INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY: APPLIED BUSINESS AND EDUCATION RESEARCH
2022, Vol. 3, No. 11, 2462 – 2479
http://dx.doi.org/10.11594/ijmaber.03.11.29

Research Article

Supplementary Instructional Materials Via Video-Clip (SIMVI): Effects On Grade 9 Students' Conceptual Understanding and Motivation

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Article history:
Submission October 2022
Revised November 2022
Accepted November 2022

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ABSTRACT

The study aimed to develop, evaluate, and determine the effectiveness of recorded video-clip lessons as supplementary materials in teaching least mastered learning competencies in science among forty Grade 9 students during the School Year 2021 - 2022. The quantitative research was used in this study using the questionnaires and pretest/ posttest and LRMDS rating sheets as the data gathering instruments. The statistical methods used to treat the data were mean, standard deviation, t-test, percentage and ranking. Both the science teachers and experts evaluated the SIMVI with a grand mean of 3.97 and 3.88 respectively interpreted as strongly agree in selected criteria such as content quality, instructional quality, technical quality and technical accuracy. There was no significant difference between the evaluation of the two groups of respondents in terms of content quality, instructional quality, technical quality and technical accuracy of SIMVI with computed t values of 0.89, 1.84, 1.46 and 1.00 which are all less than the tabular t value of 2.20. It is recommended that future researchers may conduct similar study and validate the veracity of the SIMVI as to relevance, effectiveness and efficiency.

Keywords*: supplementary instructional materials, Science teaching, video clips*

Introduction

In the first quarter of the year 2020, people around the world were challenged because of the unexpected spreading of an unknown virus. The outbreak changed the lifestyle of human beings around the globe caused by SARS-CoV-2. In the Philippines, the healthcare, economy, and the system of education are severely affected by the COVID-19 crisis. It caused lockdowns in different cities and provinces in the country to prevent the spread of the virus. School opening was moved to lengthen the preparation of possible learning modality to be implemented. From the data of the Department of Education (DepEd), close to 4 million students were not able to enroll in the last school year. Maybe the reasons are fear of the parents

How to cite:
Bebita, D. J. A. (2022). Supplementary Instructional Materials Via Video-Clip (SIMVI): Effects on Grade 9 Students' Conceptual Understanding and Motivation. *International Journal of Multidisciplinary: Applied Business and Education Research*. *3* (11), 2462 – 2479. doi: 10.11594/ijmaber.03.11.29

for their child's safety and doubtful on how learning will continue in the new normal.

The government took various steps to face the virus outbreak. In order to secure the health safety of teachers and learners in the Philippines, the Department of Education released DepEd Order 007, s. 2020, wherein all face-to-face engagement of teachers and learners within the school has been suspended. Schools and universities have developed various ways to reach the students via internet. The changes brought stress for many teachers, parents and learners who prefer in-person instruction and no capability in online classes. To address the challenge of remote learning, the Department of Education (DepEd) launched the Learning Continuity Plan (LCP), the implementation of the different modalities of learning delivery by different schools amidst the pandemic. Aside from online learning, lessons may be delivered using Self-Learning Modules (SLMs) and other platforms such as TV and radio broadcast. Modular learning is the most popular type of Distance Learning. According to research made by the Department of Education (DepEd), learning through printed and digital modules emerged as the most preferable distance learning option of parents with children who are enrolled in the last academic year, as reported by Bernardo (2020). This is important in consideration of learners in remote regions who do not have access to the internet for online learning.

We are almost a year now living and adapting to the new normal caused by the pandemic. Despite all the attempt to make things better, there is still no certainty on how things will end. Since education is one of the most affected in our country, learning should not stop and learners should continue learning. Moreover, with the rapid advancement of computer and software technology gives an opportunity to produce and enhance the teaching strategy to deliver the lessons effectively. The purpose of this research is to help students, parents and teachers to address their difficulty in the new normal approach of teaching-learning. Innovation of instructional materials in delivering lessons could help increase the understanding of the learners in lessons. The study also aims to find out if using recorded video-clip lesson will improve the performance of learners, especially in the least mastered learning competency in Science 9, hence this study.

Statement of the Problem

The study aimed to develop, evaluate and determine the effectiveness of recorded video-clip lesson as supplementary materials in teaching least mastered learning competencies in Science among Grade 9 students.

More specifically, it sought answers to the following questions:

1. What are the least mastered learning competencies to be used as the content in developing recorded video lesson based on the MELCS?
2. How can video clips be produced based on the following phases?
   a. Preparation
   b. Designing
   c. Presentation
3. What is the evaluation of the Science teachers and Experts on the developed supplementary recorded video lessons based on:
   a. content quality;
   b. instructional quality;
   c. technical quality; and
   d. technical accuracy?
4. Is there a significant difference between the evaluations of the two groups of respondents on the developed supplementary recorded video lessons based on the aforementioned aspects?

Scope and Delimitation of the Study

The research study is about the use of recorded video-clip lesson as a supplementary tool in delivering lessons in Science of Grade 9 students of a public national high school in Antipolo City. It gives support to the search for effective and innovative supplementary materials that will improve the conceptual understanding and motivation in learning of Grade 9 students in the least mastered learning competency. Based from the last school year, the competencies with the least mastery in the fourth quarter are MELC 21: Relate impulse and momentum to collision of objects (e.g., vehicular collision), MELC 22: Infer that the total momentum before and after the collision is equal, MELC 23: Perform activities to demonstrate

conservation of mechanical energy and, MELC 24: Construct a model to demonstrate that heat can do work. The study started on the fourth quarter of the school year 2021-2022 and finished until the said quarter end. The researcher used quasi-experimental to determine the difference in the pretest and posttest of the participants before and after the treatment. The researcher selected forty students from the handled sections that served as the participants in the study by simple random sampling procedure. The results of the study would show the effectiveness of recorded video-clip lesson as supplementary instructional material to increase the conceptual understanding of the students at the same time their learning motivation on topics. Thus, this would serve as a basis in pursuing innovation in teaching material to decrease the number of low proficient learners and help increase the knowledge retention on the content.

