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Effectiveness of Animated Learning Materials in Enhancing Grade 8 Students' Academic Performance in Physics

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Index Terms:

academic performance, animated learning materials, multimedia learning, physics education, quasi-experimental design

Abstract. This paper explored the use of animated learning resources to enhance academic performance of Grade 8 students in Physics especially in force, motion and energy concepts. A quasi-experimental one-group pretest–posttest research design was employed involving 56 Grade 8 students from Pintuyan National Vocational High School, Philippines because based on the data from the previous school year. The participants were exposed to animated instructional materials over a three-week period. Data were collected using a 40-item multiple-choice test and a validated perception survey. Descriptive statistics, including mean and standard deviation, as well as inferential analysis using a paired t-test, were utilized to determine significant differences in performance. Results revealed a statistically significant improvement in students' performance across all competencies ($p < .001$), with large effect sizes ($d > 1.0$). The mean score increased from 39.10% in the pretest to 72.60% in the posttest, indicating substantial learning gains. Furthermore, students reported high levels of engagement, motivation, and conceptual understanding, with overall perception ratings categorized as "Strongly Agree" (M = 3.26–3.27). Positive feedback highlighted improved comprehension and increased interest in learning Physics through animation, while minimal concerns were noted regarding usability and clarity of instruction. The findings suggest that animated learning materials significantly enhance both conceptual understanding and learner engagement in Physics. This supports the integration of multimedia-based instructional strategies in promoting student-centered and technology-enhanced learning environments. It is recommended that educators adopt animation-driven approaches to improve science instruction and address conceptual difficulties in secondary education. It is suggested to integrate multimedia-based instructions to enable the student-centered and technology-enhanced learning environments in secondary education.

Introduction

Science education is a crucial part of the national development because it provides the students with the ability to think analytically and solve problems required in such a society as is arguably technology-driven. In practical situations, high level of science literacy is directly associated with the ability to innovate, labor preparedness, and the results of sustainable development. Although it is important, the performance of the Philippine students in science is alarmingly low. The Organisation for Economic Co-operations and Development (OECD, 2023) has reported that out of the 23 percent of Philippine students, only 23% of students attained at least Level 2 in science, in comparison to the OECD average of 76 percent. Moreover, the average science score of the country was 356, which was one of the lowest among the world, and this index showed significant differences in the concepts of understanding and implementing them. Likewise, international indices like Global Innovation Index also show a continued low in the area of science education, although there are slight positive changes in innovation outputs. The trends imply that there is an institutional issue in the application of scientific knowledge into quality learning outcomes.

There has been an emerging literature on the application of technology-based instruction methods to mitigate these gaps. Based on Constructivist Learning Theory and the Multimedia Learning Theory by Mayer, animated learning materials have been widely noted to simplify abstract concepts, increase engagement and retention of those concepts. Science education Empirical research continues to record positive results in science education. By way of example, animation-driven learning was found to enhance the conceptual knowledge of such complex subjects as Laws of Newton and to make students more motivated (Sastradika et al., 2021). Equally, student-centered methods that also involved the use of multimedia tools have also shown substantive improvement in science performance and engagement (Kang and Keinonen, 2018). The Philippine situation was also supported by a meta-analysis by Antonio and Castro (2023) that demonstrated that virtual simulations with animated instructions media produce significantly positive impacts on the achievement of students in Physics. This pattern of agreement can be seen across these studies: the use of animated and multimedia-based instruction stimulates the comprehension level of learners, their motivation, and engagement. Nevertheless, there are severe shortcomings. Numerous studies are carried out not in the Philippine educational setting, so generalization to local curricula and classroom conditions is not possible. Furthermore, some studies are also done on other subjects of science like Biology and Chemistry with relatively less studies on Physics which is a topic that is well known as an abstract and intensive subject with heavy formulas and methods. The methodological soundness of some studies also depends on small samples or does not provide strong pretest- posttests comparisons, raising a question of the extent and stability of the learning purposes. In the local setting, these gaps are further illustrated with the school-level performance statistics. In Pintuyan National Vocational High School, Grade 8 Physics (79.67) Mean Percentage Score (MPS) was below the grade physics disciplines, indicating that the school kept having challenges in learning the basics of Physics. It suggests that conceptual gaps require instructional interventions which may facilitate the conceptual learning of abstract concepts in the fields of force, motion and energy by learners. With these limitations, one serious unanswered question arises, and it is as follows: how much can animate learning materials materially enhance the academic performance and learning experiences of Grade 8 students in Physics in the Philippine education system? The solutions to this gap have both significant theoretical effects on justifying multimedia learning principles in local contexts and practical effects on curriculum design, instructional transformation and policy formulation in science education.

