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Impact of Educational Videos on Students' Understanding of General Physics in Grade 12 Students

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Abstract

In the modern educational world, multimedia resources have become increasingly essential in enhancing student learning and engagement. Among these resources, educational videos have emerged as a powerful tool in enhancing the comprehension of complex subjects, especially general physics. This quantitative study explores the impact of educational videos on students' learning, specifically focusing on their effectiveness in improving conceptual understanding, problem solving skills and retention of their knowledge. This research aims to know how the use of educational videos helps in improving the academic performance of grade 12 science, technology engineering and mathematics (STEM) students at Young Achievers School of Caloocan, Inc. and whether this tool can serve as an effective way to improve the learning of students.

Through the experiment conducted to the 20 students who were the respondents of this study, the researchers were able to evaluate the impacts of educational videos on the student's understanding compared to traditional teaching methods. Using the questionnaires, it aims to discover whether the use of educational videos both pre-test and post-test, improves the students' conceptual understanding, retention of knowledge and problem-solving skills in terms of use of educational video. Not only that, but this study will also be discussing and investigating the certain aspects that hinders a student's progression in their understanding. The results that were obtained in this study will be used for the sole purpose of enhancing a student's understanding using educational videos.

Keywords: Multimedia, General Physics, Educational Video, Retention, Conceptual Understanding

1. The Problem and its Background

1.1 Introduction

Physics is a crucial topic, it requires deep understanding of the natural world of science. It examines the basic characteristics of matter, time, energy, and space. Kohler, S., *et al*. (2021). Stated that educational videos are understood as a fruitful strategy to enhance the student knowledge and are applied in schools, as well as in science communication.

Weidner R. and Brown L. (2025) stated that physics plays an important role in all the natural sciences, however, and all such fields have branches in which physical laws and measurements receive special emphasis, bearing such names as astrophysics, geophysics, biophysics, and even psychophysics. Physics can be defined as the science of matter, motion, and energy.

According to Bouras. A. *et al*., (2025). The emergence of multimedia has fostered the development of interactive videos, introducing an innovative approach to enhancing learner engagement.

According to, Section 1 of the REPUBLIC ACT NO. 10650, this Act shall be known as the "Open Distance Learning Act". It is hereby declared the policy of the State to expand and further democratize access to quality tertiary education through the promotion and application of open learning as a philosophy of access to educational services, and the use of distance education as an appropriate, efficient and effective system of delivering quality higher and technical educational services in the country.

1.2 Background of the Study

The students' participation inside the classroom is very essential in order to improve or develop their understanding in the higher education, as well as their critical thinking skills Loftin, *et al*., (2020). Before pandemic happened, the use of social media platforms were not frequently used. Students nowadays rely most of the time on watching some educational videos that is posted in different social media platforms. Educational videos suddenly became a very important part in higher education because it provides content-delivery tool that is being especially on online classes nowadays (Brame, 2016).

Ever since the year of 2020 when COVID-19 was all around the world, the use of internet especially in educational sector became a vital factor. It accelerated the number of people adopting to the new normal and many teachers in higher education really used educational videos, as a key part of online learning education (Zhu, J., Yuan, H., Zhang, Q. *et al*, 2022). Many households had to have access to internet in order to keep going with their jobs and studies. Based on Philippine Statistics Authority (2020), more than 50 million have access to the internet, 42.1 percent in this only have an internet through their sim cards, while 15.0 percent have internet through wired or fixed internet.

This study aims to know the impact of educational videos on students' understanding of General Physics for STEM students at Young Achievers' School of Caloocan. To know how educated they get by watching educational videos and if they can perform this inside the classroom. As the STEM strand is not that easy, the researchers know that most students have been struggling to understand and learn the subject General Physics.

According to John Wiley & Sons, (2023). It is an interactive focus principle of physics is an industry leading resource with insightful and accessible treatments of a wide variety of subjects focuses on several wide array of tools.

1.3 Review of Related Literature

This part of the research study will focus on a comprehensive analysis and interpretation of existing related literatures, studies, and academic works that provides important and relevant information that support and provide context to the research topic.

1.4 Local Synthesis of Literature

Empirical Research found that video-based training is an excellent tool for learning independent of grade level, subject content, or learning modes. The overall big effects of 2.03 indicates that video-based training is an effective instructional tool that teacher can utilize to supplement their teaching. This educational tool can also use in science and mathematics education, as well as in other areas of education. To increase student performance, educational policy makers and curriculum developers, as well as classroom teachers, may incorporate video-based instruction into the teaching learning process at various levels of education. A more comprehensive study might be done to assess the effectiveness of video-based instruction and education.

This study show that video-based instruction can help to improve the students academic performance, specially in the subject math and science.

The results that researchers found states that 14 qualified empirical studies clarify that video-based instruction is effective way to learn even to the different grade levels, subject, modalities, and teaching style that different students and schools has. This research findings stated that the overall large effect size is 2.03 thinks that videbased is a tool that can be used by the teachers as a way of support and enhanced their way of teaching. Video-based instruction can be used specially in the subject Math and Science. The study also stated that video-based instruction will continue to get better as the times goes by that can boost the student's knowledge and understanding.

Dipon, C.H. & Dio, R.V. (2024). A meta-analysis of the effectiveness of video based instruction on students' academic performance in science and mathematics. International Journal on Studies in Education (IJonSE), 6(4), 732-746. According to the study by Villanueva & Concepcion (2023) [7], they tried to enhance and assess e-learning materials among grade 10 physics they used descriptive method to find out their effect on the Sta. Elena High School students performance for S.Y. 2022-2023. Because the data was well suited to examine the elements of the developed interactive e-learning materials in Physics. They used and analyzed twenty grade 10 science teachers, thirty science teachers, thirty expert teachers, and thirty grade 10 students to get the date for the research. Proving that interactive e-learning material can be advanced depending on the perception of the Grade science teachers and the adoption of the 5Es of Learning and ADDIE model. The study also showed that the advanced e-learning materials have met the standard placed by the Department of Education in developing and evaluating non-print learning materials and completed its purpose of improving students' physics performance.

Villanueva, D., & Concepcion, E. (2023) [7]. Interactive E-Learning materials in Physics for an Enhanced performance of Grade 10 students.