Related Literature

Video is defined as an electronic recordings composed of both visual and audio elements and has been used to capture lecture, content and communication for decades (McGarr, 2009; Rajadell & Garriga-Garzón, 2017). Using video-clips in delivering lessons is not new. During World War II, filmstrips were first studied as a training tool for soldiers. Now, commonly used by teachers as an instructional tool and strategy to capture the students' interest in the lesson, increase the motivation in learning and improve one's learning process (Pérez-Torre-grosa et al., 2017). Research found out that students viewed educational videos as additional materials which supplemented conventional methodologies and supported self-learning as well as providing flexibility at no extra cost (Rajadell & Garriga-Garzón, 2017). Most science teachers preferred to use video clips to show illustrations from real life that are not possible through textbook learning. It is a very relevant instructional tool where it can illustrate potentially dangerous, costly, or hard-to-access phenomena and demonstrations that impossible to demonstrate in school. Furthermore, it helps students to reduce the cognitive load which increase knowledge retention.

In creating and designing a video lesson, the following concepts should be considered by an educator, according to Brame (2016): (1) Limiting the length of videos and focusing on specific learning objectives; (2) Getting the right parts of pictures conveyed; (3) Focusing on the key concepts and ideas; (4) Use a cheerful and conversational approach to boost interest; Then, (5) use interactive parts, such as leading questions or linked homework assignments, to integrate videos in an active learning context. Additionally, students find the video engaging if the instructor's image is included (Pi et al., 2017). It allows the students to know their teacher as a real person rather than an abstraction (Smedshammer, 2017).

Another element that teachers need to reckon with in developing educational video is students' engagement. Motivation is one of the most essential components for the students' success in the teaching-learning process (Filgona, 2020). As defined by Luthans (2012), motivation is the process that begins with mental or physical need that trigger a behavior which aimed to achieve the goal or incentive. As stated on Asian Journal of Education and Social Studies, (Filgona, 2020), for teachers view, lacking of motivation has long been one of the most frustrating obstacles to students' learning performance. Teachers play a crucial role in motivating students to engage in learning activities within their specific educational contexts (Wood, 2019). They are responsible to the success of the teaching-learning outcomes in the classroom.

There are various ways on how teachers can increase motivation in learning of students by applying teaching strategies, giving rewards or incentives and using teaching tools. Applying appropriate teaching strategies and methods can achieve a high level of motivation results to a higher level of understanding (Vansteenkiste et al., 2005). Moreover, motivation has been the common focus of several research studies particularly in improving learner's academic achievements.

The researcher applied the theory of self-determination to understand the behavior and help student to be self-goal oriented in learning. Motivation has two main types (intrinsic

and extrinsic motivation), which greatly influences in shaping who we are and how we behave (Deci & Ryan, 2008). Intrinsic motivation comes from oneself or within. The drive of someone in doing a task is based on core values, interests, and personal sense of morality. On the other hand, extrinsic motivation is a drive of a person that depends on external sources and it results in external rewards. Some sources are grading systems, awards, respects and admiration of others.

Due to the fact that face to face is not possible, one way of motivating the students during this time is by implementing new strategies in delivering the lesson, hence the researcher conducts this study. The video lesson will play as a personal source of motivation where students' interest and confidence in understanding the lesson might increase.

Video clips can be an effective tool to help students in acquiring a deeper understanding about the topic (Alber, 2019). Several studies have been conducted with regards to the effectiveness video lessons in improving the performance of respondents particularly during this time. Bullo (2021) integrated video lessons in teaching Grade 9 students as instructional materials in Science amidst the pandemic crisis. Thirty students of Cataingan National High School of Poblacion Masbate were used as respondents in the descriptive-experimental study. The purpose of the study is to compare the performance of the students before and after using the video lessons. Based from pretest and posttest results, it was concluded that the used of science video lessons were effective than modular learning approach alone, and the combination of these two approaches resulted very satisfactory performance of the respondents.

As revealed from the studies, watching educational videos affected the academic activities and classroom engagement of the respondents positively. In a nutshell, we can say that videos are effective teachers. People learn more effectively when content is provided with both words and pictures instead of words alone, and words should be delivered as audio narration than as on-screen text (Clark & Mayer, 2016).

Generally, the results of their studies support the significant change in the academic performance and motivation of students who were introduced to the use of videos to the lesson. As revealed from the related studies, multimedia like use of video-clips can be effective media in teaching and learning process. It can elevate motivation in the lesson at the same time, increase the retention of the students that help to learn efficiently.

Conceptual Model of the Study

The researcher provides a paradigm shown in Figure 1. This paradigm guided the researcher in the development of SIMVI.

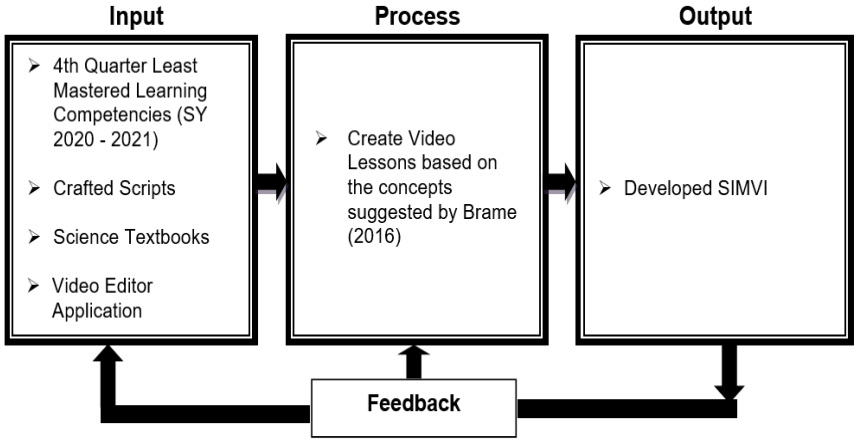

Figure 1. Conceptual Model for the Development of SIMVI

The input consists of the identified least mastered learning competencies in 4th quarter based from MELCS of the last school year, references and crafted scripts used to ensure

that the developed video lesson follow the K-12 curriculum standards and the video editor application used by the researcher in creating the video lesson. The process involves the creating video which is based on the suggested concepts of Brame (2016) that focuses on the length of videos, right pictures conveyed, key concepts, use of conversational approach, some interactive parts and instructional design theories such as the cognitive theory of multimedia learning and cognitive load theory as the main framework for design. The output of this process was the developed SIMVI.