The study is very topical and required due to the growing demands to incorporate technologies in the learning process and the necessity to restore learning deficits in the core science skills. With the move to a more digital and student-centered learning process, evidence-based practices, like animation-based instruction, should be tightly tested to verify their effectiveness and scalability.
Specifically, this study addresses the following research questions:

1. What are the pretest and posttest performance levels of Grade 8 students in Physics after exposure to animated learning materials?
2. Is there a statistically significant difference between students' pretest and posttest scores?
3. How do students perceive the effectiveness, engagement, and usability of animated learning materials?

The main aim of the research is to focus on the effectiveness of animated learning materials in enhancing the academic performance of students in Physics. In particular, it will help to examine the importance of learning outcomes and the attitude of students to the instructional intervention. The study sets out to educate the creation of improved animated instructional materials that can be used in the classroom as a secondary goal.

Framework of the Study

The theoretical framework of the study is rooted at Constructivist Learning Theory by Jean Piaget (1937) and Lev Vygotsky (1978), and the Multimedia Learning Theory, which was created by Richard Mayer (2005). Constructivist Learning Theory assumes that learners actively build knowledge by engaging in an interaction with the surrounding, past experiences, and social interaction. Piaget focused on cognitive processes of assimilation and accommodation in which learners combine the new information with the already existing mental framework, whereas Vygotsky positively emphasized the role of social interaction and scaffolding in the Zone of Proximal Development (ZPD). With the scope of this research, animated learning content can be used as a teaching tool that offers interactive visual illustrations of abstract Physics concepts, and thus the students can actively create meaning through guided discovery and interaction. To add to this, the Multimedia Learning Theory developed by Mayer describes the fact that information is better processed by learners when presented via visual and auditory means. The framework shows that animated learning materials can be considered the independent variable which is affected by these theoretical bases and directly depends on the academic performance of the students as the dependent variable. The Grade 8 students are the target group that will be given the intervention using animated material application. The process flow also illustrates that incorporation of animation in teaching brings about better learning

results and informs the establishment of better animated learning data. By and large, the framework proves the fact that a blend of constructivist principles and multimedia strategies can produce a student-centered, engaging and cognitively effective learning environment that can enhance the Physics learning outcomes.

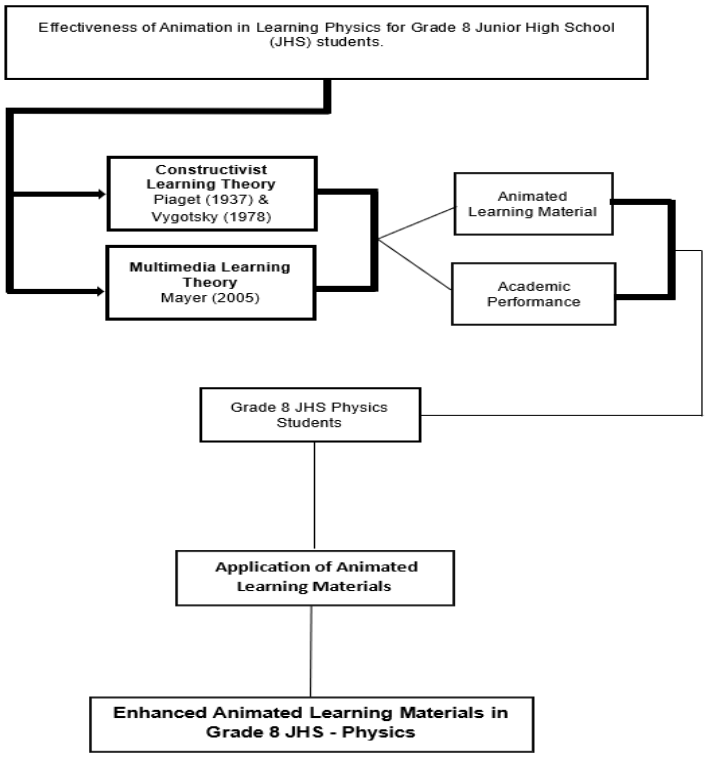

Figure 1. Theoretical Framework of the Study

Methodology

Research Design

This study used a quasi-experimental one-shot design. This is a research design in which a single group of participants is exposed to an experimental treatment or intervention, and then a single measurement is taken afterward to observe the outcome. The quasi-experimental one-shot design has no comparison with another group that did not receive the intervention. Although this design follows the principle of limited causality, which means that there are no controlled group and no pre-test, this study conducted a pre-test as a baseline measurement to determine the mean difference of scores using the intervention.

