Taught Using Video Tutorial

Indicator	Preexposure			Postexposure		
	Mean	SD	Descriptive Level	Mean	SD	Descriptive Level
Overall Interest	3.99	0.705	High	4.39	0.589	Very High

The lower posttest standard deviation also suggests that learners' ratings became more consistent, implying broader agreement that video tutorials were engaging and worthwhile as a learning support rather than being perceived positively by only a subset of learners. This upward shift in overall interest is consistent with evidence that learner interest and acceptance of instructional videos tend to increase when students perceive them as clear, manageable, and instructionally valuable.

Research-based guidance highlights that effective instructional videos are more likely to sustain learners' attention and positive engagement when they are focused, well-paced, and designed to support meaningful processing (Brame, 2016; Fiorella & Mayer, 2018; Mayer et al., 2020). Meta-analytic evidence further supports the idea that video can enhance learning experiences and outcomes in formal education contexts when used to promote active learning rather than passive viewing, thereby reinforcing learners' sense that video is a productive and motivating tool (Noetel et al., 2021).

From a technology acceptance standpoint, increases in overall interest are also coherent with models showing that learners' positive attitudes are strengthened when educational technologies are perceived as useful and easy to use, which typically encourages continued engagement and favorable evaluations (Granić & Marangunić, 2019). Taken together, the pattern in the grand mean indicates that the video-tutorial approach was not only accepted but became more compelling for learners over time, reflecting increased readiness to engage with chemistry learning through a technology-supported format. Moghavvemi (2018) also observed that many learners frequently use video-sharing platforms as academic support tools, thereby increasing their comfort and preference for video-based learning. And this likely contribute to the positive shift in learners' attitudes and interest toward the use of video tutorials in chemistry.

### Summary of the Academic Performance of Grade 9 Chemistry Learners Before and After Exposure to Video Tutorials

Table 6 shows the paired-samples t-test comparing grade 9 Chemistry learners' academic performance before and after instruction using video tutorials. All statistical assumptions for the paired-samples t-test were satisfied, including an approximately normal distribution of the paired difference scores and the absence of

influential outliers, supporting the appropriateness of the test for evaluating the mean change in performance (Kim & Park, 2019).

Table 6 Paired T-test Summary of the Academic Performance of Grade 9 Chemistry Learners Before and After exposure using Video Tutorials

Variable	Mean Difference	t	df	p	Cohen's d
Academic Performance	-5.88	-8.027	98	.000	1.605
<i>*Significant at <math>p &lt; 0.05</math> alpha level</i>					

The test indicates a statistically significant improvement in academic performance following the use of video tutorials. The negative mean difference shows that the posttest scores are significantly higher than the pretest minus posttest values. It only implies that learners demonstrated greater mastery of the chemistry lesson after using video tutorials.

This improvement aligns with the cognitive theory of multimedia learning which emphasizes that meaningful learning occurs when learners actively process both visual and auditory information. Additionally, Miller's information processing theory (1956) explains that breaking information into smaller segments improves memory retention, which was evident in the structured video tutorials used in the study. When video tutorials are designed to be coherent, well-paced, and aligned with learning targets, they can support learners' active processing by helping them select essential information, organize it into coherent mental structures, and integrate it with prior knowledge, conditions associated with stronger learning outcomes in multimedia environments (Fiorella & Mayer, 2018; Mayer, Fiorella, & Stull, 2020).

From a cognitive load perspective (Sweller, 1988), video tutorials can improve performance when they reduce unnecessary processing demands (extraneous load) and guide learners' attention toward critical chemistry ideas through design features such as signaling and segmentation (Paas & van Merriënboer, 2020; Rey et al., 2019; Sweller et al., 2019). These mechanisms align well with chemistry learning, where students often benefit from instruction that clearly link explanations with relevant representations and procedures, allowing them to work within working-memory limits while building more stable knowledge structures that support test performance (Mayer et al., 2020; Sweller et al., 2019). Taken together, the statistically significant gain and very large effect size support the study's conceptual expectation that appropriately designed video tutorials can function as a powerful instructional scaffold that strengthens academic performance by improving how learners process, retain, and apply chemistry concepts (Fiorella & Mayer, 2018; Mayer et al., 2020).

