IJOEM

Indonesian Journal of Elearning and Multimedia
https://ejournal.1001tutorial.com/index.php/ijoem

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Development and Validation of Contextualized Video Lessons as Home-based Intervention in Physics for Grade 9 Students

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Article Information:
Received March 03, 2025
Revised May 07, 2025
Accepted May 14, 2025

Keywords:
Contextualization; Home-based Intervention; Physics; Video Lessons

Abstract

Background of Study: In the 21st century teaching and learning, technology plays a vital role in improving students' performance. In Physics learning where developing critical thinking and problem-solving skills was a challenge, technology integration like video-based instruction could be of huge impact.

Aims and scope of the paper: This study aimed to develop and validate contextualized video lessons as a home-based intervention in physics for grade 9 students.

Methods: The research used the developmental research design using the ADDIE model and pre-experimental research using the pretest-posttest design. Six validators consisting of physics and physical science teachers and thirty grade 9 low-performing students were selected using purposive sampling. The validity of the contextualized video lessons was assessed by the validators in terms of content, instructional and technical quality. Furthermore, the effectiveness of the contextualized video lessons as a home-based intervention was determined using the students' pretest and posttest results.

Results: The video lessons were contextualized by embedding simulations, animations, diagrams and problem-solving of real-life applications of the physics concepts. The results revealed that the contextualized video lessons passed all the criteria with a very satisfactory rating. Moreover, the contextualized video lessons were effective as a home-based intervention in physics as shown in the significant increase between the pretest and posttest scores ($p < .001$) with an effect size of Cohen's $d = 3.29$.

Conclusion: The contextualized video lessons as a home-based intervention significantly improve the performance of grade 9 students in Physics.

A. Introduction

The increasing reliance of students on technology, specifically on internet use for social interaction and access to entertainment and information has been observed in the past few years. According to UNESCO (2023), the internet users percentage increased from 16% in 2005 to 66% in 2022 with 50% of secondary schools having internet access. This brought a gradual shift in the educational landscape around the world from traditional to digitalized education. Moreover, the transition to digital education in schools has become the top priority in many countries around the world to cater to the needs of 21st-century learners characterized as technologically inclined learners. UNESCO (2024) fully supports each country's initiatives

How to Cite : Borabo, J., & Ricafort, J. D. (2025). Development and Validation of Contextualized Video Lessons as Home-based Intervention in Physics for Grade 9 Students. *IJOEM Indonesian Journal of E-Learning and Multimedia*, *4*(2), 67–80. https://doi.org/10.58723/ijoem.v4i2.374
ISSN : 2830-2885
Published by : Asosiasi Profesi Multimedia Indonesia

to design, incorporate and implement national policies on digital education to answer the needs of each country, especially the underprivileged communities.

Digital technology is highly relevant for the attainment of UN Sustainable Development Goals (SDG), specifically SDG 4: Quality Education and SDG 9: Industry, Innovation and Infrastructure (ICT) (Bathla et al., 2023). Hence, the prioritization of digital education in every country by providing ICT infrastructures in schools promotes innovation that helps uplift educational quality. Janardhanan et al. (2023) stated that digital education involves the integration of technology in education to produce high-quality educational practices to attain better learning outcomes. Through digital-based curriculum, self-directed instruction, and abundant sources of information, digital education offers new learning experiences to students (Alshehri, 2024).

According to the study conducted by DataReportals on approximately 50 countries, Filipinos were ranked third highest on average screen time at 54.44% and have the highest digital dependence in all of Asia. The pandemic serves as a game changer for the proliferation of digital technologies in the Philippines. Based on the research conducted by UNESCO (2023), the pandemic revealed the lack of national policies regarding digital education in the Philippines. It also highlighted the need for better ICT infrastructure in the country. It also revealed the degree of digital skills and knowledge and the readiness of teachers in digital education. According to Dayson and Benavides (2023), teachers use non-digital materials more frequently than digital instructional materials. They suggested that teachers be given technical assistance and training on digital technologies that are unfamiliar to them.

Because of the pandemic, the government saw the benefits of investing and improving digital education in the country. Hence, the Department of Education by providing better ICT infrastructure and training encourages schools to use technology in the teaching and learning process to meet the increasing influence of technology on Filipino student's way of learning. As a response to the call for ICT integration, teachers became more open to employing and adopting digital technologies to improve the teaching-learning process. Lohr et al. (2024) stated that teachers must possess technology-related teaching skills to provide various forms of active learning using digital technologies.

Video-based Learning is one of those ICT-based strategies employed by many teachers. During the pandemic, teachers started to utilize video-based instruction to address the gap in implementing distance learning, up until post-pandemic video-based learning showed relevance as the increasing patronage of students to videos was growing as shown in their participation in various video streaming social media apps. Replacing traditional lectures with teacher-made video lessons can increase students' engagement and benefit teachers to work with the students even without direct instruction. Moreover, using videos may increase concept processing and retention because the video's visual and auditory elements draw interest to people thus allowing them to absorb information easily (Hung et al., 2018). It can be integrated into online learning environments such as flipped classrooms, learning management systems (LMS), learning portals and e-class (Beheshti et al., 2018). To maximize the positive effects of video-based instruction, it can be used along with other interventions like lectures, printed materials and other digital tools (Ampofo et al., 2020; Gratela & Janer, 2022).

Video-based instruction is one of the innovative technologies that most science teachers integrate into their lessons to make complex lessons interesting and easy to understand. During distance learning at the height of the pandemic, a handful of science video lessons were made by teachers to deliver learning content. The results of different studies on using video-based instruction in science show its potential to improve science education in the country which is declining as revealed by the recent PISA 2022 results. The Philippines ranked third lowest in science from 81 participating countries with a drop of score from 356 to 355 (OECD, 2023). In connection, employing contextualized video lessons showing real-life application of concepts can address the poor critical thinking and problem-solving skills of students which are the key findings during the PISA assessment.