The researcher provides a paradigm shown in Figure 2. This paradigm guided the researcher in the evaluation of SIMVI.

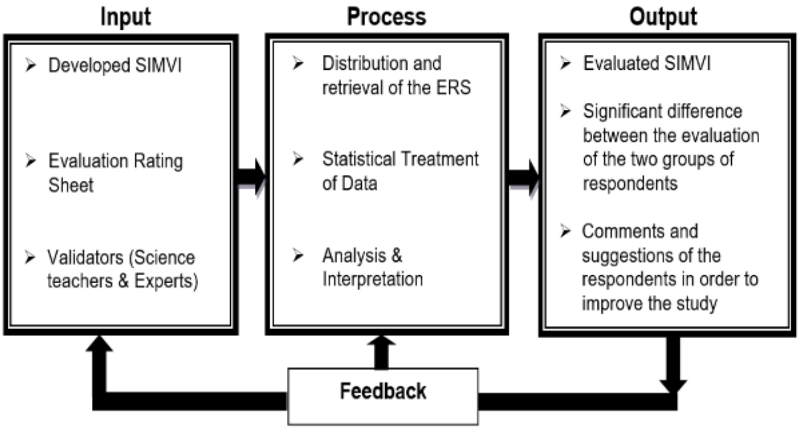

Figure 2. Conceptual Model for the Evaluation of the Developed SIMVI

Figure 2 describes the procedures on how SIMVI evaluated. The input consists of the following: developed video lessons, evaluation rating sheet for non-print from DepEd LRMDS and 30 science teachers and 11 experts serve as respondents who evaluated the tool. The process was the distribution and retrieval of the Evaluation Rating Sheet, statistical treatment of data and analysis and interpretation. The expected outputs were the significant difference between the evaluation of the two groups of respondents and the comments and recommendations of the respondents on the developed and evaluated SIMVI.

The researcher provides a paradigm shown in Figure 3. This paradigm guided the researcher in the validation of SIMVI.

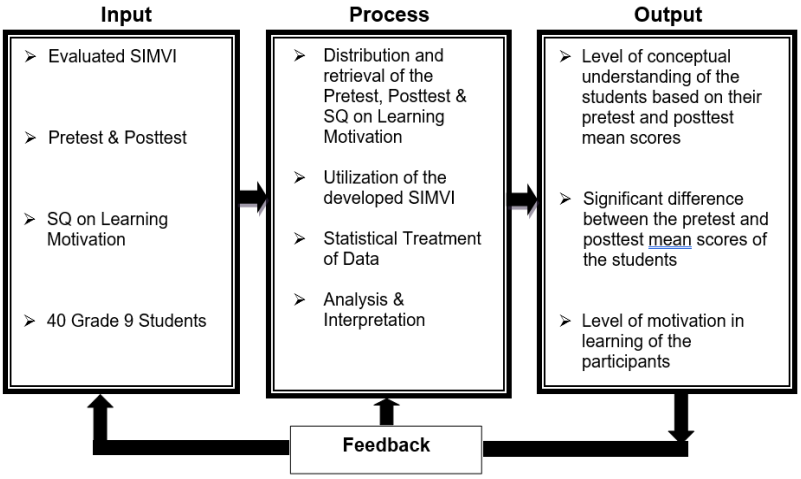

Figure 3. Conceptual Model for the Validation of the Developed SIMVI

Figure 3 represents the validation of the evaluated SIMVI. The input is composed of developed and evaluated recorded video-clips, the sample participants from the five sections handled by the researcher and the questionnaires for pretest, posttest and learning motivation. Meanwhile, the process involves the distribution and retrieval of pretest, posttest and survey questionnaire on Learning Motivation. The utilization of the SIMVI by the students, statistical treatment of data, analysis and interpretation of data were also part of the process. The output was the level of conceptual understanding of the students based on their pretest and posttest mean scores, significant difference between the pretest and posttest means scores of the students, and the level of motivation of students in learning science concepts.

Methodology

This study used the Quasi-Experimental type of research method. As stated by Thomas (2022), the purpose of quasi-experimental design is to investigate the cause-and-effect relationship between an independent and dependent variable in the study. Thus, this method was applied to determine the effectiveness of the developed video lessons as supplementary materials to the performance and motivation in learning Science concepts among Grade 9 students. The pretest and posttest design was used to examine the attitudes or perceptions of the respondents in evaluating their comfort in the implementation of the new concept (Campbridge University Press, 2019). This research design tested the acceptance and efficacy of the developed video lessons through the comparison of the pretest and posttest scores relative to the intervention applied. Hence, researcher came up with conclusions regarding the use of recorded video-clip lesson as supplementary learning material to increase the conceptual understanding and motivation in learning of Grade 9 students in Science particularly in the least mastered competencies of fourth quarter.

Sources of Data

Table 1 presents the designation or position of Science Teachers and Expert Teachers who evaluated the SIMVI.

Table 1. Teacher-evaluators Profile

Designation / Position	Science Teacher	Expert Teacher
Master Teacher	-	2
Head Teacher	-	2
Teacher III (With Master's Degree and 10 years of experience in teaching Science	-	7
Teacher II	8	-
Teacher I	22	-
Total	**30**	**11**

The teacher-evaluators were composed of science teachers and Expert teachers who are currently teaching Science in Junior High School in public schools in Antipolo City. The Science Teachers consisted of eight Teacher II and twenty-two Teacher I, where ten teachers in this group are Physics Education Major and the rest are teachers with experience in teaching Physics topics. Moreover, the Expert teachers consisted of two Master teachers, two Head teachers and seven Teacher III with Master's Degree and 10 years of experience in teaching science subject.