1.5 Foreign Synthesis of Literature

According to Journal of Science Education and Technology (Garcia, V., *et al*, 2022), stated that students' interactions with video can give important insights into how to use this resources (Merky *et al*., 2021 and Yoon *et al*., 2021) Generally, a more thorough comparative analysis by context and by video content various courses that may varying degrees of difficulty is made possible by the quantity of views and each videos receives and the visualization dates. (Walsh *et al*., 2019).

In the past research (Perez-Navaroo *et al*., 2021) This study examined how students viewed "videos with hands," or videos that showed teachers' hands while they were demonstrating a concept or resolving an issue, in the context of starting physics classes that were taught both in person and online. Regarding the present work, the primary findings in both works are that: (1) students find videos to be very helpful resources and are highly satisfied with them; (2) they find both theory and problem-solving videos to be equally useful; (3) Utilize videos to prepare for assignments and tests. According to this study, educational videos can assist students in understanding how to use this type of resource when learning a particular subject, such as general physics. Physics is taught both in-person and online to compare research findings.

This study investigates the student's participation between online and in-person. The study utilized data from Youtube, found that students were highly intrigued and satisfied with

educational video. This stated that educational videos are equally useful for theoretical concepts and problem-solving when it comes to learning Physics.

Garcia, V., Conesa, J., & Perez-Navarro, A. (2022). Videos with Hands: an Analysis of Usage and Interactions of Undergraduate Science Students for Acquiring Physics Knowledge. Journal of Science Education and Technology, 31(4), 442–460.

According to Noetel *et al*. (2021) [3], using videos can help students understand the course material and give them the chance to participate in an interesting synchronous learning environment. This study investigates how university students' academic performance is impacted by instructional videos. It investigates the effects of viewing these videos, students' perceptions of them, and their desire to use them on academic achievement. The study also investigates if a student's location—rural or urban—alters the way these factors impact academic achievement. 400 students from the Virtual University of Pakistan, evenly split between urban and rural areas, were polled by the researchers. The results demonstrate that academic performance is positively and significantly impacted by all three factors: motivation, attitude, and video exposure. However, the strength of these associations is not considerably affected by the pupils' location (rural or urban).

Some of the online explainer videos for physics present misconceptions as scientifically correct explanations. Even so, some of these videos achieve good ratings on online platforms. A possible reason is that explainer videos with misconceptions foster an "illusion of understanding"—the mistaken belief that a topic has been understood. Misconceptions close to everyday experiences might appear more attractive than scientifically correct explanations. This experimental study (N = 149 physics learners with a low prior knowledge on average, sample of convenience) was conducted to explore this effect. Two explainer videos were developed to be comparable in terms of comprehensibility and duration. The explanatory approach was the only difference between the two videos. While the experimental group watched a video introducing the concept of force using misconceptions, the control group watched a scientifically correct video. Learners from the experimental group developed an equal belief of understanding, but more misconceptions and fewer scientifically correct conceptions than those from the control group. We argue that this illusion of understanding might become problematic (a) in physics instruction because students who have watched a misleading video might regard further teaching in school as irrelevant, and (b) learners might tend to rate videos including misconceptions better on an online platform like YouTube. Future studies should examine these two possible consequences. Kulgemeyer, C., & Wittwer, J. (2023).

Introductory physics courses can be a challenge for some college students, especially those that have not taken Advanced Placement (AP) physics courses in high school. Even some classical mechanics concepts, such as energy, power, or the laws of Newton, can be non-intuitive and hard to grasp. When it comes to evaluating the learning outcome of our students, some of the aspects we evaluate are their abilities to solve numerical problems. By solving problems the students show how well they understood the concepts and the problem-solving methods. But students can practice enough and learn how to solve related numerical exercises without a deep understanding of the physical concepts. When asked more conceptual questions, some students struggle and lack confidence. Aragoneses, A., & Messer, R. (2020).

Digital videos have an important (and increasing) presence in learning processes, especially within online universities and schools. However, creating videos is a time-consuming activity for teachers, who are usually not expert in video creation. Therefore, it is important to know which kind of video is perceived as more satisfactory and useful by students, among the videos that docents usually create. In this paper we show a structural model with the relation between satisfaction, the way in which a video has been created, the kind of video (with or without the hands of the teacher and with or without the body/head of the teacher), perceived usefulness, contents of the video (theory or problems) and the potential impact of videos on passing rates. The experiment has been performed in an introductory Physics of Engineering course with over 200 first year students in both: at 100% online university, Universitat Oberta de Catalunya (UOC); and at a face-to-face university, Escola Universitària Salesiana de Sarrià (EUSS). Tests have been performed with around 100 videos of two types: videos created with a digitizing tablet and screen capture, and videos created by recording the hands of the teacher. Results have been quantitatively analysed. The research shows that results are independent of the environment and that students prefer videos with hands. On the other hand, little effect has been found regarding the content of the video in the perceived usefulness or satisfaction. The performance results show that videos can improve the chances of passing the subject. Thus, the paper shows that videos with hands are a useful complement to challenging subjects, like introductory physics in Engineering, to effectively assimilate scientific knowledge. The main contributions of this paper are: to analyse the perception that students have of video in a specific context, introductory course of Physics in Engineering, in different environments; and to analyse the perception of the video regarding the way in which it has been created, and the kind of content. Pérez-Navarro, A., Garcia, V., & Conesa, J. (2021).

Effective teaching of physics requires the use of well-designed and diversified instructional tools such as multimedia throughout the teaching and learning process. The main objective of this study was to investigate the effectiveness of Physics Educational Technology (PhET) simulations and YouTube videos to improve the learning of optics in Rwandan secondary schools. The study was framed by the cognitive theory of multimedia learning. A total of 136 senior-4 physics students from six schools were divided among three groups and taught with the usual teaching methods only, the usual teaching methods supported by PhET simulations or YouTube videos, respectively. Student achievement was measured by administering the Geometric Optics Conceptual Understanding Test to each group of students before and after teaching. The groups of students who were taught using PhET simulations and YouTube videos achieved significantly more gains on the posttest compared with the students who experienced neither. PhET simulations and YouTube videos saw average normalised learning gains of 12 and 11%, respectively, while students who experienced solely the usual teaching methods got a gain of only 2%. These results show that the use of PhET simulations without student manipulation (as applied in this

study) is equally effective as the use of YouTube videos. The researchers recommend that teachers incorporate these instructional tools as a way of effectively teaching and learning optics. Ndihokubwayo, K., Uwamahoro, J., & Ndayambaje, I. (2020).