Contextualization is another strategy that science teachers employ in teaching to make science concepts more relatable to learners. Contextualization is a teaching strategy where content and context are connected through students' experiences (Giamellaro, 2017). Contextualization makes learning meaningful and relevant because learners can relate it to previous experiences and real-life situations. Teachers can contextualize lessons by capitalizing on the relevant interests and issues from the student's context to produce meaningful learning experiences. Contextualizing teaching requires teachers to understand the content very well and the context of their learners as well as to be able to successfully connect the two (Giamellaro et al., 2022).

Contextualizing science lessons by applying video-based instructions can help teachers and curriculum developers narrow the gaps between curriculum and student learning. Contextualized videos can be integrated into contemporary teaching strategies like game-based learning, flipped classroom, and distance learning. It can also be integrated into remedial lessons for students who still struggle to understand concepts in science during the allotted class hours. Remedial lessons are educational interventions designed to help struggling learners by reteaching at a level suitable to the student's current state of learning (Glewwe & Muralidharan, 2016). In connection, the K to 12 curriculum is jampacked with topics to be taught every quarter, teachers find it hard time to conduct intervention during class hours because of time constraints in covering all the topics (Tito & Perez, 2017). Home-based intervention is an alternative to classroom intervention and remedial lessons. Home-based intervention offers a stress-free and convenient learning environment. It also strengthens the partnership of the school and parents to help students improve their learning (Sahu et al., 2017). Lastly, home-based intervention helps teachers extend students' learning to solve the problems of insufficient time for remedial lessons and limited learning content taught at school.

Many researchers studied separately contextualization and video-based instruction as teaching strategies in science. Meanwhile, few studies focused on contextualizing video-based instructional materials. Moreover, it is rare to find studies that developed contextualized video lessons and used them in home-based interventions in physics. The goal of the current study is to address the gaps. The study utilized contextualization, video-based instruction and home-based intervention as a unified approach to augment the learner's performance in physics. Hence, it could be the start of a new teaching practice that contextualized ICT-based teaching tools used in home-based interventions for more personalized and convenient learning.

This research aimed to develop and validate contextualized video lessons as a home-based intervention in physics for grade 9 students. Specifically, it developed contextualized video lessons along the following learning content (a) Projectile Motion, (b) Momentum, and (c) Conservation of Mechanical Energy. Moreover, it determined the validity of the contextualized video lesson along: (a) Content Quality, (b) Instructional Quality, and (c) Technical Quality. Lastly, it determined the effectiveness of the contextualized video lessons as a home-based intervention in physics for grade 9 students.

B. Research Methods

The study employed developmental and pre-experimental research designs. The developmental research was used in the development and validation of the contextualized video lessons as home-based intervention in physics for grade 9 students. Developmental research is a research design utilized to develop instructional material (Ibrahim, 2016). The ADDIE model was utilized for the development and validation of the contextualized video lessons. To know the effectiveness contextualized video lessons as home-based intervention, pre-experimental research through pretest-posttest design was employed in the study. Though it does not assure the generability and validity of the result because of the lack of randomization and absence of a comparison group, the pre-experimental using pretest and posttest design allows for a more convenient and rapid assessment of the conducted intervention using established statistical tools.

The primary source of data was the low-performing Grade 9 students enrolled in Louella Gotladera Alcoba National High School, S.Y. 2023-2024. These are the Grade 9 students who did not meet the expected proficiency level of 75% in each competency. Validators consisting of physics and physical science teachers were also selected from various public secondary schools in DepEd-Sorsogon. To ensure the comprehensive validation of the contextualized video lessons, the chosen validators must be experts in the field. These are experts who majored in physics and physical science, teaching for more than 5 years and are classified as proficient teachers with the position of Teacher III, Special Science Teacher and Master Teacher. Furthermore, other related qualifications were considered like master's and doctorate degrees/units earned in choosing the validators. The final pool of validators was 6 composed of 1 master teacher, 3 Special Science Teachers and 2 Teachers III teaching for more than five years all qualified to be called validators. On the other hand, 30 low-performing students were chosen from the three sections of grade 9. All the samples were obtained using purposive sampling. The total number of respondents was 36.

Research instruments were developed and adopted by the researchers to gathered the needed data. The study developed pretest-posttest to measure the performance level of the students before and after using the contextualized video lessons. The teacher-made test was assessed by the pool of validators to ensure validity using the Expert's Assessment Sheet. It was used to check the congruency among test items, learning competencies and the level of skills used. To validate the contextualized video lessons, the researchers adopted the Learning Resource Management Development System (LRMDS) evaluation rating sheet for non-print materials of the Department of Education. It was used to evaluate the content, instructional, and technical quality of the contextualized video lessons. Lastly, the researchers utilized Portfolio to elicit student's reflections on the use of video lessons.

The researchers also followed the systematic way of collecting data. First, the researchers sent letters on March 30, 2024, to the validators and their school head seeking approval to be the experts who will assess the teacher-made pretest/posttest and contextualized video lessons. Before sending the letter of approval, the researcher developed five contextualized video lessons under the topic: Projectile Motion, Momentum and Conservation of Mechanical Energy. Likewise, the pretest/posttest was developed. The validators evaluated the contextualized video lessons as well as the pretest/posttest. Then, the researchers ensured the permission of the principal of Louella Gotladera Alcoba National High School to conduct a dry run of the pretest-posttest on their grade 9 students who were not selected as respondents to ensure the test's reliability. The dry run was conducted on May 23, 2024. Then, the researchers performed necessary adjustments to the pretest and posttest and contextualized video lessons before using it.

The contextualized video lessons were utilized by the low-performing grade 9 learners. The students first answered the pretest on May 25, 2024, then the contextualized video lessons were given by the researcher as a home-based intervention by sending YouTube links to the group chat for those students who have access to the internet and by sending directly to the students' cellphones for those who do not have access to the internet. The researchers ensured that all student respondents had access to the videos. The students watched the video lessons for one week from May 25 to May 30, 2024. The teacher ensured that the students watched the video lessons by constantly monitoring them through the group chat, requiring them to send pictures while watching the video lessons and requiring them to write their experience in using the video lesson in their journal. After watching the video lessons for a week, the researchers conducted the posttest on May 31, 2024. Lastly, the researchers gathered and recorded the data and then used the appropriate statistical tool for data analysis.