Research Locale

The study was conducted in Pintuyan National Vocational High School, a school located in the District of Pintuyan within the Southern Leyte Division. It is a public school located at San Roque, Pintuyan, Southern Leyte which is in the town proper and along the highway and is accessible to vehicles, such as buses, jeepneys, and tricycles. It has served the community for more than 4 decades and is one of only two secondary schools in the district.

Research Respondents

The respondents of this study were the Grade 8 students of Pintuyan National Vocational High School, in the science class. The research respondents were identified using a convenient sampling method. Grade 8 Level has two sections: Grade 8 - Gomez and Grade 8 - Mabini. Since the current investigation utilized quasi-experimental one-shot design, both sections

were applied with an intervention through the application of animated instructional material. The table below presented the distribution of the respondents of the study.

Respondents	Total Population		% Male	% Female	Total
	Male	Female			
Grade 8 – Gomez	16	12	58.62%	42.38%	28
Grade 8 – Mabini	15	13	55.17%	44.82%	28
Total	**31**	**25**	**56.90%**	**43.10%**	**56**

Table 1. Frequency Distribution of Respondents

Grade 8 learners were chosen as respondents because based on the data from the previous school year, the mean percentage score on the 1st quarter which consisted of physics discussion was lower compared to the mean percentage score of the other quarters which focused on different branches of science.

Research Instrument

The researcher adapted the Self Learning Grade 8 Modules and Regional Test Item Bank (RTIB) of the Department of Education (DepEd) in a multiple-choice test format. The purpose of the Multiple-Choice type of test in this study was to assess the student's academic performance. A 40-item Multiple-Choice type of test was given as a pre-test exam to check the prior knowledge of the learners and a post-test to test for their retention and comprehension. After the post-test, the researcher also administered a survey in both sections to determine the learners' feedback and perceptions on the use of animated learning materials towards Physics concepts. This survey form was the basis for the enhancement of the animated learning materials being used. The validity of the instrument was evaluated by an expert, who reviewed its alignment with the research objectives and content accuracy. Additionally, any necessary revisions were made based on feedback from the expert.

Data Gathering Procedures

The researcher submitted a letter to the office of the principal and the research administration, asking permission to conduct a study in the school. The researcher then conducted an orientation of the respondents to emphasize the importance of their participation and assured them that their data were considered confidential. Next, the researcher conducted an orientation to the science teacher of the said respondents. After then, a pre - test was given to assess their prior knowledge of the physics concepts – Newtons' Laws of Motion, Potential Energy, and Kinetic Energy. Both groups answered same sets of tests. Right after, the teacher then conducted the discussion which were conducted for two (hours) for each group of learners every Wednesday for three consecutive weeks. The class sections were exposed to animated learning materials as a part of the discussion. After three weeks of discussion, a post-test was conducted and both groups answered the same sets of tests. The results of the assessments were gathered to measure the effectiveness of animation in learning physics on the students' academic performance. A survey questionnaire was given to the learners to gather feedback for the enhancement of the animated learning materials.

Statistical Treatment of Data

This study employed a range of statistical tools to ensure an objective and comprehensive analysis of the data gathered. Descriptive statistics such as frequency and percentage were utilized to summarize and present the distribution and proportion of students' responses in a clear and interpretable manner. The mean (average) was used to determine the central tendency of scores, providing an overall measure of students' academic performance, while the weighted mean was applied to analyze survey responses by assigning appropriate importance to each indicator. In addition, standard deviation (SD) was computed to assess the variability or dispersion of the data, indicating the consistency of students' performance and perceptions across the measured variables. To determine the effectiveness of the intervention, inferential statistics were employed, particularly the paired t-test, which was used to compare the pre-test and post-test scores of the same group of students. This test established whether the observed differences in performance were statistically significant, thereby validating the impact of the animated learning materials. The pre-test and post-test results were analyzed using both mean and standard deviation to describe performance levels before and after the intervention. Furthermore, the

survey data collected through a validated researcher-made questionnaire were analyzed using weighted mean and standard deviation to evaluate students' perceptions in terms of effectiveness, engagement, and areas for improvement, ensuring a robust and reliable interpretation of the findings.