Formation of the skills of conducting an experiment and analyzing its results during laboratory work in natural science has always been an important didactic problem, which has significantly increased in the conditions of distance and mixed learning. The study of approaches to the effective use of software for the analysis of video recordings of observations of real physical processes and phenomena is one of the tasks of instrumental digital didactics. The affordable and regularly updated software Tracker: Video Analysis and Modeling Tool is a popular didactic tool for the analysis of physical quantities based on the processing of static and dynamic images followed by comparison with the corresponding mathematical model. The rules for creating educational videos suitable for analysis in a digital environment are summarized. On the examples of laboratory classes on many topics of physics (mechanics, hydrodynamics, molecular and atomic physics, and optics) and astronomy, the general features of creating video recordings, laboratory works, and problem tasks based on video analysis are shown. The STEM laboratory of the Junior Academy of Sciences of Ukraine has created numerous reference videos about physical experiments and the rules for their use; a collection of video tasks was also created; innovative methods of educational physical experiments were developed. The methods of video analysis were tested during distance and mixed education in the conditions of threats, also in formal and informal education formats, such as the summer science school for students and the All-Ukrainian natural science online tournament "Open Natural Science Demonstration". Instrumental digital didactics is a component of training courses for teachers and is regularly discussed at seminars and conferences on science education. The stemua.science source of the "MANU" NC is popular among Internet users. Chernetckiy, I., Slipukhina, I., Mieniailov, S., & Kurylenko, N. (2022).

Educational videos have become increasingly relevant in today’s learning environments. While prior research in laboratory studies has provided valuable insights, analyzing real-world interaction data can enhance our understanding of authentic user behavior. Previous studies have investigated technical aspects, such as the influence of cuts on pausing behavior, but the impact of visual complexity remains understudied. In this paper, we address this gap and propose a novel approach centered on visual complexity, defined as the number of visually distinguishable and meaningful elements in a video frame, such as mathematical equations, chemical formulas, or graphical representations. Our study introduces a fine-grained taxonomy of visual objects in educational videos, expanding on previous classifications. Applying this taxonomy to 25 videos from physics and chemistry, we examine the relationship between visual complexity and user behavior, including pauses, in-video navigation, and session dropouts. The results indicate that increased visual complexity, especially of textual elements, correlates with more frequent pauses, rewinds, and dropouts. The results offer a deeper understanding of how video design affects user behavior in real-world scenarios. Gritz, W., Salih, H., Hoppe, A., & Ewerth, R. (2025, July).

1.6 Synthesis of Literature

Teachers and YouTube: The use of video as an educational resource the appearance of YouTube in 2005 transformed the possibilities of using video as an educational resource. Our research aims to understand the use of videos in today's education from the teachers' point of view and to determine the factors that influence its implementation in the classroom. Through a survey study of 1,150 teachers, we delve into the following items: number of videos they use, selection criteria, types of content of the videos, agent that proposes them, most used platforms and level of satisfaction in their implementation, relating them to the variables of sex, age, educational stage and type of educational centre. The results show how teachers are currently using the video resource in their lessons. We also conclude that the variables of educational stage and type of educational centre are significant in the implementation of videos in education. Our research offers reliable data to adapt teachertraining plans to educational reality. Pattier, D. (2021) [5]. Teachers and YouTube: The use of video as an educational resource. Ricerche di Pedagogia e Didattica. Journal of theories and research in Education, 16(1), 59-77. The release of YouTube in 2005 made many possibilities of using videos as an educational tool. Through the teacher’s point of view, the researcher’s goal is to comprehend the use of educational videos in today's education, also to find the components that effect on adding it in the classroom.

The researchers surveyed 1,150 teachers with questions about: how many videos they use, selection criteria, kinds of videos, agent that suggest them, platforms they used most often and how satisfied they are in their implementation, connecting them to the variables of sex, age, educational stage and type of educational centre. The outcome reveals how teachers generally used the video resource in their lessons. The researchers conclude the use of videos as an educational tool are notable because of the variables of educational stage and type of educational centre. The research gives dependable informational to adapt teacher training plans to educational reality.

Video Improves Learning in Higher Education: A Systematic Review Universities around the world are incorporating online learning, often relying on videos (asynchronous multimedia). We systematically reviewed the effects of video on learning in higher education. We searched five databases using 27 keywords to find randomized trials that measured the learning effects of video among college students. We conducted full-text screening, data extraction, and risk of bias in duplicate. We calculated pooled effect sizes using multilevel random-effects meta-analysis. Searches retrieved 9,677 unique records. After screening 329 full texts, 105 met inclusion criteria, with a pooled sample of 7,776 students. Swapping video for existing teaching methods led to small improvements in student learning ($g = 0.28$). Adding video to existing teaching led to strong learning benefits ($g = 0.80$). Although results may be subject to some experimental and publication biases, they suggest that videos are unlikely to be detrimental and usually improve student learning. Noetel, M., Griffith, S., Delaney, O., Sanders, T., Parker, P., del Pozo Cruz, B., & Lonsdale, C. (2021) [3].

Video improves learning in higher education: A systematic review. Review of educational research, 91(2), 204-236. This study systematically reviewed if using videos on

learning in Higher Education is effective, since universities across the world are including online learning, and relying on videos. To find tests, that's randomized that measures the learning effects of video of college students, the researchers looked for five databases using 27 keywords. The researchers conducted tests. Such as, full-text screening, data extraction, and risk of bias in duplicate. The researchers calculated the collected effects using multilevel random-effects meta-analysis. The searchers found 9,677 unique records. 105 met inclusion criteria with a sample of 7,776 after screening 329 full texts. Existing teaching methods results in lower improvements on students learning while attaching a video on existing teaching resulted in higher improvement in learning. They propose that using videos can positively affect the students learning, although the outcome may be subject to some experimental and publication biase. The Effect of YouTube Video on Students' Listening Comprehension Performance The difficulties to catch any intended information conveyed by speakers on the audio recording by the students still become problematic during learning listening comprehension in the classroom.