The researchers utilized appropriate statistical tools to analyze and interpret data. The reliability of the test was determined using Kuder and Richardson Formula 20. It is used to measure the internal consistency therefore determining the extent to which all the items measure the same characteristic. The developed contextualized video lesson was validated in terms of content, instructional, and technical quality. After collecting the rating sheet from the validators, the researcher determined the frequency count of the responses of the validators in each indicator. Then, the weighted mean for each indicator was computed. Moreover, the mean score and performance level in each learning competency were computed as well as the overall mean score and performance level in the pretest and posttest. The performance levels were interpreted using the rating scale adopted from the DepEd Order No. 8, s. 2015. The Mean Normalized Gain (MNG) in each competency was determined utilizing Hakes g. To determine the significant difference between the pretest and posttest results, the t-test (two-tailed) was used. A normality test was performed by the researchers to determine if the student t-test or the non-parametric test would be used. The result shows non-normal distribution, so the non-parametric Wilcoxon Rank Test was performed. Moreover, the standardized mean difference between the pretest and posttest was also determined using Cohen's d and rank biserial correlation.

C. Results and Discussion

1. Results

Development of the Contextualized Video Lessons in Physics

A total of 5 contextualized video lessons were developed and aligned on five learning competencies along the following topics: Projectile Motion, Momentum and Conservation of Mechanical Energy. The first two topics consisted of two video lessons respectively labeled as parts I and II. The last topic consisted of only one video lesson. The researchers used the Kinemaster App to make video lessons. The time frame of all the video lessons was only 10 to 15 minutes. The average attention span of the learners according to research is between 10 to 15 minutes.

Before the video lessons were developed, the researcher made contextualized lesson plans that followed the 5E's instructional design. Hence, the contextualized video lessons contain the following parts: Engage, Explore, Explain, Elaborate, and Evaluate. Contextualization was integrated in some parts of the lesson where it was highly applicable.

Projectile Motion

The developed video lesson on the topic of Projectile Motion is a two-part video lesson that covers two (2) learning competencies on describing the horizontal and vertical components of projectile motion and investigating the relationship between height and range of the projectile motion. In the ***Engage*** of part 1 of the lesson, some familiar activities like watering the plants using a hose and diving were shown to describe how to produce projectiles. In the Engage of part 2 of the lesson, familiar sports like basketball, volleyball and sepak takraw were used as examples of activities that involved projectile motion. The teacher highlighted the importance of understanding projectile motion in employing techniques in playing sports that involve projectile motion. The researchers utilized interdisciplinary contextualization to relate the lessons to some sports taught in Physical Education subject. Simulations taken from Phet simulation were also embedded in the ***Explore*** part of the lesson to compare the horizontal and vertical components of projectile motion as well as to demonstrate the relationship of angle of release, range and height of the projectile. Since the concepts of projectile motion are somehow abstract, especially in how to describe the horizontal and vertical motion of a projectile, a simulation of a cannon was used to show the vector arrows of both the vertical and horizontal components as the canon ball follows a projectile motion. The simulation was presented as an activity with guide questions to elicit interest and boost critical thinking among the students. The discussion of the answers to the guide questions was presented in the ***Explain*** part of the lesson using again the Phet simulation. The researchers also localized terms and concepts for a better understanding among students. The word problems in the ***Elaborate*** part of the lesson were applications of the lesson to the students' real-life activities and tasks like playing basketball in the barangay league and playing marble at the top of the table. Furthermore, some unfamiliar words were translated to local dialects for better understanding like the terms Jolen for marble and Liga for basketball league. The researchers also localized terms and concepts for a better understanding of the students. In the ***Evaluate*** of part 1 and 2, the learners were given 5 item open-ended questions to fill in the words/phrases to make correct statements about projectile motion.

Figure 1. Application of Projectile Motion in Sports

Figure 2. Embedded Phet Simulation of Components of Projectile Motion

Momentum

The developed contextualized video lessons on the topic of momentum were two-part video lessons that covered two learning competencies: relate impulse and momentum to collision of objects (e.g. vehicular collision) and infer that the total momentum before and after collision is equal. In the ***Engage***, the researchers highlighted how momentum is being used in layman's terms like in sports and games in the first part of the lesson. The teacher discussed how the term momentum is used in sports like basketball, track and field even in mobile games. Then, the teacher defined momentum scientifically using examples familiar to the students. In the second part of the video lesson, the conservation of momentum was introduced using the concept of collision. Familiar examples of colliding bodies were given like playing billiards and baseball. In the ***Explore*** of part 1, the learners analyze scenarios where they are going to apply the concept of change in momentum and conservation of momentum. All the scenarios and examples given were applications of impulse and momentum in road safety and sports. In the second part of the lesson, the teacher shows the two types of collisions. The teacher helped the students determine the difference between elastic and inelastic collisions using colliding cars and billiard balls. In ***Explain***, the video explains how impulse causes a change in momentum in part 1. Furthermore, the video explains how momentum is conserved in the elastic and inelastic collision in part 2 of the lesson. In the ***Elaborate*** of part 1, animations of how airbags work were embedded in the video to further relate impulse and momentum to vehicular collisions. In part 2, to further understand the concept of conservation of momentum students were taught how to solve problems to prove that momentum is conserved during collisions. The word problems were localized using familiar situations like the collision of jeepney and tricycle to make it more relatable. In the ***Evaluate***, the researcher presented 5 item multiple-choice questions that contained items about impulse-momentum for part 1 and conservation of momentum for part 2.