Table 2 presents the demographic profile of selected Grade 9 students who utilized the developed SIMVI.

Table 2. Student' Demographic Profile

Characteristics	Frequency	Percentage
Age		
18 above	4	10
16-17	12	30
15 below	24	60
Sex		
Male	16	40
Female	24	60
Enrollment Status		
Repeater	2	5
Balik Aral	0	0
Regular	38	95

The participants of the study are Grade 9 students of a public national high school in Antipolo City. There are 29 sections in the said school for school year 2021-2022 and each section was heterogeneous with a maximum of 45 students. Five sections from Grade 9 were used as participants in the study. The sample participants of the study cover forty (40) Grade 9 students currently enrolled this School Year 2021-2022, composed of sixteen males and twenty-four females. Four of them aged 18 years old and above, 12 were aged 16-17 years old and 24 were aged 15 years old and below. Based from their enrollment status, there are 38 regular students and 2 repeaters for the school year 2021-2022. Participants were selected by a simple random sampling procedure. All participants (40 students) used the recorded video lesson as supplementary learning material in studying force and motion topics.

Data Gathering Instruments

The following were the research instruments used in the study.

1. Evaluation Rating Sheet for Non-Print. These were the rating sheets of DepEd LRMDS used for assessment and evaluation of non-print materials. This was the basis on how SIMVI were evaluated by Science Teachers and Experts. The rating sheet was composed of four factors as follows: (1) Content Quality which consists 10 descriptors that describe how well the content meets its objectives with the aid of the material, (2) Instructional Quality with 10 descriptors that describe the design of the tool in terms of instructions, (3) Technical Quality which consists of 13 descriptors that describe the audio visual presentation of the tool, and (4) Other findings which were replaced by the researcher as Technical Accuracy which includes conceptual, factual, grammar errors. A 4-point Likert's scale was used and presented as follows:

Scale	Ranges	Verbal Interpretation
4	3.50 - 4.00	Strongly Agree (SA)
3	2.50 - 3.49	Agree (A)
2	1.50 - 2.49	Disagree (D)
1	1.00 - 1.49	Strongly Disagree (SD)

2. Pretest and Posttest for Conceptual Understanding

A 10-item teacher-made test was designed to measure the conceptual understanding of the students on the least mastered competencies. The set of questions were essay and composed of rubrics on how learners will be graded.

Points	Descriptions
4	- Shows in-depth of understanding of topic - 3-4 underlying concepts presented
3	- Shows understanding but lacks depth - 2 underlying concepts presented
2	- Show basic understanding of topic - 1 underlying concept presented
1	- Shows little understanding of topic - No underlying concepts presented

To determine the level of conceptual understanding of the students based on their pretest and posttest mean scores, percentage was utilized. The following rubrics was used:

Scores	Verbal Interpretation
33 - 40	Very Satisfactory (VS)
25 - 32	Satisfactory (S)
17 - 24	Fairly Satisfactory (FS)
9 - 16	Needs Improvement (NI)
0 - 8	Did Not Meet Expectation (DE)

3. Survey Questionnaire for Students' Motivation in Learning

A survey questionnaire that measured the level of motivation of the participants in using SIMVI was used by the sample participants to evaluate the effectiveness of video lessons as supplementary instructional materials in learning concepts of science lessons. It was composed of 10 item statements that measure the level of motivation of student participants in using the tool. The questionnaire was adopted from study of Francis Donkor (2011), in his study Assessment of Learner Acceptance and Satisfaction with Video-Based Instructional Materials for Teaching Practical Skills at a Distance and modified by researcher by replacing the verbal interpretation. The questionnaire was validated by selected Master Teachers who were not involved as evaluators of the SIMVI. A 5-point Likert's scale was used and presented as follows:

Scale	Ranges	Verbal Interpretation
5	4.50 - 5.00	Very Highly Motivated (VHM)
4	3.50 - 4.49	Highly Motivated (HM)
3	2.50 - 3.49	Moderately Motivated (MM)
2	1.50 - 2.49	Slightly Motivated (SM)
1	1.00 - 1.49	Not Motivated (NM)

Data Gathering Procedure

The researcher together with other Science teachers of a public national high school in Antipolo City where the sample of the study are enrolled had identified the least mastered skills in Grade 9 Science and found out that the mastery level was not achieved by the students in the previous years. Thus, the least mastered competency in the fourth quarter was used as bases for the content of the SIMVI. The researcher asked the permission from the School Principal through a formal letter to conduct the study in a public national high school in Antipolo City. The researcher informed the Head Teacher of the Science Department, advisers of each section and gave a letter of consent to the parents/ guardians of selected students to be participants in the study. The video-clip lesson was evaluated by Science teachers and experts using the rating sheet for non-print of DepEd LRMDS in assessing the acceptability of the materials in the learning process of the students before use in pilot testing.

A pilot pretest was administered to the selected sample students before the experiments. The sample participants were exposed to the use of recorded video-clip lesson that served as additional learning resource materials. Likewise, a pretest was given prior the lesson and a posttest after the end of the lesson. The video lesson was watched and studied by the students and the researcher directed the students to learn in the context of their own personal experiences.

The researcher together with other Science teachers of a public elementary school had identified the least mastered skills in Grade Four Science and found out that mastery level was not achieved by the students in the previous years and current year. Thus, the researcher chose the least skill of all the least mastered in all the competencies given by the Department of Education which was the content of the strategic intervention material.

Respondent scores in every treatment was tallied and interpreted by the researcher to determine whether there are significant differences on their mean scores in pretest and posttest. The participants evaluated the video lessons using a scaled item survey questionnaire to measure their level of learning motivation in using SIMVI. The researcher also included free response items on the last part of the questionnaire about their personal experiences in using the SIMVI in studying force and motion.

Statistical Treatment of Data

This study used quasi-experimental to respond to the research study. Several statistical treatments were used to evaluate the information acquired.