This study aimed to find out the effect of applying YouTube videos on the students' listening comprehension performance. This study was experimental research (quasiexperimental with non-equivalent control group design). The researchers used all the firstsemester students of English language education as a sample through the total sampling technique. To get the data, the researchers used a listening test as the instrument. There were two groups that were tested in the study; experimental and control groups. The experimental group was treated by applying YouTube videos while the control group was treated by Audio recording. Based on the result of the study, it was found that the t-test was 1.834 and the ttable was 0.073 (t-test was higher than t-table). In the other words, the alternative hypothesis was accepted, and the null hypothesis was rejected.

The result of the study also showed that the students felt more interested and motivated to learn listening comprehension by using YouTube videos as the learning media during the learning process takes place in the classroom. Thus, it could be concluded that the application of YouTube videos has given a positive and significant effect on students' listening comprehension performance. Qomariyah, S. S. A., Permana, D., & Hidayatullah, H. (2021) [6]. The effect of YouTube video on students' listening comprehension performance. Jo-ELT (Journal of English Language Teaching) Fakultas Pendidikan Bahasa & Seni Prodi Pendidikan Bahasa Inggris IKIP, 8(1), 67-73. The studies goal is to discover the effect of including YouTube videos on students listening comprehension performance. This was experimental research. As a sample using the total sampling technique, they used all first-semester students of English language education and to get the data, they utilized a listening test as the instrument. They tested experimental groups and control groups. The experimental group used YouTube video, and the control group used audio recording. From the outcome, the alternative hypothesis was accepted, and the null hypothesis was rejected because it was discovered that the t-test was 1.834 and the ttable was 0.073. The students had more interest and motivation to learn listening comprehension by using YouTube videos, showed from the study. Therefore, the study could be finished that YouTube videos has provided a positive and significant effect on students listening comprehension performance.

Students' active cognitive engagement with instructional videos predicts STEM learning the efficacy of well-designed instructional videos for STEM learning is largely reliant on how actively students cognitively engage with them. Students' ability to actively engage with videos likely depends upon individual characteristics like their prior knowledge. In this study, we investigated how digital trace data could be used as indicators of students' cognitive engagement with instructional videos, how such engagement predicted learning, and how prior knowledge moderated that relationship. One hundred twenty-eight biology undergraduate students learned with a series of instructional videos and took a biology unit exam one week later. We conducted sequence mining on the digital events of students' video watching behaviors to capture the most commonly occurring sequences.

Twenty-six sequences emerged and were aggregated into four groups indicative of cognitive engagement: repeated scrubbing, speed watching, extended scrubbing, and rewinding. Results indicated more active engagement via speed watching and rewinding behaviors positively predicted unit exam scores, but only for students with lower prior knowledge. These findings suggest that the ways students cognitively engage with videos predict how they will learn from them, that these relations are dependent upon their prior knowledge, and that researchers can measure students' cognitive engagement with instructional videos via mining digital log data. This research emphasizes the importance of active cognitive engagement with video interface tools and the need for students to accurately calibrate their learning behaviors in relation to their prior knowledge when learning from videos.

Kuhlmann, S. L., Plumley, R., Evans, Z., Bernacki, M. L., Greene, J. A., Hogan, K. A., ... & Panter, A. (2024) [1]. Students' active cognitive engagement with instructional videos predicts STEM learning. Computers & Education, 216, 105050. The researchers investigated how digital trace data may be utilized as measure of student's cognitive engagement with instructional videos, how such engagement predicted learning, also how prior knowledge moderated that relationship. 128 biology undergraduate students learned using a sequence of instructional videos, then answered a biology unit exam a week later.

To obtain the highest commonly occurring sequences, the researchers run a sequence mining on the digital events of student's video-watching behaviors. 26 sequences appeared and split into four groups with cognitive engagement: repeated scrubbing, speed watching, extended scrubbing, and rewinding. The outcome shows more active engagement through speed watching and rewinding behaviors foresee good unit exam scores, only for students with small prior knowledge. The findings propose that the processes students cognitively engage with videos predict how students understand from them, the connection depends on how big or small their prior knowledge. Also using mining digital log data, the researchers can calculate students' cognitive engagement. In short, the study highlights the importance of active cognitive engagement with video interface tools and the necessity for students to accurately calibrate their learning behaviors in correlation to the knowledge they already possess when learning from videos.

The studies back that using educational videos is an effective tool to enhance the learning and understanding. One study proves that the use of YouTube videos can help improve students listening comprehension and enhanced their interest and motivation to learn listening comprehension. Another study showed how teachers use videos in the classroom, showing their adaptability in other learning environments. While also research about higher education proves that using both existed learning technique with educational videos show to greater learning results. This relates to the goal of improving the understanding of hard and complex subjects like physics 1. A study about students watching behaviors to instructional videos appear cognitive engagement. Such as rewinding the videos or rewatching them, helps in better performance, mainly for those that has lower prior knowledge. These studies and their findings propose that videos not only improve understanding but also gives better learning routine, these studies explain how educational videos affect students understanding in Physics.

1.7 Theoretrical Framework

This study supported by the theory of Virtual reality learning media (Haryana *et al*., 2022) explain how educational videos can enhance STEM students' understanding of general physics According to Marougkas *et al*. (2023) One of the primary advantages of implementing VR in education is that it provides a more immersive and engaging learning experience. VR can transport learners to difficult-to-access places, such as historical monuments, outer space or even within the human body. Students are able to better understand the subject and engage with the learning material when they are given a unique perspective.

Richard Mayer's theory of cognitive multimedia learning (CTML), developed in the 1990s, emphasizes on implementing effective cognitive strategies to help learners learn efficiently. This theory states that it is more effective for people to learn with the use of words and graphics rather than just words alone. The cognitive theory of multimedia learning (CTML) is based on three cognitive science principles of learning: the dual channel assumption, which states that humans have separate channels for visual and auditory information; the limited capacity assumption, states that each channels only has a limited capacity; the active processing assumption which states that purposeful learning occurs when learners are engaged in selecting, organizing, and integrating information. (Mayer, 2014) [2] The relevance of this theory to the study lies in its emphasis on watching educational videos as an effective technique on enhancing knowledge acquisition.