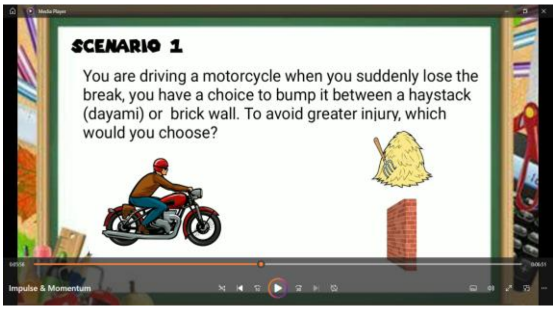

Figure 3. Application of impulse-momentum theorem

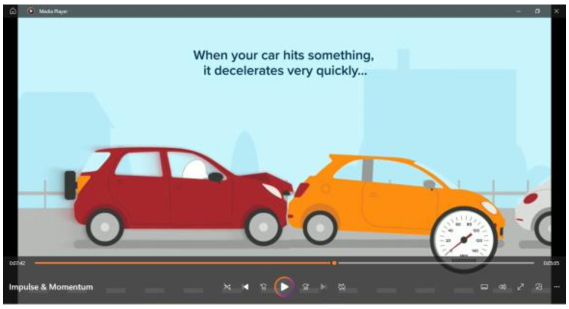

Figure 4. Application of Road Safety using Airbags

Conservation of Mechanical Energy

This topic consists of only one video lesson that covers the learning competency; perform activities to demonstrate the conservation of mechanical energy. In the ***Engage***, the students were asked to label the Venn Diagram as a review of what they have learned from the grade 8 lesson about potential and kinetic energy. The teacher delivered a short review of potential and kinetic energy by giving examples which are familiar to the students. In ***Explore***, Phet simulation was again embedded in the video. The students were asked to observe what happens to the energy of the skater as it goes up and down the ramp. They should be able to describe what happens to potential and kinetic energy. In ***Explain***, the teacher explains how the conservation of mechanical energy occurs by simply highlighting what happens to the bar graph in the Phet simulation. In the ***Elaborate***, the students analyze an image of a boy riding a bicycle going up and down the hill. The students were tasked to determine the potential, kinetic and mechanical energy at the different positions to be able to further understand the conservation of mechanical energy. In the ***Evaluate***, the students were given 5 item multiple-choice questions to assess their knowledge about the conservation of mechanical energy.

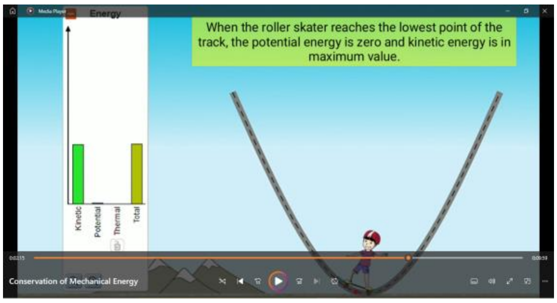

Figure 5. Embedded Phet Simulation about Conservation of Mechanical Energy

Validity of the Contextualized Video Lessons

The five developed contextualized video lessons along the three topics were validated by six physics and physical science teachers. The validators used the LRMDS evaluation tool to assess the contextualized video lessons in terms of content, instructional and technical quality. The results are presented below:

Table 1. Validators' Rating on Content Quality

Factor A. Content Quality	WM	DR
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	VS
2. Concepts developed contribute to enrichment, reinforcement, or mastery of the identified learning objectives.	4.00	VS
3. Content is accurate.	4.00	VS
4. Content is up-to-date.	4.00	VS
5. Content is logically developed and organized.	3.97	VS
6. Content is free from cultural, gender, racial, or ethnic bias.	4.00	VS
7. Content stimulates and promotes critical thinking.	3.73	VS
8. Content is relevant to real-life situations.	4.00	VS
9. Language (including vocabulary) is appropriate to the target user level.	3.83	VS
10. Content promotes positive values that support formative growth.	4.00	VS
Total Points	39.53	Passed

Legend: WM – Weighted Mean DR - Descriptive Rating VS – Very Satisfactory

The table above revealed the validators' rating of the content quality of the contextualized video lessons. The criteria that state the *content stimulates and promotes critical thinking* obtained the lowest weighted mean of 3.73 which is still interpreted as Very Satisfactory. It is followed by the indicator that pertains to *language (including vocabulary) is appropriate to the target user level* with a 3.83 weighted mean which is interpreted as Very Satisfactory. The indicator that states the *content is logically developed and organized* follows with a weighted mean of 3.97 interpreted as Very Satisfactory. All other indicators obtained a perfect weighted mean of 4.0 interpreted as Very Satisfactory. It includes the following; *content is consistent with topics/skills found in the DepEd Learning Competencies for the subject and grade/year level it was intended*, *concepts developed contribute to enrichment, reinforcement, or mastery of the identified learning objectives*, *content is accurate*, *content is up-to-date*, *content is free from cultural, gender, racial, or ethnic bias*, *content is relevant to real-life situations* and *content promotes positive values that support formative growth*.

Though some areas need to be improved in the content of the contextualized video lessons according to the rating, the content quality attained a total point of 39.53 described as passed. At least 30 points are needed to pass the criterion. The instructional quality of the video lessons was also validated. The table below revealed how the validators assessed the instructional quality of the video lessons.

Table 2. Validators' Rating on Instructional Quality

Factor B. Instructional Quality	WM	DR
1. Purpose of the material is well defined.	4.00	VS

Factor B. Instructional Quality	WM	DR
2. Material achieves its defined purpose.	4.00	VS
3. Learning objectives are clearly stated and measurable.	4.00	VS
4. Level of difficulty is appropriate for the intended target user.	3.73	VS
5. Graphics / colors / sounds are used for appropriate instructional reasons.	3.93	VS
6. Material is enjoyable, stimulating, challenging, and engaging.	3.73	VS
7. Material effectively stimulates creativity of target user.	3.87	VS
8. Feedback on target user's responses is effectively employed.	3.87	VS
9. Target user can control the rate and sequence of presentation and review.	4.00	VS
10. Instruction is integrated with target user's previous	4.00	VS
Total Points	39.13	Passed

Legend: WM – Weighted Mean DR - Descriptive Rating VS – Very Satisfactory

The indicators that state *the level of difficulty is appropriate for the intended target user* and *material is enjoyable, stimulating, challenging, and engaging* obtained the lowest weighted mean of 3.73 respectively interpreted as Very Satisfactory. On the other hand, the indicators that pertain to *material stimulates creativity of target user* and *feedback on target user's responses is effectively employed* attained a similar weighted mean of 3.87 described as very satisfactory. Moreover, the indicator that states *graphics/colors/sounds are used for appropriate instructional reasons* got a 3.93 weighted mean interpreted as very satisfactory. All of the remaining indicators under the instructional quality acquired a perfect weighted mean of 4.0 interpreted as very satisfactory. It includes the *purpose of the material is well defined*, *material achieved its defined purpose*, *learning objectives are clearly stated and measurable*, *target user can control the rate and sequence of presentation*, and *instruction is integrated with target user's previous experience*.