To determine the evaluation of the Science Teachers and Experts on the developed supplementary recorded video lesson based on content quality, instructional quality, technical quality and technical accuracy, *mean* and *standard deviation* was utilized. A 4-point Likert's scale was used and presented as follows:

Scale	Ranges	Verbal Interpretation
4	3.50 - 4.00	Strongly Agree (SA)
3	2.50 - 3.49	Agree (A)
2	1.50 - 2.49	Disagree (D)
1	1.00 - 1.49	Strongly Disagree (SD)

To determine if there is a significant difference that exist between the evaluation of the two groups of respondents on the developed supplementary recorded video lesson based on the aforementioned aspects, *t - test* was used. The hypothesis was tested at 0.05 level of significance.

To determine the level of conceptual understanding of the students based on their *pretest* and *posttest mean scores, percentage* was utilized. The rubrics was presented as follows:

Scores	Verbal Interpretation
33 - 40	Very Satisfactory (VS)
25 - 32	Satisfactory (S)
17 - 24	Fairly Satisfactory (FS)
9 - 16	Needs Improvement (NI)
0 - 8	Did Not Meet Expectation (DE)

To determine if there is significant difference that exists between the pretest and posttest mean scores of the students, t - Test was used. The hypothesis was tested at 0.05 level of significance.

To determine the level of motivation, perceive by Grade 9 students in learning using the developed SIMVI, *mean* and *standard deviation* was utilized. A 5-point Likert's scale was used and presented as follows:

Scale	Ranges	Verbal Interpretation
5	4.50 - 5.00	Very Highly Motivated (VHM)
4	3.50 - 4.49	Highly Motivated (HM)
3	2.50 - 3.49	Moderately Motivated (MM)
2	1.50 - 2.49	Slightly Motivated (SM)
1	1.00 - 1.49	Not Motivated (NM)

Results and Discussions

Least Mastered Learning Competencies as Basis for Recorded Video-Clip Lesson as Supplementary Material in Science 9 Students

Table 3 presents the list of least mastered learning competencies that was used as the content in developing recorded video lesson based on the MELCS in Science among Grade 9 students of Bagong Nayon II National High School during the 4th Quarter of the School Year 2021 - 2022.

The least mastered learning competencies that were used as the content in developing recorded video lesson based on the MELCS in Science were as follows: (1.) Relate impulse and momentum to collision of objects; (2.) Infer that the total momentum before and after the collision is equal; (3.) Perform activities to demonstrate conservation of mechanical energy; and (4.) Construct a model to demonstrate that heat can do work. The topics were based on 4th Quarter of the School Year 2020 - 2021. These topics were identified by the Science Teachers of the concerned public school where the study was conducted based from the test results of summative assessment from the last two previous school years. Students from school year 2019-2020 and 2020-2021 got lower scores on their summative assessment in the said competencies.

Table 3. Least Mastered Learning Competencies as Basis for Recorded Video-Clip Lesson as Supplementary Material in Science 9 Student

MELC No.	Topics
21	Relate impulse and momentum to collision of objects
22	Infer that the total momentum before and after the collision is equal
23	Perform activities to demonstrate conservation of mechanical energy
24	Construct a model to demonstrate that heat can do work

Development/ Production of Video-Clips in Terms of Preparation, Design and Presentation of Video Clips

Table 4 presents the preparation, design and presentation of recorded video lesson used in developing the SIMVI. Listed on the table are the processes undergone by the researcher to create the video lesson.

Table 4

Preparation, Design and Presentation of Video Clips

Developing Stage	Developed Video Clips
Preparation	- Writing of scripts - Checking of grammar - Citing for other references - Collecting of pictures and gifs
Design	- Limiting the length of videos and specific objectives - Getting the right parts of pictures conveyed - Focusing on the key concepts and ideas
Presentation	- Use of cheerful voice and conversational approach - Use of parts such as leading questions - Use of clear pictures/ gifs related to the topic

The preparation involves writing of scripts, checking of grammars, citing of other references and collecting of pictures and gifs. The design involves limiting the length of videos, getting the right pictures and focusing on key concepts. The presentation involves the use of cheerful voice, leading questions and clear pictures / gifs related to the topic. These procedures were followed by the researcher in developing SIMVI to be utilized by student-respondents.

According to Brame (2016), in creating and designing a video lesson, the following concepts should be considered: (1) Limiting the length of videos and focusing on specific learning objectives; (2) Getting the right parts of pictures conveyed; (3) Focusing on the key concepts and ideas; (4) Use a cheerful and conversational approach to boost interest; Then, (5) use interactive parts, such as leading questions or linked homework assignments, to integrate videos in an active learning context. In connection to this, the researcher also applied the Cognitive Load Theory by Sweller (1994) in which SIMVI reduced the extraneous information that results to effective learning. The simpler the ideas are, the easier to process them and to store in the long-term memory. These are the concepts that were considered by the researcher in constructing the video lesson.

Additionally, students find the video engaging if the instructor's image is included (Pi et al., 2017). It allows the students to know their teacher as a real person rather than an abstraction (Smedshammer, 2017). The researcher applied this concept to enable for the students to feel like it was a real classroom setting in which increases student's motivation in learning.

Evaluation of the Science Teachers and Experts on the Developed Supplementary Recorded Video Lesson

Table 5 presents the mean and standard deviation as regard the evaluation of science teachers and experts on the developed supplementary recorded video in terms of content quality.