Scoring Procedure

Range of Percentage	Category	Verbal Description
90% - 100%	Outstanding	The student demonstrates an excellent understanding of the material, with a high level of accuracy in answering questions
85% - 89%	Very Satisfactory	The student demonstrates limited understanding of the material.
80% - 84%	Satisfactory	The student displays a good understanding of the subject matter, with a majority of questions answered correctly, indicating an average comprehension level.
75% - 79%	Fairly Satisfactory	The student has a basic understanding of the content, with a fair number of correct answers. Some areas may need improvement, but there is a fundamental grasp of the material.
0 – 74%	Did Not Meet Expectations	The student demonstrates limited understanding of the material, with fewer correct answers. Significant improvement is needed to meet the expected level of knowledge and skills.

Table 2. The Scoring Procedure of the Study

To give the performance rating, the Department of Education Grade transmutation was used. The test scores were categorized into five descriptors based on the percentage of correct answers. Each descriptor corresponded to a range of percentage, providing a qualitative assessment of student performance.

Ethical Consideration

The research was conducted in accordance with the high standards of ethics in order to guarantee protection and well-being of each of participants. The school administration and the respondents gave formal permission and informed consent respectively before data collection was done, so that the respondents had a free choice on whether to participate on the study based on complete comprehension of the purpose of the study. The students were not identified by their names during the research process but the confidentiality and anonymity of respondents was preserved, and all the data collected were utilized only in academic purposes and presented in aggregate form in order not to reveal any individual respondents. Moreover, the research made sure that neither harm, coercion, or excessive pressure was applied on the learners, when administering the animated learning materials and assessments. The ethical issues also found their reflection in the fair recognition of the sources and the compliance with the principles of academic integrity to make the research process as transparent and honest as possible.

Results and Discussion

Pre-Test Scores of the Students Before the Implementation of Animated Learning Materials

Competencies	Scores	f	%	Mean (SD)	Equiv. %	Verbal interpretation
Investigating the relationship between the amount of force applied and the mass of the object to the amount of change in the object's motion.	9-10	0	0	4.96 (1.76)	49.6	Did not meet expectation
	7-8	13	23.21			
	5-6	19	33.93			
	3-4	20	35.71			

Inferring that when a body exerts a force on another, an equal amount of force is exerted back on it.	0-2	4	7.14	4.07 (1.74)	40.7	Did not meet expectation
	9-10	1	1.79			
	7-8	4	7.14			
	5-6	20	35.71			
	3-4	19	33.93			
Calculating forces, accelerations, and masses related to Newton's Laws of Motion.	0-2	12	21.43	2.20 (1.07)	22.0	Did not meet expectation
	9-10	0	0.00			
	7-8	0	0.00			
	5-6	0	0.00			
	3-4	22	39.29			
Identifying the factors that affect potential and kinetic energy.	0-2	34	60.71	4.39 (2.12)	43.9	Did not meet expectation
	9-10	2	3.57			
	7-8	6	10.71			
	5-6	15	26.79			
	3-4	22	39.29			
	0-2	11	19.64			
Overall				**3.91 (1.67)**	**39.10**	**Did not meet expectation**

Legend: 90 and above, Outstanding; 80 – 89, Very satisfactory; 80 – 84, Satisfactory; 75 – 79, Fairly satisfactory; Below 75, Did not meet expectations.

Table 3. Pre-test Scores of the Grade 8 Students on the Identified Learning Competencies

As indicated in table 3, the performance of the students in the pre-test in all the competencies, was below the performance of the students as shown in the did not meet expectations mark, with an overall mean percentage of 39.10. According to the competency that involves exploration of the relationship between force and motion, the students scored an average of 4.96 (49.6%), which shows that they had learned only half of the essence. The understanding of the Newton Laws of Motions was weaker with a score of 4.07 (40.7%), which implies that the students were finding issues with action-reaction laws. In the meantime, the results in calculations were worrisome as the mean was 2.20 (22%), which showed that students had severe problems using mathematical concepts to solve Physics problems. Concepts energy had the highest variability (SD=2.12) with a mean of 43.9 (4.39) (high variability) with an overall lack of consistent understanding of relationships between potential and kinetic energy. The result of these base scores indicates that there exists a big gap in the conceptual and quantitative application especially in the translation of theoretical knowledge into problem solving situations.