According to Singer, B. *et al*. (2023) "Making educational videos more engaging and enjoyable for all ages: an exploratory study on the influence of embedded questions" Educational videos have interactive elements that can be incorporated to boost interest and improve student's cognitive function. As a result, the researchers hypothesized that students will be participative to perform. The researchers predicted that embedding questions during videos (rather than after) would enhance the performance of students. The researcher hypothesized that the benefits of presenting questions during educational videos might increase with age. Using a counter-balanced within-subject design each participant watched short videos with questions embedded either during the video or presented after the video, the researcher then surveyed the participants. There were no differences in correct responses though the participants answered questions posed during videos more efficiently rather than questions presented after. In conclusion, questions during module-related educational videos are a successful way to make a certain topic more interesting and interactive towards students.

Another theory titled The Video-based Learning Theory that explains how videos can effectively facilitate learning and knowledge acquisition. The theory posits that videos offer a multisensory learning experience by combining visual, auditory, and sometimes kinesthetic elements, resulting in enhanced engagement and information processing. The dynamic and interactive nature of videos stimulates cognitive processes, such as attention, perception, and memory, which contributes to effective learning outcomes (Oreed, 2023) [4]. The relevance of this theory to the study is rooted in the fact that this theory directly deals with videos being used in a teaching or educational setting.

1.8 Conceptual Framework

This conceptual framework describes the use of educational videos and its impact towards to Grade 12 STEM students at Young Achievers' School of Caloocan Inc.

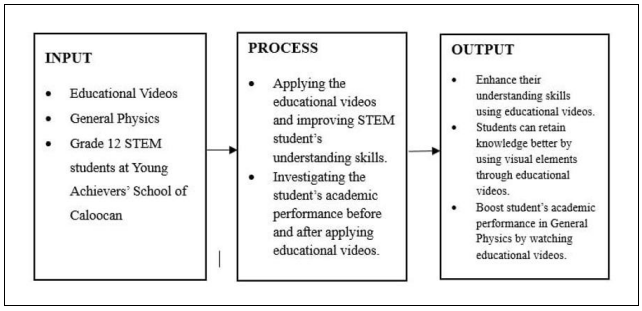

Fig 1: Conceptual Framework Diagram

This study aims to find if educational videos is a tool that is efficient at enhancing STEM students understanding at General Physics. The researcher will utilize pre-test and post-test to discover educational videos are effective. The researchers will conduct a pre-test by giving the students a questionnaire without utilizing educational videos after they finished answering the researchers will now move on the post-test which will firstly let them watch an educational video then give the post-test and questionnaire.

1.9 Statement of the Problem

This study generally aims to know the impact of educational videos on STEM students' understanding of general physics at Young Achievers School of Caloocan Inc. School year 2025 to 2026.

Specifically, this study aims to answer the following questions:

1. What is the level of understanding of general physics among STEM students before the implementation of educational videos in terms of:
   1.1. Conceptual Understanding;
   1.2. Problem-solving skills;
   1.3. Retention of knowledge?
2. What is the perceived usefulness of educational videos in helping STEM students understand general physics?

3. What problems and barriers do students face while using educational videos to learn physics?

1.10 Hypotheses

H_a: Educational Videos are effective for improving the retention skills of students

H_o: Educational videos are not effective in improving the retention skills of students

1.11 Significance of the Study

This study aims to identify the usefulness and advantages of educational videos to improve retention of knowledge of Grade 12 STEM Students at Young Achievers School of Caloocan, Inc.

Students: Physics can be challenging for a lot of STEMS students, especially when it comes to understanding abstract concepts, and formulas. Because of this, some students struggle to keep up or lose interest in the subject altogether This research aims to find out whether educational videos can make these topics easier to understand. If videos are proven helpful, students might become more motivated and confident in learning Physics. They may also discover better ways to study using visual resources that match their learning style. In the long run, this can lead to better academic performance.

Teachers: The findings of this study can also benefit Physics teachers at Young Achievers' School of Caloocan. If the results show that educational videos make a positive difference, teachers might consider including more video materials in their teaching methods. This could help explain difficult topics more clearly, especially for students who learn better through visuals and examples. This study may also help teachers choose the right kinds of videos that are suitable for their lessons and the level of their students. Over all, this can lead to a more engaging classroom environment and a better connection between teachers and students.

School Administrators: The findings and discovery that the researchers found in this study can be used as a guide for school administrators to know the things that can enhanced their students understanding especially in difficult subject like physics. School administrators can impel to the teachers thatthey should used educational videos for extra knowledge and to retain what the students have learned.

Future Researchers: This research can be used as a guide or reference for those future researchers that will study the same thought as educational videos. Future research can gain some insights and knowledge to how big the impact of educational videos on the understanding of STEM students specially in complex subject like physics. Furthermore more future research can use the findings of this study to show them what students can gain by watching educational videos.

1.12 Scope and Delimitation

This study focuses on determining the impact of educational videos on STEM students' understanding of General Physics at Young Achievers' School of Caloocan Inc. During the school year 2025-2026. It specifically focuses on grade 12 STEM students and aims to analyze whether educational videos improve their understanding of a certain physics topic.

This study will not examine the impact of educational videos on understanding of general physics among students on other academic strands, grade levels, or educational institutions. This research also excludes other learning tools that may have an impact on understanding of general physics, such as guided worksheets or study groups, as it is not covered by this study.

1.13 Definition of Terms

Astrophysics: is a branch of space science that applies the laws of physics and chemistry to seek to understand the universe and our place in it. (Balter, 2022).

Biophysics: Is the study of biological systems and biological processes using physics-based methods or based on physical principles. (Zhou, 2011).

Cognitive: It is an act or process of mental knowing and gaining understanding (Bayne *et al*., 2019).

Education: It is the deliberate, systematic, and sustained to acquire knowledge, values, skills, or sensibilities that results from the effort (Cremin, Public Education, p.27, 1976).

Educational Videos: It is a tool designed to use to educate and share knowledge and information to viewers (Allahdadi, Journal of Space Safety Engineering, 2015).

Electromagnetism: The physical interaction among electric charges, magnetic moments, and electromagnetic fields. (Baird, 2024).