Table 5

Evaluation of Two Groups of Respondents on the Developed Supplementary Recorded Video Lesson in Terms of Content Quality

A. Content Quality	Science Teachers			Experts		
	Mean	SD	VI	Mean	SD	VI
1. Content is consistent with topics/skills found in the DepEd Learning Competencies for the subject and grade/year level it was intended.	4.00	0.00	SA	4.00	0.00	SA
2. Concepts developed contribute to enrichment, reinforcement, or mastery of the identified learning objectives.	4.00	0.00	SA	3.91	0.30	SA
3. Content is accurate.	3.97	0.18	SA	4.00	0.00	SA
4. Content is up-to-date.	3.97	0.18	SA	3.91	0.30	SA
5. Content is logically developed and organized.	4.00	0.00	SA	3.91	0.30	SA
6. Content is free from cultural, gender, racial, or ethnic bias.	3.93	0.25	SA	3.82	0.40	SA
7. Content stimulates and promotes critical thinking.	3.93	0.25	SA	3.82	0.40	SA
8. Content is relevant to real-life situations.	3.97	0.18	SA	3.82	0.40	SA
9. Language (including vocabulary) is appropriate to the target user level.	4.00	0.00	SA	4.00	0.00	SA
10. Content promotes positive values that support formative growth.	3.93	0.25	SA	3.91	0.30	SA
Overall	**3.97**		**SA**	**3.91**		**SA**

Note: 1.00 - 1.49 (SD); 1.50 - 2.49 (D); 2.50 - 3.49 (A); 3.50 - 4.00 (SA)

The table shows that both respondents strongly agree to all items fall under this factor. Obviously, a concurred mean of 4.00 from both respondents was seen on the two indicators which are: "Content is consisted with topics/ skills found in the DepEd Learning Competencies for the subject and grade/ year level it was intended" and "Language is appropriate to the target user level", and the rest of the indicators have mean ratings ranging from 3.97-3.82. Then, two indicators with the high standard deviation from both respondents were observed which are: "Content is free from cultural, gender, racial or ethnic bias" and "Content stimulates and promotes critical thinking. This implies that the contents of the SIMVI followed the curriculum standards of Department of Education providing quality learning materials which are appropriate to the target user level. Overall, the results averaged mean of both respondents are 3.96 and 3.83 which translates to a rating of Strongly Agree. The results imply that both Science teachers and experts have positive feedback in terms of the content quality of the SIMVI.

Table 6 presents the weighted mean, standard deviation and the verbal interpretation as regard the evaluation of science teachers and experts on the developed supplementary recorded video lessons in terms of instructional quality. As shown in the table, both respondents strongly agree to all items under instructional quality with the mean ratings ranging from 3.64-4.00.

Both respondents have different assessment on the developed video lessons in terms of technical quality. There were two indicators obtained a mean of 4.00 based from the assessment of Science teachers which are: "Material achieves its defined purpose" and "Instruction is integrated with target user's previous experience." Meanwhile, only one indicator obtained a mean of 4.00 as per the evaluation of experts which is "Purpose of the material is well defines". Overall, the gained average mean of both respondents are 3.96 and 3.83 which translates to strongly agree in terms of technical quality. Moreover, the developed video lessons perceived to be effective to achieve the target learning outcomes and implies that both science teachers and experts positively perceive the SIMVI.

Table 6

Evaluation of Two Groups of Respondents on the Developed Supplementary Recorded Video Lesson in Terms of Instructional Quality

B. Instructional Quality	Science Teachers			Experts		
	Mean	SD	VI	Mean	SD	VI
1. Purpose of the material is well defined.	3.97	0.18	SA	4.00	0.00	SA
2. Material achieves its defined purpose.	4.00	0.00	SA	3.91	0.30	SA
3. Learning objectives are clearly stated and measurable.	3.97	0.18	SA	3.82	0.40	SA
4. Level of difficulty is appropriate for the intended target user.	3.97	0.18	SA	3.91	0.30	SA
5. Graphics / colors / sounds are used for appropriate instructional reasons.	3.93	0.25	SA	3.82	0.40	SA
6. Material is enjoyable, stimulating, challenging, and engaging.	3.93	0.25	SA	3.82	0.40	SA
7. Material effectively stimulates creativity of target user.	3.90	0.31	SA	3.64	0.50	SA
8. Feedback on target user's responses is effectively employed.	3.93	0.25	SA	3.64	0.50	SA
9. Target user can control the rate and sequence of presentation and review.	3.97	0.18	SA	3.82	0.40	SA
10. Instruction is integrated with target user's previous experience.	4.00	0.00	SA	3.91	0.30	SA
Overall	**3.96**		**SA**	**3.83**		**SA**

Note: 1.00 - 1.49 (SD); 1.50 - 2.49 (D); 2.50 - 3.49 (A); 3.50 - 4.00 (SA)

Table 7 presents the mean standard deviation and verbal interpretation as regard the evaluation of science teachers and experts on the developed supplementary recorded video lessons in terms of technical quality.

Table 7

Evaluation of Two Groups of Respondents on the Developed Supplementary Recorded Video Lesson in Terms of Technical Quality

C. Technical Quality	Science Teachers			Experts		
	Mean	SD	VI	Mean	SD	VI
1. Audio enhances understanding of the concept.	3.93	0.25	SA	3.64	0.67	SA
2. Speech and narration (correct pacing, intonation, and pronunciation) is clear and can be easily understood.	3.93	0.25	SA	3.82	0.40	SA
3. There is complete synchronization of audio with the visuals, if any.	4.00	0.00	SA	3.91	0.30	SA
4. Music and sound effects are appropriate and effective for instructional purposes.	3.97	0.18	SA	3.64	0.67	SA
5. Screen displays (text) are uncluttered, easy to read, and aesthetically pleasing.	3.93	0.25	SA	3.82	0.40	SA
6. Visual presentations (non-text) are clear and easy to interpret.	4.00	0.00	SA	3.91	0.30	SA
7. Visuals sustain interest and do not distract user's attention.	3.97	0.18	SA	3.91	0.30	SA
8. Visuals provide accurate representation of the concept discussed.	4.00	0.00	SA	3.82	0.40	SA
9. The user support materials (if any) are effective.	4.00	0.00	SA	3.82	0.40	SA
10. The design allows the target user to navigate freely through the material.	3.93	0.25	SA	3.82	0.40	SA
11. The material can easily and independently be used.	3.97	0.18	SA	3.91	0.30	SA
12. The material will run using minimum system requirements.	3.93	0.25	SA	3.82	0.40	SA
13. The program is free from technical problems.	3.90	0.31	SA	3.73	0.47	SA
Overall	**3.96**		**SA**	**3.81**		**SA**

Note: 1.00 - 1.49 (SD); 1.50 - 2.49 (D); 2.50 - 3.49 (A); 3.50 - 4.00 (SA)

The table shows that all of the indicators under this factor were perceived to be strongly agree with the mean ratings ranging from 3.90-4.00. Similarly, both respondents have different assessment on the developed video lessons in terms of technical quality. There were three indicators obtained a mean of 4.00 which only from the evaluation of Science teachers, and these are: "There is complete synchronization of audio with the visuals"; "Visual presentations (non-text) are clear and easy to interpret"; and "The user support materials are effective".