The validator's overall rating on instructional quality is 39.13 which means that the video lessons passed the criterion. According to the LRMDS tool, at least 30 points on instructional quality must be attained to pass the criterion. The validators also evaluate the technical quality of the video lessons. The table below shows the rating of the validators on the technical quality of the video lessons.

Table 3. Validators' Rating on Technical Quality

Factor C. Technical Quality	WM	DR
1. Audio enhances understanding of the concept.	3.67	VS
2. Speech and narration (correct pacing, intonation, and pronunciation) is clear and can be easily understood.	3.57	VS
3. There is complete synchronization of audio with the visuals, if any.	3.97	VS
4. Music and sound effects are appropriate and effective for instructional purposes.	3.97	VS
5. Screen displays (text) are uncluttered, easy to read, and aesthetically pleasing.	3.80	VS
6. Visual presentations (non-text) are clear and easy to interpret.	3.97	VS
7. Visuals sustain interest and do not distract user's attention.	3.93	VS
8. Visuals provide accurate representation of the concept discussed.	4.00	VS
9. The user support materials (if any) are effective.	3.00	S
10. The design allows the target user to navigate freely through the material.	4.00	VS
11. The material can easily and independently be used.	4.00	VS
12. The material will run using minimum system requirements.	4.00	VS
13. The program is free from technical problems.	4.00	VS
Total Points	49.87	Passed

Legend: WM – Weighted Mean DR - Descriptive Rating VS – Very Satisfactory

The indicator that states *speech and narration (correct pacing, intonation, and pronunciation) is clear and can be easily understood* got the lowest weighted mean of 3.57 described as very satisfactory. It is followed by the indicator that pertains to *audio enhances understanding of the concept* with a weighted mean of 3.67 interpreted as very satisfactory. Then, the indicator that refers to *screen displays (text) are uncluttered, easy to read, and aesthetically pleasing* acquired a 3.80 weighted mean interpreted as very satisfactory. On the other hand, three indicators got a 3.97 weighted mean described as very satisfactory. These are the indicators that state *there is complete synchronization of audio with the visuals*, *music and sound effects are appropriate and effective for instructional purposes*, and *visual presentations (non-text) are clear and* *easy to interpret*. The other indicators on the technical quality obtained a perfect weighted mean of 4.0 described as very satisfactory. The indicators are the following: *visuals provide accurate representation of the concept discussed*, *the design allows the target user to navigate freely through the material*, *the material can easily and independently be used*, *the material will run using minimum system requirements* and *the program is free from technical problems*. The indicator that states the *user support materials (if any) are effective* is Not Applicable (NA) because no support materials were given so it was rated automatically as 3 interpreted as satisfactory as per the instruction on how to accomplish the LRMDS tool. Technical quality obtained total points of 49.87 which means the video lessons passed the criterion. At least 39 points are needed to pass the criterion.

Effectiveness of Contextualized Video Lessons as Home-based Intervention

The effectiveness of the contextualized video lessons was determined using the outcomes of the pretest and posttest conducted on 30 grade 9 students who needed intervention in physics. To give a glance if the contextualized video lessons are indeed effective, the table below reveals the mean, performance level and mean normalized gain per learning competency.

The table shows that the overall mean of the pretest is 10.4 with a corresponding performance level of 25.9 % which means it did not meet expectation. On the other hand, the posttest overall mean is 22.3 with a corresponding performance level of 55.8 which is also interpreted as did not meet expectation. Both the performance level of the pretest and posttest did not meet the expected passing performance level which is 75% however it can be gleaned from the data that there is an improvement in the performance level from the results of the pretest and posttest.

Table 5. Performance Level of Grade 9 students in the Pretest and Posttest

Learning Competencies	Total Items	Pretest			Posttest			MNG
		Mean	PL	D	Mean	PL	D	
1. Describe the horizontal and vertical motions of a projectile	7	2.03	29.00	DNME	4.27	60.95	DNME	0.45
2. Investigate the relationship between the angle of release and the height and range of the projectile	10	2.94	29.30	DNME	6.00	60.00	DNME	0.43
3. Relate impulse and momentum to collision of objects (e.g., vehicular collision)	5	1.33	26.6	DNME	2.80	56.00	DNME	0.40
4. Infer that the total momentum before and after collision is equal	8	1.43	17.88	DNME	3.80	47.50	DNME	0.36
5. Perform activities to demonstrate conservation of mechanical energy	10	2.67	26.70	DNME	5.47	54.67	DNME	0.38
Overall	40	10.40	25.9	DNME	22.3	55.8	DNME	0.40

Legend: PL – Performance Level MNG - Mean Normalized Gain
D – Description DNME – Did Not Meet Expectation

Based on the data above, the learning competency that got the highest mean normalized gain is Learning Competency No. 1 having 0.45 mean normalized gain interpreted as a medium gain with an increased performance level from 29.00 % to 69.50 %. The next learning competency is Learning Competency No. 2 having a mean normalized gain of 0.40 interpreted as a medium gain with an increase of performance level from 29.30 % to 60.00 %. The Learning Competency No. 3 obtained 0.40 mean normalized gain described as medium gain with improved performance level from 26.6 % to 56.00 %. It was followed by Learning Competency No. 5 having a mean normalized gain of 0.38 interpreted as a medium gain with an increased performance level of 26.70 % to 54.67 %. The competency that got the lowest mean normalized gain is Learning Competency No. 4 having 0.36 mean normalized gain interpreted as a medium gain with an improved performance level from 17.88 % to 47.50 %. The overall mean normalized gain (MNG) based on the pretest and posttest results was 0.40 interpreted as medium gain. Hence, it was gleaned from the result that there was an increase in the mean scores and performance levels of the students from the pretest to the posttest. To know if the improvement is significant, the researcher conducted t-test and Cohen's d. The result is shown in the table below.