Geophysics: is a scientific discipline that examines the Earth's physical properties using quantitative methods. It encompasses a wide array of topics, including the study of gravitational and magnetic fields, seismology, ocean dynamics, and the interactions between the Earth and solar phenomena. (Young, 2023).

Matter: Everything that exists is made up of matter that consists two fundamental properties which volume and mass (United States Nuclear Regulatory Commission, 2020).

Meta-Analysis: It is a systematic approach that uses statistical techniques for combining results to get the estimate quantitative estimate of an intervention (D. Whitcomb, 2006).

Participation: In education, it is defined as the attendance and involvement of students to gain knowledge inside the classroom; led by proctor or teacher. (Deslandes *et al*., 2022).

Physics: Is a branch of science that studies different kinds of matter and how the constituents of the universe interact (Weidner & Brown, 2025).

Prior Knowledge: It refers to the knowledge that one person possesses before learning a new information (Helmke & Schrader, 2001).

Psychophysics: The study of the relationship between stimuli and perceived sensations. It investigates the stimulus magnitudes for the various senses by determining each sense's absolute threshold. (Aiken, 2023).

Quantum Mechanics: In physics, it explains the behavior of atoms and subatomic particles (Serpico & Poccia, 2024).

Quantum Mechanics: The branch of physics that studies the behavior of matter and light on the atomic and subatomic level (Squires & Leslie, 2025).

Relativity: refers to the basis for understanding cosmic processes and the geometry of the universe itself. (Perkowitz, 2025).

Rewatching: It is an act of watching the same media or material that has already been watched.

Social Media: Interactive platforms where individuals and communities share texts, images, videos and games that can be accessed through internet (Benetoli *et al*.,2015).

Thermodynamics: It deals with the transfer of energy from one place to another and from one form to another. The key concept is (Drake, 2025).
Youtube: It is a social media platform and website for sharing variety of videos (Hosch, 2025).

2. Methods

2.1 Research Design

This study aims to elaborate the knowledge about students' understanding of General Physics of Grade 12 STEM students, utilizing educational videos. A quantitative research approach that focuses on expanding how educational videos can improve student's understanding of General Physics of Grade 12 STEM students, specifically at Young Achievers' School of Caloocan.
According to Bhandari, P. (2020), Quantitative Research is the process of collecting and analyzing numerical data. It can be used to find patterns and averages, make predictions, test causal relationships, and generalize results to wider populations. As stated by Sreekumar, D. (2024) A quasi-experimental design is a study design in which participants cannot be randomly assigned to an experimental or control group for practical or ethical reasons. However, like a true experiment, it is used to evaluate the effects of an intervention, or in other words, to establish a cause-and effect relationship between independent and dependent variables. The intervention could be a training program, a policy change, a medical treatment, etc. In such quasi-experimental designs, the assignment of participants is usually based on self-selection or selection by an administrator or researcher. Quantitative methods such as surveys and experiments will be used to gather data, which can then be analyzed statistically to identify impacts in the data. Quasi-experimental research provides utilizing data collection techniques and statistical analysis to test hypotheses to draw conclusions based on the data collected.

2.2 Locale of the Study

This study was conducted in the Young Achievers School of Caloocan located in the Philippines at 7 Ramos Compound, Bagumbong, Caloocan City specifically at Barangay 171. This school has the strand of Science, Technology, Engineering, and Mathematics (STEM) which is the target sample of the research because the strand has the major subject like physics.
Since the subject is known to be challenging for many students, the researchers wanted to see how video materials might help improve understanding in General Physics, and most students are already familiar with using technology for learning, so the setting made it easier to examine how videos affect their engagement and performance in Physics. The study was conducted since the school has a significant number of STEM students, and the curriculum focuses on Physics as a major subject of study for the Grade 12 STEM students at Young Achiever's School of Caloocan Incorporated.

2.3 Respondents of the Study

The respondents of the study are the chosen Grade 12 STEM students from STEM 1 and STEM 3 sections, at Young Achievers' School of Caloocan, Inc. A total of 20 students were hand-picked by the researchers out of 88.These students were chosen because they are directly connected to the focus of the study which centers on understanding general physics. They were also chosen based on their availability, mixed academic performance with high to low performances, had experience watching educational videos, and could answer the tests truthfully. Students in the Grade 12 STEM strand struggle to understand the subject of general physics since it requires a deep understanding of scientific and mathematical concepts. This study would also be acknowledged by the researchers, such as for its focus on a single school and the potential inability to generalize to all Grade 12 STEM students.

2.4 Data Gathering Procedure

This research aims to know the impact of educational videos on the understanding of Grade 12 STEM students at Young Achiever's School of Caloocan Incorporated and to do that. The researchers employed the use of a 5-point scale Likert scale that consists of a pre-test and post-test questionnaire that consists of (10) statements. The pre-test, which measures their knowledge about general physics and the challenges they faced learning it with traditional lectures, and their expectations and experiences with educational videos before the intervention. After the pre-test, the researchers showed an educational video about general physics. After watching, the post-test was focused on the respondents understanding and experiences after the intervention to see if there is indeed an impact on a student's understanding of General Physics using educational videos. Afterwards, the researchers wrote down the data from both pre-test and post-test scores and then analyzed.

2.5 Data Gathering Instrument

To gather data, the researchers created a Likert scale questionnaire that included a pre-test and a post-test, compared to other data-gathering tools such as open-ended surveys or multiple-choice assessments, the Likert scale offers a balance between structure and flexibility. Both pre-test and post-test aimed to assess the students' understanding and experiences related to General Physics. The pre-test, which was administered before watching the educational video, concentrated on students' thoughts, challenges with traditional lectures, their experiences with using educational videos, and their expectations with educational videos. On the other hand, the post-test, conducted after watching educational videos, assessed students' experience and understanding after the intervention, along with what they prefer, and their satisfaction.
In short, the goal of the questionnaire was to evaluate the student's level of understanding in general physics, before and after the intervention. The questionnaire used a 5- point scale Likert scale which had 10 statements, and the following choices: Strongly Agree (1), Agree (2), Neither Agree or Disagree (3), Disagree (4), and Strongly Disagree (5). This allowed the students to answer the level of agreement they have with each statement. To ensure the quality and relevance of the questionnaire, the questions were carefully reviewed and checked by our subject teacher, Mr. Cornelio Doloque.