The outcome of this research was in agreement with that of Hanif (2020) who stated that the traditional form of instruction was not engaging and understandable which led to a lesser level of understanding before the introduction of animated materials. Additionally, as Nuni et al. (2019) say, students who were taught through traditional means scored much lower, which implies poor baseline knowledge, just as the pre-test scores of the present study. However, in the opposite, Rahim et al. (2022), found that the application of songs and animation-based media contributed significantly to increasing the motivation of students, and the experimental group demonstrated higher scores than the control group.

Post-Test Scores of the Students After the Implementation of Animated Learning Materials

Competencies	Scores	f	%	Mean (SD)	Equiv. %	Verbal interpretation
Investigating the relationship between the amount of force applied and the mass of the object to the amount of change in the object's motion.	9-10	3	5.36	7.05 (1.26)	70.5	Did not meet expectation
	7-8	37	66.07			
	5-6	13	23.21			
	3-4	3	5.36			
	0-2	0	0.00			
Inferring that when a body exerts a force on another, an equal amount of force is exerted back on it.	9-10	28	50.00	8.20 (1.13)	82.0	Satisfactory
	7-8	24	42.86			
	5-6	4	7.14			
	3-4	0	0.00			
	0-2	0	0.00			
Calculating forces, accelerations, and masses related to Newton's Laws of Motion.	9-10	2	3.57	6.29 (1.42)	62.9	Did not meet expectation
	7-8	27	48.21			
	5-6	18	32.14			
	3-4	9	16.07			
	0-2	0	0.00			
Identifying the factors that affect potential and kinetic energy.	9-10	18	32.14	7.52 (1.26)	75.2	Fairly Satisfactory
	7-8	25	44.64			
	5-6	13	23.21			
	3-4	0	0.00			
	0-2	0	0.00			
Overall				**7.26 (0.70)**	**72.60**	**Did not meet expectation**

Legend: 90 and above, Outstanding; 80 – 89, Very satisfactory; 80 – 84, Satisfactory; 75 – 79, Fairly satisfactory; Below 75, Did not meet expectations.

Table 4. Post-test Scores of the Grade 8 Students on the Identified Learning Competencies

The post-test results as represented in Table 4 above recorded improvement in all the competencies but the overall performance is still rated as Did not meet expectation at 72.60%. There was also a high improvement in force-motion knowledge where the students were able to visualize and understand how forces were used with a mean of 7.05 (70.50%). An increase in competency in calculations was the most dramatic with mean value of 6.29 (62.90%), and animated visualization helped close the gap between abstract mathematical ideas and natural phenomena. The energy concepts proved to demonstrate significant gains in comprehension and concordance with a mean value of 7.52 (75.20%), which indicates that the use of animations was relevant in demonstrating the abstract relationships between potential and kinetic energy. These progressions imply that graphic contents can be used to explain ideas but further developments might be necessary to achieve success in all subjects.

It was corroborated by the study of Rosdiana & Ulya (2021), who focused on the moderate to high increases in the mastery of the concepts of science among the students following the intervention of animated video, which was comparable to the post-test acquisition in the present study. Moreover, Sastradika et al. (2021) showed the way animation was used to assist students to grasp abstract concepts such as the direction of force in Newtons law. These studies would be in favor of the findings of the present research, as they give scientific and factual foundations on animated learning materials. Likewise, in the present study, a 2024 study by Wati et al. (2025) found that the use of the ADDIE model to create Powtoon animated videos to implement STEM-integrated learning to grade eight learners showed that the animated videos helped students grow their understanding, motivation, and fascination of Physics.