Moreover, Noetel et al. (2021) stated that video-based instruction can significantly improve learners' learning outcomes when integrated effectively into the classroom and when it encourages active cognitive engagement rather than passive viewing. The significant improvement in this study therefore supports the growing body of evidence suggesting that video tutorials can enhance conceptual understanding and learning achievement in science education.

### Summary of the Interest of Grade 9 Chemistry Learners Before and After Exposure to Video Tutorials

Table 7 Paired t-test Summary of the Interest of Grade 9 Chemistry Learners Before and After exposure of Video Tutorial

Measure 1	Mean Difference	t	df	p	Cohen's d
Satisfaction Towards the Use of Video-Tutorial	-.36	-4.037	98	.000	0.807
Learners Perception of the Ease Use of Video	-.43	-4.809	98	.000	0.962



Tutorial					
Perceive Usefulness of Video Tutorial	-.41	-4.718	98	.000	0.944
General Interest	-.40	-5.106	98	.000	1.021
*Significant at $p < 0.05$ alpha level					

Table 7 presents the paired-samples t-test comparing learners' interest toward video tutorials before and after the intervention across four dimensions: satisfaction, perceived ease of use, perceived usefulness, and general interest. Across all measures, the tests indicate statistically significant increases in interest after the use of video tutorials. Satisfaction with video tutorials reflects a large practical improvement. Learners' perception of the ease of use of video tutorials indicates a large effect. Perceived usefulness also reflects a large shift. Finally, general interest indicates a very large practical improvement. In all cases, the negative mean difference reflects the computation as pretest minus posttest, meaning that posttest ratings were higher than pretest ratings.

These findings align closely with the study's theoretical anchorage, which posits that well-designed video tutorials can strengthen learners' interest by improving cognitive processing conditions and making learning experiences more engaging and manageable. From a multimedia learning perspective, instructional videos are more likely to generate positive learner responses when they help students focus on essential ideas, coordinate verbal explanations with relevant visuals, and encourage active processing rather than passive viewing (Fiorella & Mayer, 2018; Mayer et al., 2020). When these design features are present, students often experience learning as clearer and more attainable, which can foster greater satisfaction and a stronger willingness to continue using the resource (Brame, 2016; Mayer et al., 2020).

The strong improvements in perceived ease of use and perceived usefulness are also consistent with evidence on technology acceptance in educational contexts. Reviews and meta-analytic work based on the technology acceptance model indicate that ease of use and usefulness are foundational drivers of positive attitudes and sustained adoption of educational technologies (Granić & Marangunić, 2019; Scherer et al., 2019). In the present results, learners' increased perception that video tutorials are easy to use likely reduced barriers to engagement. In contrast, increased perceived usefulness reflects learners' stronger belief that the videos help them learn effectively, conditions that typically support satisfaction and overall interest. This pattern complements the conceptual logic of the intervention: as video tutorials become easier to navigate and are experienced as more beneficial for learning, learners are more likely to value them and to engage with them more consistently.

Finally, the findings can be interpreted through cognitive processing and cognitive load principles embedded in the study framework. Cognitive load research emphasizes that learning and engagement are supported when instruction reduces unnecessary demands on working memory and guides learners toward meaningful processing (Paas & van Merriënboer, 2020; Sweller et al., 2019). Segmented, coherent, and well-signaled video tutorials can reduce extraneous processing and improve the subjective experience of learning, thereby plausibly elevating satisfaction and perceived ease of use while reinforcing perceived usefulness (Mayer et al., 2020; Rey et al., 2019).

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