2.6 Statistical Tool

Paired T-Test. A t-test is a statistical tool used to determine if there's a significant difference between the means of two groups.

Formula:

$$t = \frac{\bar{D} - \mu_D}{\sqrt{\frac{SS_D}{N(N-1)}}}$$

Where:

D = difference scores
$\bar{D}_{obt}$ = mean of the sample differences scores
μ_D = mean of population of difference scores
s_D = standard deviation of the sample difference scores
N = number of difference scores
$SS_D = \Sigma(D - \bar{D})^2$ = sum of squares of sample difference scores

Likert scale is another tool employed by the researchers. It is used in research questionnaires to determine the level of agreement of respondents to a given statement. In this study, the responses were expressed using a 5-point scale as shown below:

Scale	Verbal Interpretation	Weighs
5	Strongly Agree	4.21-5.00
4	Agree	3.41-4.20
3	Neither Agree or Disagree	2.61-3.40
2	Disagree	1.81-2.60
1	Strongly Disagree	1.00-1.80

3. Results and Discussion

This chapter presents the compilation, summarization, and analyzation of the collected data from the test conducted among grade 12 Science, Technology, Engineering, and Mathematics strand at Young Achievers School of Caloocan, Inc. To determine the effect of educational videos on their understanding of General Physics. The findings are discussed in relation to the study's objectives, focusing on students' conceptual understanding, problem-solving skills, knowledge retention, perceived usefulness of videos, and the challenges they encountered during the learning process.

Table 1: Computed Paired T-Test Scores STEM 1 and STEM 3

X1	*X2*	*d*	*d2*
32	40	-8	64
29	41	-12	144
30	44	-14	196
41	44	-3	9
33	42	-9	81
40	42	-2	4
32	33	-1	1
43	49	-6	36
32	42	-10	100
36	40	-4	16
29	38	-9	81
26	38	-12	144
27	38	-11	121
35	40	-5	25
34	38	-4	16
33	36	-3	9
33	38	-5	25
33	35	-2	4
33	34	-1	1
36	36	0	0
33	35	-2	4
Total = 700	Total = 823	Total = -123	Total = 1081
M = 35	*M* = 41.15		

In Table 1, the indicated numbers are the compilation of data obtained from the respondent's post-test and pre-test results. To determine the Impact of Educational Videos of learning General Physics of students and to determine if there is a significant difference between the results of the pre-test and post-test, a paired t-test was conducted. Firstly, the researchers tabulated the pre-test and post-test scores of the 20 respondents. To obtain the difference (d) of the scores, the results of the post-test and pre-test are subtracted before solving for the mean difference (đ) by dividing the score difference to the number of participants (n), which means that the mean difference (đ) is equal to -123.

To compute the mean of sample difference score and the standard deviation divides the mean difference which is -123 to the number of participant (20) and the sample difference score is (-6.15). For the standard deviation, divide the mean difference and square it before dividing to the number of participants which is (324.55).

To calculate T-statistics, subtract the mean of the sample difference scores (-6.15) and the mean of the population of difference scores (0_ and divide the value of sum of squares of the sample difference scores (324.55) and divide it with the number of participant (20) and multiply it with the number of participants subtracting one (19). T-statistics are (-6.76) With an alpha level of 0.05 and the degrees of freedom (df) being (19).

H_a: Educational Videos are effective for improving the retention skills of students

H_o: Educational videos are not effective in improving the retention skills of students

In conclusion, since the computed value (-6.76) is greater than its critical value (2.093), the null hypothesis is rejected. Therefore, there is a significant difference between the pre-test and post-test results. The statistical treatment emphasized that educational videos are effective for improving the retention skills of students in learning physics among Grade 12 STEM students.

3.1 Analysis:

Pretest

In statement number 1, the respondents answered neither about the question if they can explain energy conservation in their own words with the weighted mean of 2.9.

In statement number 2, the respondents agreed that they can remember recently taught physics topics with the weighted mean of 3.6.

In the statement number 3, the respondents agreed that they are confident in solving physics problems presented in class with the weighted mean of 3.1.

In the statement number 4, the respondents agreed that they can choose appropriate equations and methods to solve physics problems with the weighted mean of 3.48.

On the fifth statement, the respondents agreed that they often need to refer to their textbooks or class notes with the weighted mean of 4.1.

On the sixth statement, the respondents answered neither that they can recall physics concepts from last week without difficulty with the weighted mean of 2.75.

In question number 7, the respondents disagree that they can retain information until exams without needing to re-study with the weighted mean of 2.30.

In the question number 8, the respondents answered strongly agree that they believe educational videccan help them to learn physics concepts more easily with the weighted mean of 4.25.
In statement number 9, the respondents agreed that they expect watching physics videos will improve their problem-solving ability with the weighted mean of 3.8.
In question number 10, the respondents agreed that they worry about technical issues (slow internet) while watching educational videos with the weighted mean of 4.35.

Posttest
In the statement number 1, respondets agreed that they gained a better understnding on General Physics with the help of educational videos with the weighted mean.
In the statement number 2, respondets agreed that educational videos are better in retaining in the subject physics than the traditional teaching method with the weighted mean of 3.92.
In the statement number 3, the respondents agreed that the quality and pacing of videos affecthow effectively they learn from it with the weighted mean of 4.05.
In the statement number 4, the respondents agreed that after they watch educational videos it really helps them to understand the topic easily with weighted mean of 4.3.
In the question number 5, the respondents agreed that they gain more knowledge watching educational videos about physics compare to classroom discussion with the weighted mean of 3.2.
The statement in number 6 states that the videos I have watc hed explained the topic simpler and easier to understand. They agreed with this, and the weighted mean is 2.85.
On the seventh statement, I would rather watch educational videos to learn about general physics; the respondents neither agree nor disagree with this statement because the weighted mean is 3.71.
On the eighth statement, educational videos improve my problem solution due to the visual representation; they agreed with this statement and the weighted mean is 4.15.
In the statement 9, the respondents agreed that educational videos helped me with my assignments and quizzes about general physics with the weighted mean of 4.1.
In the statement 10, I will recommend watching educational videos to my classmates as a learning tool to improve their understanding of general physics; the respondents agreed with this, and the weighted mean is 4.2.