The results from both science teachers and experts gained an average of 3.96 and 3.81, which translates to an overall rating of Strongly Agree. This implies that the both respondents have positive feedback with regards to the technical quality of the SIMVI.

Table 8 presents the mean and standard deviation as regard the evaluation of science teachers and experts on the developed supplementary recorded video lessons in terms of technical accuracy.

Table 8

Evaluation of Two Groups of Respondents on the Developed Supplementary Recorded Video Lesson in Terms of Technical Accuracy

D. Technical Accuracy	Science Teachers			Experts		
	Mean	SD	VI	Mean	SD	VI
1. No conceptual errors.	4.00	0.00	SA	4.00	0.00	SA
2. No factual errors.	4.00	0.00	SA	4.00	0.00	SA
3. No grammatical and / or typographical errors.	4.00	0.00	SA	4.00	0.00	SA
4. No other errors (i.e., computational errors, obsolete information, errors in the visuals, etc.)	4.00	0.00	SA	3.91	0.30	SA
Overall	**4.00**		**SA**	**3.98**		**SA**

Note: 1.00 - 1.49 (SD); 1.50 - 2.49 (D); 2.50 - 3.49 (A); 3.50 - 4.00 (SA)

It can be seen from Table 8 that both respondents strongly agree to the four items under technical accuracy. Remarkably, a concurred mean of 4.00 was seen on the three indicators such as: No conceptual errors; No factual errors; and Grammar and/ or typographical errors. It implies that SIMVI has a minimal error that can be addressed in the improvement phase of the process. Overall, the technicalities of the developed video lessons were evaluated to be very satisfactory by both science teachers and experts as evidenced on the grand means of 4.00 and 3.98.

Table 9 presents the summary of the evaluation of science teachers and experts in terms of content quality, instructional quality, technical quality and technical accuracy on the developed supplementary recorded video lessons.

Table 9

Evaluation of Two Groups of Respondents on The Developed Supplementary Recorded Video Lesson

Developed Supplementary Recorded Video Lesson	Science Teachers		Experts	
	Overall Mean	VI	Over-all Mean	VI
A. Content quality	3.97	SA	3.91	SA
B. Instructional quality	3.96	SA	3.83	SA
C. Technical quality	3.96	SA	3.81	SA
D. Technical accuracy	4.00	SA	3.98	SA
Grand Weighted Mean	**3.97**	**SA**	**3.88**	**SA**

Note: 1.00 - 1.49 (SD); 1.50 - 2.49 (D); 2.50 - 3.49 (A); 3.50 - 4.00 (SA)

The table revealed that both science teachers and experts responded strongly agree to the 4 factors prescribed by DepEd in evaluating the non-print learning material which resulted to the grand weighted means of 3.97 and 3.88. It implies that the developed SIMVI were acceptable to the standards of DepEd providing quality learning materials in terms of content quality, instructional quality, technical quality and has technical accuracy. and can be implemented and used in public schools particularly the Grade 9 students taking Science subject. Therefore, both respondents have positive feedback with regards to the instructional videos' quality.

Test of Significant Difference in the Evaluation of the Two Groups of Respondents on the Developed Supplementary Recorded Video Lesson

Table 10 presents the *computed t value* and *tabular t value* as regard the significant difference in the evaluation of the two groups of respondents on the developed supplementary recorded video lessons in terms of content quality.

Table 10

Significant Difference in the Evaluation of Two Groups of Respondents on the Developed Supplementary Recorded Video Lesson in Terms of Content Quality

Group	#	Mean	SD	Computed *t* Value	Tabular *t* Value (0.05)	Decision	Interpretation
Science Teachers	30	3.97	0.10	0.89	2.20	Accept H_0	Not Significant
Experts	11	3.91	0.22				

Note: Computed *t* value > Tabular *t* value (Reject H_0);
Computed *t* value < Tabular *t* value (Accept H_0)

Table 10 shows that science teachers acquired a mean of 3.97 with standard deviation of 0.10 while expert respondents got a mean of 3.91 with 0.22 standard deviation. The computed t value of 0.89 is less than tabular t value of 2.20 which led to the acceptance of null hypothesis.

Therefore, at 0.05 level of significance it can be concluded that there is no significant difference in the evaluation of two groups of respondents in terms of content quality. The results imply that both Science teachers and experts are satisfied with the content design of the SIMVI. This indicates that the content of the developed video lessons was found to be adherent to the DepEd standards and specifications for content development.

Table 11 presents the computed t value and tabular t value as regard the significant difference in the evaluation of the two groups of respondents on the developed supplementary recorded video lessons in terms of instructional quality.

Table 11

Significant Difference in the Evaluation of Two Groups of Respondents on the Developed Supplementary Recorded Video Lesson in Terms of Instructional Quality

Group	#	Mean	SD	Computed *t* Value	Tabular *t* Value (0.05)	Decision	Interpretation
Science Teachers	30	3.96	0.09	1.84	2.20	Accept H_0	Not Significant
Experts	11	3.80	0.28				

Note: Computed *t* value > Tabular *t* value (Reject H_0);
Computed *t* value < Tabular *t* value (Accept H_0)

Table 11 illustrates the result of t-test on finding the significant difference between the evaluation of the two groups of respondents on SIMVI in terms of instructional quality. Science teachers acquired a mean of 3.96 with standard deviation of 0.09 while expert respondents got a mean of 3.80 with 0.28 standard deviation. The computed t value of 1.84 is less than tabular t value of 2.20 which led to the acceptance of null hypothesis.