Significant Mean Difference Between Pre-test and Post-Test Scores using the Animated Learning Materials

Competencies	Mean Diff.	Test Statistic	Effect Size	p-value
Investigating the relationship between the amount of force applied and the mass of the object to the amount of change in the object's motion	2.09	7.92	1.06	<.001*
Inferring that when a body exerts a force on another, an equal amount of force is exerted back on it	4.13	15.22	2.03	<.001*
Calculating forces, accelerations, and masses related to Newton's Laws of Motion	4.09	19.14	2.56	<.001*
Identifying the factors that affect potential and kinetic energy	3.13	9.24	1.24	<.001*

**Significant when p-value ≤ 0.05*

Table 5. Significant Difference in the Pre-test and Post-test Performances of the Students

The pre-test and post-test performances of the students in all the competencies are statistically different after using the animated learning materials in Physics as indicated by table 5. The results obtained were the comparison of the scores of the students before and after using the animated learning material in Physics class. The post-test performances of the students in exploring the correlation between the magnitude of force applied and the mass of the object to the magnitude of change in the motion of the object (Mean Diff = 2.09, z = 7.92, p = <.001), determining the effect of forces, accelerations and masses on the Newton Laws of Motion (Mean Diff = 4.09, z = 19.14, p = <.001), identifying the factors which influence potential and kinetic energy (Mean Diff = 3.1

The findings of the present research were in line with the concept that animations improve learning as a socially mediated activity by supporting a more direct instructor engagement besides peer interaction. This enables the teacher to guide the learners through complex concepts that are represented visually (Chand, 2023). When animated simulations of real physics experiment are introduced, students are better placed to engage with the content in a way that facilitates the advancement of understanding, discussion and critical reasoning. Zakiyah et al. (2024) supported this outcome by stating that the implementation of media using songs and animation resulted in an increase of student motivation significantly with the outcome of the experimental group being higher than that of the control one. More to the point, Tresiadi et. al. (2024) produced Powtoon-based STEM videos that positively influenced the comprehension, motivation, and interest in Physics. In the meantime, the importance of animated videos in the learning performance and critical thinking of elementary school students was discovered by Astuti et al. (2021), which further promotes the effects observed in the present study. Such studies identified the various effects of animated video materials on the process of learning in respect to the influence they have on the learning process.

Students' Level of Perception on the use of Animated Learning Materials

	Indicators	Weighted Mean	SD	Category
1.	The animated materials helped me understand the concepts better.	3.29	0.49	Strongly Agree
2.	The animations made the lessons more interesting.	3.27	0.52	Strongly Agree
3.	I can remember the lessons better when animations are used.	3.23	0.47	Agree
4.	The animations were clear and easy to follow.	3.27	0.59	Strongly Agree
	Total	**3.26**	**0.52**	**Strongly Agree**

Legend: 3.26-4.00, Strongly Agree; 2.51-3.25, Agree; 1.76-2.50, Disagree; 1.00 -1.75, Strongly Disagree.

Table 6. Students' Feedback and Perceptions on the Effectiveness of Animated Learning Materials

Table 6 indicates the responses and attitude towards Effectiveness of Animated Learning Materials. The weighted mean of 3.26 is viewed as Strongly Agree. Students were most emphatic that animations increased their comprehension of concepts (3.29), and made learning more interesting (3.27). The ease and the readability of the animations (3.27) were also rated high, which means its quality and usability. Although students concurred that animations enhanced retention (3.23), this marginally low score indicates that this area can be enhanced. This indicates a moderate consistency in responses as shown by the standard deviation of 0.52. This finding was corroborated by Rosdiana & Ulya (2021), that stated that student's evidence moderate to high intensity of improvements in learning concepts in science after being exposed to animated video interventions, which is in line with the post-test improvements in the present study.

	Indicators	Weighted Mean	SD	Category
1.	I am more motivated to learn when animations are used in the lessons.	3.29	0.53	Strongly Agree
2.	I participate more in class when animations are used.	3.20	0.64	Agree
3.	I prefer lessons that include animations over those that do not.	3.32	0.64	Strongly Agree
	Total	**3.27**	**0.60**	**Strongly Agree**

Legend: 3.26-4.00, Strongly Agree; 2.51-3.25, Agree; 1.76-2.50, Disagree; 1.00 -1.75, Strongly Disagree.

Table 7. Student's Feedback and Perceptions on Engagement and Motivation

Table 7 indicates the feedback and perception of the students on the Engagement and Motivation: the weighted mean is 3.27, which can be interpreted as Strongly Agree. When animations were applied, students reported a high level of motivation to learn (3.29) and they favored lessons that included animations to the lessons that did not include animations (3.32). There was also more participation in class as shown by a mean score of 3.20 though this is a little bit lower implying that there might be variability in responses of respondents. The standard deviation of 0.60 demonstrates moderate uniformity in perceptions.