Table 6. Difference between the pretest and posttest results

			Statistics	Df	p		Effect Size
Pretest	Posttest	Student's t	16.9	29.0	<.001	Cohen's d	3.09
		Wilcoxon W	0.00		<.001	Rank biserial correlation	1.00

It can be observed from the table that the $p < .001$ which is less than the alpha ($p = 0.05$) which means the rejection of the null hypothesis. Hence, the pretest and posttest results have significant differences. Since the test of normality indicates a not normal distribution of the scores, the Wilcoxon Signed Rank Test as the non-parametric option for the Student's t-test was utilized. The result of the Wilcoxon test is 0.00. In addition, the effect size as shown by Cohen's d and rank biserial correlation has a result of 3.09 and 1.00 respectively described as a huge effect size.

2. Discussion

2.1. Implications

The researchers integrated simulations of the real-world applications of the topics to make students understand the concepts. A simulation is a powerful tool in physics because it can model real-life applications which makes conceptual learning more meaningful for the students (Banda & Nzabahimana, 2021). The researchers integrated into the videos Phet simulations to explain the abstract concept of projectile motion and conservation of mechanical energy. According to Wirda et al. (2023), Phet simulations can supplement or replace the use of laboratory equipment in physics experiments on projectile motion and momentum which solve the problem on insufficient physics laboratory equipment among schools. It can also generate a more reliable result which can provide an exact or correct explanation of concepts than the actual experiment which is prone to scientific error if not performed properly. Furthermore, the video lessons contain visual representations of concepts to be learned about projectile motion, momentum and conservation of mechanical energy. The use of visual representations through illustrations and diagrams of real-life applications of concepts is effective in making the students learn science. According to Poluakan (2019), the laws of physics can be explained well if teachers use correct visual representations. That's why learners must be taught to relate visuals to real-life situations.

The researchers also contextualized the word problems in the video lessons so that students will have interest and patience in solving problems through contextualized problem-based learning. It was found in the study of Satriawan et al. (2020), that providing contextual problems in physics through problem-based learning (PBL) increases creative thinking among learners. Moreover, Pozas et al. (2020) found that the positive effect of contextualized problem-solving in physics is not only observed in students' motivation and learning but also their metacognition. Furthermore, the video lessons were contextualized which delivered content that integrates real-life examples and application of the concepts. It uses pictures and animations that make the concepts engaging and easy to understand among students. Arevalo et al. (2023) also found out that using illustrations of real-life situations and animated pictures in science instructional material was successful in enhancing the student's performance in science.

The contextualized video lessons' quality was assessed along its content, instructional and technical qualities. In the content quality, the result implied that the video lessons should employ more familiar words for students to easily understand the content. Furthermore, it also implied that the video should demonstrate more techniques to promote critical thinking among students. The result shows similarity to the result of the content validation on the mathematics video lessons of Jeremias and Carretero (2022) in which the developed video lessons got low ratings in the indicators that pertain to the enhancement of critical thinking and the language used in the video lessons. Based on the overall result on content quality, the contextualized video lessons in physics passed the criteria with a very satisfactory rating. The overall result was similar to the content validation of the micro-lecture videos made by De Oca et al. (2024) where the content quality passed the criterion with a very satisfactory rating. In terms of instructional quality, the result revealed that the video lessons may be improved to make them more interesting and engaging to the students. Likewise, the video lessons should consider the level of difficulty since it is intended for low-performing students through home-based intervention. The concepts should be delivered in a way that the students can easily grasp. On the contrary, the video lessons developed by Jeremias and Carretero (2022) obtained the lowest rating in the indicator about instant feedback on the target users. The total points on the instructional quality revealed that the contextualized video lessons passed the criterion with a very satisfactory rating. Similarly, the mini-lecture videos made by De Oca et al. (2024) passed the criterion with a very satisfactory rating. In the technical quality, the result implied that the video lessons need improvement in the quality and delivery of sound and text display. Thus, audio consistency and appropriateness must be observed throughout the videos. Furthermore, the validators agreed that the speech and voice of the teacher need improvement. The result is contrary to the result on the validation of the technical quality of the mathematics video lessons created by Jeremias and Carretero (2022) where the audio and voice quality was highly rated. Based on the outcome of the evaluation of the technical quality of the contextualized video lessons, the material passed the criterion with a very satisfactory rating. It is like the result of the technical validation of the mini-lectures videos of De Oca et al. (2024) which passed the criteria with a very satisfactory rating.

In general, the results of validation revealed that the contextualized video lessons in physics passed all the criteria with a very satisfactory rating. It was recommended by the validators that it be used as a home-based intervention in physics for grade 9 students. This proves that the developed contextualized video lessons in physics are of high quality. In connection, Beheshti et al. (2018) stated that quality video lessons should explicitly state their purpose specifically the learning goals. It should be short and simple. The audio, text and graphics complement one another. He added that screen recording, and animated characters may be integrated into the videos to make them more interesting and easier to understand.

The contextualized video lesson was found to be effective as a home-based intervention in physics for Grade 9 students based on the significant difference between the pretest and posttest results. It was successful in increasing the conceptual knowledge of learners in the three topics in physics namely projectile motion, momentum, and conservation of mechanical energy. Similarly, video-based instruction was used to improve students' performance in other topics in Physics. Samosa (2023) utilized videos as a remedial tool in teaching thermodynamics. The result revealed that employing video-based instruction resulted in an improvement in pedagogical content, individual learning motivation, productivity and commitment in preservice science teachers. Furthermore, Ndihokubwayo et al. (2020) found out that both Phet simulations and YouTube videos are effective in enhancing the knowledge of learners in Optics. Similarly, Animations and simulation help enhance the understanding of Heat among secondary learners (Zakirman et al., 2022). Indeed, using educational videos improves the conceptual understanding of the different topics in Physics.