Therefore, at 0.05 level of significance it can be concluded that there is no significant difference in the evaluation of two groups of respondents in terms of instructional quality. The results imply that both Science teachers and experts are satisfied with the instructional design of the SIMVI. This implies that the designed instructions of the developed video lessons were found to be adherent to the DepEd standards and specifications.

Table 12 presents the computed *t* value and tabular *t* value as regard the significant difference in the evaluation of the two groups of respondents on the developed supplementary recorded video lessons in terms of technical quality.

Table 12

Significant Difference in the Evaluation of Two Groups of Respondents on the Developed Supplementary Recorded Video Lesson in Terms of Technical Quality

Group	#	Mean	SD	Computed *t* Value	Tabular *t* Value (0.05)	Decision	Interpretation
Science Teachers	30	3.96	0.09	1.46	2.20	Accept H_0	Not Significant
Experts	11	3.81	0.33				

Note: Computed *t* value > Tabular *t* value (Reject H_0);
Computed *t* value < Tabular *t* value (Accept H_0)

Table 12 reveals the result of t-test on finding the significant difference between the evaluation of the two groups of respondents on SIMVI in terms of technical quality. Science teachers acquired a mean of 3.96 with standard deviation of 0.09 while expert respondents got a mean of 3.81 with 0.33 standard deviation. The computed t value of 1.46 is less than tabular t value of 2.20 which led to the acceptance of null hypothesis.

Therefore, at 0.05 level of significance it can be concluded that there is no significant difference in the evaluation of two groups of respondents in terms of technical quality. The results imply that both Science teachers and experts are satisfied with the technical design of the SIMVI. This indicates that the technical format of the developed video lessons was found to be adherent to DepEd standards and specifications for audio-visual development.

Table 13 presents the computed *t* value and tabular *t* value as regard the significant difference in the evaluation of the two groups of respondents on the developed supplementary recorded video lessons in terms of accuracy of the content.

Table 13

Significant Difference in the Evaluation of Two Groups of Respondents on the Developed Supplementary Recorded Video Lesson in Terms of Technical Accuracy

Group	#	Mean	SD	Computed *t* Value	Tabular *t* Value (0.05)	Decision	Interpretation
Science Teachers	30	4.00	0.00	1.00	2.20	Accept H_0	Not Significant
Experts	11	3.98	0.08				

Note: Computed *t* value > Tabular *t* value (Reject H_0);
Computed *t* value < Tabular *t* value (Accept H_0)

Table 13 indicates the result of t-test on finding the significant difference between the evaluation of the two groups of respondents on SIMVI in terms of technical accuracy. Science teachers acquired a mean of 4.00 with standard deviation of 0.00 while expert respondents got a mean of 3.98 with 0.038 standard deviation. The computed t value of 1.00 is less than tabular t value of 2.20 which led to the acceptance of null hypothesis.

Therefore, at 0.05 level of significance it can be concluded that there is no significant difference in the evaluation of two groups of respondents in terms of technical accuracy. The results imply that both Science teachers and experts are satisfied with the technical design of the SIMVI. This means that the technical accuracy of the developed video lessons was found to be adherent to the DepEd standards and specifications.

Table 14 presents the summary of the computed t values and tabular t values as regard the significant differences in the evaluation of the two groups of respondents on the developed supplementary recorded video lessons in terms of content quality, instructional quality, technical quality and technical accuracy.

Table 14

Significant Differences in the Evaluation of Two Groups of Respondents on the Developed Supplementary Recorded Video Lesson

Developed Supplementary Recorded Video Lesson	Computed *t* Value	Tabular *t* Value (0.05)	Decision	Interpretation
A. Content quality	0.89	2.20	Accept H_0	Not Significant
B. Instructional quality	1.84	2.20	Accept H_0	Not Significant
C. Technical quality	1.46	2.20	Accept H_0	Not Significant
D. Technical Accuracy	1.00	2.20	Accept H_0	Not Significant

Note: Computed *t* value > Tabular *t* value (Reject H_0);
Computed *t* value < Tabular *t* value (Accept H_0)

Table 14 reveals that the computed t values of 0.89, 1.84, 1.46 and 1.00 are all less than the tabular t value of 2.20 which led to the acceptance of null hypotheses. Therefore, at 0.05 level of significance it can be concluded that there are no significant differences in the

evaluation of two groups of respondents in terms of content quality, instructional quality, technical quality and technical accuracy of the SIMVI. The developed video lessons was found to be adherent to the standards of the Department of Education of providing quality learning materials.

It implies that both teachers and experts agreed to the acceptability of the developed video lessons to use by Grade 9 students as supplementary material in science and recommended to implement in public schools.

Conclusion and Recommendations

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

1. Four (4) least mastered learning competencies where the basis for developing recorded video lesson based on the MELCS in Science based on 4th Quarter of the School Year 2020 - 2021.
2. Preparation, design and presentation were considered in developing recorded video lesson based on the MELCS in Science based on 4th Quarter of the School Year 2020 - 2021.
3. Both teachers and experts agreed that the developed SIMVI were accepted in terms of content quality, instructional quality, technical quality and has technical accuracy
4. The level of conceptual understanding among Grade 9 students has improved in using the SIMVI.
5. The developed SIMVI has improved the motivation of Grade 9 students in learning science concepts.
6. The developed SIMVI is effective supplementary materials in teaching science concepts.

Based on the conclusions, the following recommendations were arrived at:

1. The developed SIMVI for Grade 9 students may be utilized by all students in Grade 9 as it is valid in terms of content quality, instructional quality, technical quality and has technical accuracy.
2. Science department of the concerned public national high school is encouraged to developed SIMVI in Science 7, 8, and 10.
3. Other departments of the public national high school involved in the study is encouraged to develop another SIMVI which may be utilized by all Grade 9 students.
4. Other public secondary high schools in the Division of Antipolo City is encouraged to develop SIMVI.
5. Future researchers may conduct similar study and validate the veracity of the SIMVI as to relevance, effectiveness and efficiency.

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