Generally, these findings indicate that animations are much more engaging and motivating to students in terms of the level of interest and preference. As with the outcome of this research, Zakiyah et al. (2024) found that the application of the media based on the use of songs and animation greatly increased the level of student motivation, and the experimental group had higher scores than the control group. This highlighted the fact that the respondents were driven and involved in animated learning contents that they watched. They consider it to be more involving and encouraging. The focus on motivation is part of the teaching-learning process since it enables more meaningful learning experiences of the students.

	Indicators	Weighted Mean	SD	Category
1.	Visuals and graphics	3.52	0.54	Strongly Agree
2	Clear explanations	3.36	0.59	Strongly Agree
3.	Engaging content	3.32	0.58	Strongly Agree
4.	Easy to understand	3.45	0.50	Strongly Agree
5.	Too fast-paced	1.32	0.47	Strongly Disagree
6.	Difficult to understand	1.25	0.44	Strongly Disagree
7.	Not engaging enough	1.23	0.43	Strongly Disagree
8.	Technical issues (e.g., lagging, poor quality)	1.11	0.31	Strongly Disagree
9.	Slower pace	1.36	0.52	Strongly Disagree
10.	More detailed explanations	1.45	0.63	Strongly Disagree
11.	Better graphics/visuals	1.29	0.46	Strongly Disagree
12.	More interactive elements	1.41	0.63	Strongly Disagree
	Total	**2.0**	**0.51**	**Disagree**

Legend: 3.26-4.00, Strongly Agree; 2.51-3.25, Agree; 1.76-2.50, Disagree; 1.00 -1.75, Strongly Disagree.

Table 8. Student's Feedback and Perceptions on Areas for Improvement

Table 8 below presents the positive perceptions of the students on Areas of Improvements of the animated learning materials. The strength of Visuals and Graphics (3.52), Clear Explanations (3.36), Engaging Content (3.32), and Ease of Understanding (3.45) was observed as the indicators received all the ratings of Strongly Agree and proved their effectiveness in learning. Negative feedback signs on the other hand, including being too fast-paced (1.32), hard to understand (1.25), and technical problems (1.11) had been rated as Strongly Disagree, implying that there were not many concerns in these fields. Other suggestions that were scored low such as slower pacing or increased interactivity also indicated overall satisfaction with the intervention. The overall average of 2.0 shows the students are not really agreeing that there are major aspects to be improved, which proves the effectiveness of the animations.

According to Sastradika et al. (2021), that measured the effect of animation on increasing understanding of the Law of Newton supported this finding but also gathered the responses of students regarding using animation-based learning media. Students rated media as appropriate and viable and their motivational and interest were high. Furthermore, Zakiyah et al. (2024) investigated the effects of the media based on songs and animation to student motivation as well as some student perception was incorporated in the assessment. It stated that the group of experiment had a greater level of motivation according to feedback, which also confirms the results of this study.

Conclusion and Implications

This paper discovered that the addition of animated learning resources enhanced the performance of Grade 8 students especially in the components of Physics, especially in the concept of force and motion, Newtons Laws, and energy. The use of statistically significant differences in pre-test and post-test scores proved the effectiveness of the intervention, with students also stating more engagement, motivation, and understanding. The findings illustrate that animation improves conceptual learning and general experience by the learner. The results are relevant to Constructivist Learning Theory and Multimedia Learning Theory since they demonstrate that animation enhances active knowledge building and dual-channel processing. Animated instruction enhances verbal and visual understanding and recall, particularly of abstract concepts in Physics. This supports the multimedia as an effective tool in improving the results of science learning. In practice, the research paper demonstrates the importance of applying animated resources to instruct Physics to make complicated matters easier and enhance student learning and performance. But constraints in the form of the absence of control group, small sample size, and short course of intervention are indicative of the need to conduct more studies. To support and expand these findings, the future studies ought to employ experimental designs, bigger and more varied samples, and investigate the long-term effects and the interactive features of animation.

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Competing Interests Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study; all data used were obtained from previously published sources as cited in the reference list.

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Appendices

No appendices are attached to this study.