Khurshid and Bibi (2020) figured out that the use of interactive CDs with science ICT materials including videos increased the performance of slow learners. Likewise, Chou (2017) discovered that 3D video with an interactive response approach improves students learning in natural science. Furthermore, the developed educational video tutorials by Robles & Acedo (2019) showed effectiveness in improving the computational skills of the students which made it very useful as a remedial and reinforcement tool. Moreover, Morata (2024) found out that video lessons can be integrated into an online intervention for students with the least mastered competencies.

2.2. Research Contribution

Like the result of the above studies, the outcome of the present study showed that the contextualized video lessons enhance the academic achievement in physics of the low-performing grade 9 students in a home-based intervention setting. The result of the study contributes to a new teaching practice of contextualizing ICT-based technology to enhance student’s learning. Furthermore, it also revealed the benefits of using home-based interventions in helping low-performing students cope with lessons which can help both teachers and parents manage student’s learning.

2.3. Limitations

Though the use of contextualized video lessons shows significant positive results in the performance of low-performing grade 9 students, the result does not represent the whole population of grade 9 students because of the limited sample size, the sampling technique and the research design used. Furthermore, the same result may not be obtained if the developed contextualized video lessons are adopted by other institutions and teachers because it may be affected by other factors such as the students’ characteristics and backgrounds, school settings, and the availability of ICT tools.

2.4. Suggestions

The researchers recommend the use of contextualized video lessons as home-based intervention or remedial tool in Physics. The researchers also encourage teachers to create their own contextualized video lessons to make physics concepts relatable to students. The researchers also suggest that the developed contextualized video lessons by the study be further validated by the institutions and teachers who wish to adopt them to ensure quality and appropriateness before the implementation. Lastly, further research on contextualized video lessons as home-based intervention in other disciplines and other topics may be conducted.

D. Conclusion

The developed video lessons covered three topics in physics namely projectile motion, momentum and conservation of mechanical energy. Five video lessons were made along five learning competencies on the three topics. The video lessons were contextualized by embedding simulations, animations, diagrams, and problem solving of real-life applications of the concepts. The validity of the contextualized video lessons was assessed by six validators in terms of content, instructional and technical qualities. The result revealed that the contextualized video lessons passed all the criteria with a very satisfactory rating. The pretest and posttest results of the students in using the contextualized video lessons yielded significant differences and large effect sizes. Therefore, the use of contextualized video lessons as a home-based intervention is effective in improving the understanding of grade 9 students in Physics.

E. Acknowledgement

The researchers would like to extend deep appreciation to the Graduate School of Sorsogon State University for the unending support and encouragement for the wide dissemination of this research through publication. Similarly, we express heartfelt gratitude to the faculty and students of Louella Gotladera Alcoba National High School for the assistance and cooperation during the conduct of the study.

F. Author Contribution Statement

JB, conducted the data gathering procedure and package the whole manuscript.
JR, performed the data analysis procedure and proofread and revised the manuscript.

References

Alshehri, S. M. (2024). Perspective Chapter: The Impact of Digital Education on Modern Educational Institutions. In S. Mohamed & S. Mohamed (Eds.), *Social Media - Opportunities and Risks*. IntechOpen eBooks. https://doi.org/10.5772/intechopen.108058

Ampofo, A. G., Gyamfuaah, S. A., Opoku, N. S., Owusu, S. O., & Ibitoye, M. B. (2020). A pilot study of a video-based educational intervention and knowledge of cervical cancer among senior high school students in Ghana: A before-after study. *Journal of Cancer Policy*, *24*. https://doi.org/10.1016/j.jcpo.2020.100220

Arevalo, C. M. E., Janer, S. S., & Ricafort, J. D. (2023). Development of Contextualized Strategic Intervention Materials for Grade-8 Physics. *United International Journal for Research & Technology*, *4*(7), 114–118. Google Scholar

Banda, H. J., & Nzabahimana, J. (2021). Effect of integrating physics education technology simulations on students' conceptual understanding in physics: A review of literature. *Physical Review Physics Education Research*, *17*(2). https://doi.org/10.1103/PhysRevPhysEducRes.17.023108

Bathla, A., Aggarwal, P., & Manaswi, K. (2023). The role of digital technology in achieving sustainable development goals (SDGs): A systematic literature review, bibliometric analysis and content analysis. In R. Sharma, A. Shishodia, & A. Gupta (Eds.), *Fostering Sustainable Development in the Age of Technologies* (pp. 1–22). Emerald Publishing Limited. https://doi.org/10.1108/978-1-83753-060-120231003

Beheshti, M., Taspolat, A., Kaya, O. S., & Sapanca, H. F. (2018). Characteristics of instructional videos. *World Journal on Educational Technology: Current Issues*, *10*(2). https://doi.org/10.18844/wjet.v10i2.3418

Chou, C. C. (2017). An analysis of the 3D video and interactive response approach effects on the science remedial teaching for fourth grade underachieving students. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(4). https://doi.org/10.12973/eurasia.2017.00658a

Dayson, C. J. P., & Benavides, N. G. (2023). Utilization and Integration of Digital and Non-Digital Instructional Materials in Teaching. *United International Journal for Research & Technology*, *4*(5), 8–17. Google Scholar

De Oca, P. R. R., Villaceran, L. G., Deoma, M. E. B., Linaugo, J. D., Abao, G. M., & De Oca, M. G. A. (2024). Development and Validation of Micro-Lecture Videos as Learning Support Material for Grade 7 Science Competencies. *International Journal of Multidisciplinary: Applied Business and Education Research*, *5*(2). https://doi.org/10.11594/ijmaber.05.02.20

Giamellaro, M. (2017). Dewey's yardstick: Contextualization as a crosscutting measure of experience in education and learning. *SAGE Open*, *7*(1). https://doi.org/10.1177/2158244017700463

Giamellaro, M., L'Heureux, K., Buxton, C., Beaudry, M. C., Ayotte-Beaudet, J. P., & Alajmi, T. (2022). Learning to teach science from contextualized stance. In J. A. Luft & M. G. Jones (Eds.), *Handbook of Research on Science Teacher Education* (pp. 439–451). Routledge. https://doi.org/10.4324/9781003098478-39

Glewwe, P., & Muralidharan, K. (2016). Improving Education Outcomes in Developing Countries: Evidence, Knowledge Gaps, and Policy Implications. In *Handbook of the Economics of Education* (Vol. 5, pp. 653–743). https://doi.org/10.1016/B978-0-444-63459-7.00010-5

Gratela, K. F., & Janer, S. S. (2022). Effectiveness of Video Lessons in Improving the Numeracy Level of Grade 7 Students Amidst Pandemic. *United International Journal for Research & Technology*, *3*(8). Google Scholar

Hung, I.-C., Kinshuk, & Chen, N.-S. (2018). Embodied interactive video lectures for improving learning comprehension and retention. *Computers and Education*, *117*. https://doi.org/10.1016/j.compedu.2017.10.005

Ibrahim, A. (2016). Definition Purpose and Procedure of Developmental Research: An Analytical Review. *Asian Research Journal of Arts & Social Sciences*, *1*(6). https://doi.org/10.9734/arjass/2016/30478

Janardhanan, A. K., Rajamohan, K., Manu, K. S., & Rangasamy, S. (2023). Digital education for a resilient new normal using artificial intelligence—applications, challenges, and way forward. In *Digital Teaching, Learning and Assessment: the Way Forward*. https://doi.org/10.1016/B978-0-323-95500-3.00001-8

Jeremias, J. B. D., & Carretero, G. A. (2022). Effectiveness of Video Lessons in Improving the Performance of the Students in Mathematics 8. *United International Journal for Research & Technology*, *03*(11), 86–96. Google Scholar

Khurshid, F., & Bibi, M. (2020). A research study to explore the effectiveness of the interactive CD for remedial teaching in science at the elementary school. *International Journal of Management (IJM)*, *11*(8), 1922–1932. https://doi.org/10.34218/IJM.11.8.2020.170

Lohr, A., Sailer, M., Stadler, M., & Fischer, F. (2024). Digital learning in schools: Which skills do teachers need, and who should bring their own devices? *Teaching and Teacher Education*, *152*, 104788. https://doi.org/10.1016/J.TATE.2024.104788

Morata, J. A. (2024). Interactive Video-Based Learning on Least Learned Competencies in Mathematics of Grade 8 Students Using Edpuzzle: A Basis for an Online Intervention. *Psychology and Education Multidisciplinary Journal*, *28*(2), 143–152. https://doi.org/10.5281/ZENODO.14208188

Ndihokubwayo, K., Uwamahoro, J., & Ndayambaje, I. (2020). Effectiveness of PhET Simulations and YouTube Videos to Improve the Learning of Optics in Rwandan Secondary Schools. *African Journal of Research in Mathematics, Science and Technology Education*, *24*(2), 253–265. https://doi.org/10.1080/18117295.2020.1818042

OECD. (2023). *PISA 2022 Results (Volume I)*. OECD Publishing. https://doi.org/https://doi.org/10.1787/53f23881-en

Poluakan, C. (2019). The importance of diagrams representation in physics learning. *Journal of Physics: Conference Series*, *1317*(1). https://doi.org/10.1088/1742-6596/1317/1/012175

Pozas, M., Loffler, P., Schnotz, W., & Kauertz, A. (2020). The Effects of Context-based Problem-solving Tasks on Students' Interest and Metacognitive Experiences. *Open Education Studies*, *2*(1), 112–125. https://doi.org/10.1515/edu-2020-0118

Robles, A. C. M. O., & Acedo, E. (2019). Development and Validation of Educational Video Tutorials for 21st Century Secondary Learners. *Asian Journal of Multidisciplinary Studies*, *2*(2). Google Scholar

Sahu, A., Bhargava, R., Sagar, R., & Mehta, M. (2017). Need to develop a home-based intervention for specific learning disorder in Indian setting. *Indian Journal of Psychological Medicine*, *39*(4). https://doi.org/10.4103/IJPSYM.IJPSYM_93_17

Samosa, R. (2023). Video-Based Instruction as a Learning Remediation Strategy in Teaching Laws of Thermodynamics Among Prospective Science Teachers. *Studies in Technology and Education*, *2*(1). https://doi.org/10.55687/ste.v2i1.41

Satriawan, M., Rosmiati, R., Widia, W., Sarnita, F., Suswati, L., Subhan, M., & Fatimah, F. (2020). Physics learning based contextual problems to enhance students' creative thinking skills in fluid topic. *Journal of Physics: Conference Series*, *1521*(2). https://doi.org/10.1088/1742-6596/1521/2/022036

Tito, N. A., & Perez, D. R. (2017). Practices of Elementary School Administrators in the Districts of Aborlan and their Teachers' Performance in the K to 12 Curriculum. *Asia Pacific Journal of Education, Arts and Sciences*, *4*(1), 44–52. Google Scholar

UNESCO. (2023). Global Education Monitoring Report 2023: Technology in education: A tool on whose terms? In *Global Education Monitoring Report 2023: Technology in education: A tool on whose terms?* GEM Report UNESCO. https://doi.org/10.54676/UZQV8501

UNESCO. (2024, September 17). *Digital learning and transformation of education: what you need to know UNESCO*. https://www.unesco.org/en/digital-education/need-know

Wirda, W., Mauvizar, E., Lubis, S. P. W., & Muzana, S. R. (2023). Utilization of PhET Simulations in Replacing Real Laboratories for Physics Learning. *Radiasi : Jurnal Berkala Pendidikan Fisika*, *16*(2), 71–79. https://doi.org/10.37729/radiasi.v16i2.3539

Zakirman, Z., Gusta, W., & Rahayu, C. (2022). The Effectiveness of Videos and Animations in Learning Physics in Junior High School Heat Materials. *JIPF (Jurnal Ilmu Pendidikan Fisika)*, *7*(3), 256–263. https://doi.org/10.26737/JIPF.V7I3.3152