Legend:

SA – Strongly Agree	**SD** – Strongly Disagree
A – Agree	**WM** – Weighted Mean
N – Neutral	**V.I** – Verbal Interpretation
D – Disagree	

The level of understanding of general physics among STEM students before the implementation of educational videos. The implementation of educational videos before and after student's understanding is categorized by three following questions:

3.1.1 Conceptual Understanding
Before the use of educational videos, many stem student show moderate to low conceptual understanding of general physics. While they are familiar with definition and formula. They struggled to apply these concepts in real-world scenarios or explain them. This suggests that traditional teaching methods may not have been sufficient in making abstract concepts more accessible or relatable. The absence of visual and dynamic content likely limited their ability to build mental models of physical phenomena.

Table 2.1: Students Conceptual Understanding

Pre-Test

S. No		SD	X1	D	X2	N	X3	A	X4	SA	X5	WM	V.I
1	I can explain physics ideas energy conservation in my own word.	3	3	0	0	13	39	4	16	0	0	2.9	Agree
2	I can remember recently taught physics topics accurately.	0	0	1	2	4	12	10	40	0	0	3.6	Agree

Post-Test

S. No		SD	X1	D	X2	N	X3	A	X4	SA	X5	WM	V.I
2	I find watching educational videos better in retaining physics topics than traditional teaching	0	0	1	2	8	24	8	32	8	40	3.92	Agree
3	The quality and pacing of the educational videos affect how effectively I learn from them.	0	0	0	0	2	6	14	56	3	15	4.05	Agree

Analysis
Pretest in the statement number 1, physics problem presented in class with the weighted mean of 2.9. In the statement number 2, the respondents answered agree that they can choose appropriate equations and methods to solve physics problem with the weighted mean of 3.6. Post test in the statement number 2, the result shows that the respondents agree that using educational videos helped them improved their problem-solving skills in physics problem with the weighted mean of 3.92. In the statement number 3, the result shows that educational videos helped the respondents to improve their problem-solving in physics with the weighted mean of 4.0.

3.1.2 Students' Problem-solving skills
In terms of problem-solving, students showed **difficulty in identifying appropriate strategies** and applying theoretical knowledge to different types of physics problems. A pattern emerged where students were able to follow worked examples in class but had trouble transferring that knowledge to unfamiliar problems. This indicates a reliance on rote learning rather than deep understanding, which often stems from limited engagement or passive learning environments.

Table 2.2: Students' Problem-solving skills

Pre-Test

S. No		SD	X1	D	X2	N	X3	A	X4	SA	X5	WM	V.I
3	I feel confident solving physics problems presented in class.	2	2	2	4	9	27	6	24	1	5	3.1	Agree
4	I can choose appropriate equations and methods to solve physics problem.	0	0	1	2	9	27	11	44	0	0	3.48	Agree
5	When solving problems, I often need to refer back to the textbook or class notes.	0	0	3	6	1	3	7	28	9	45	4.1	Agree

Post-Test

S. No		SD	X1	D	X2	N	X3	A	X4	SA	X5	WM	V.I
8	Educational videos improves my problem-solution due to the visual representation.	0	0	0	0	2	6	13	52	5	25	4.15	Agree
9	Educational videos helped me with my assignments and quizzes about General Physics	0	0	0	0	4	12	10	40	6	30	4.1	Agree

Analysis

In the table of pre-test, the statement number 3, the respondents answered agree that they can confidently solve physics problems presented in class with the weighted mean of 3.1. In the statement number 4, respondents answered agree that that they can choose appropriate equations and methods to solve physics problems with the weighted mean of 3.48. In statement number 5, the respondents agreed that they often need to refer to textbooks or notes to solve physics problems with the weighted mean of 4.1.

During the Post-test, in the statement number 8, the result shows that the respondents agree that using visual representation helped them to improve their problem-solving of physics problems with the weighted mean of 4.15. In statement number 9, the result states that educational videos helped the respondents with their assignments and quizzes about general physics with the weighted mean of 4.1

3.1.3 Students Retention of knowledge

Knowledge retention over time appeared to be relatively weak. Students often forgot previously learned concepts, especially when they were not frequently revisited or reinforced through engaging methods. This shortfall points to the limitations of traditional lectures and textbooks in sustaining long-term memory, highlighting the need for more interactive and repeated exposure to core concepts-something educational videos can address effectively.

Table 2.3: Students Retention of knowledge

Pre-Test

S. No		SD	X1	D	X2	N	X3	A	X4	SA	X5	WM	V.I
6	6. I can recall physics concepts taught last week without difficulty.	0	0	9	18	8	24	2	28	1	5	2.75	Agree
7	7. I retain information from lectures until exams without needing to re-study.	3	3	11	22	3	9	1	4	1	5	2.30	Agree

Post-Test

S. No		SD	X1	D	X2	N	X3	A	X4	SA	X5	WM	V.I
1	I have gained better understanding of General Physics due to help of educational videos.	0	0	0	0	1	3	11	44	8	40	4.75	Agree
4	After watching the educational videos, it really helps me to understand the other topic easily.	0	0	0	0	1	3	12	48	7	35	4.15	Agree
5	I have gained more knowledge watching educational videos about General Physics compare to classroom discussion.	0	0	5	10	7	21	7	28	1	5	4.1	Agree

Analysis

This table shows a significant change in students' perceptions and abilities after the intervention of using educational videos. The pretest result shows that students struggled with the retaining physics concepts. A weighted mean of (2.75). the pretest findings show a general weakness in long term memory recall of physics concept among the respondents. The post test result shows a positive change following the use of educational videos. The weighted mean of (4.75) for statement 1 suggest a strong agreement that educational videos help them understand the topics easily. This states that the visual use of educational videos effectively help simplifies complex physics topics. the weighted mean for statement five (4.1) shows that students agree that they gain more knowledge from educational videos. The result from pretest to post-test suggest that the educational videos is a valuable tool for improving students' comprehension and their ability in retaining information.

The perceived usefulness of educational videos in helping STEM students understands

General Physics. The students generally perceived educational videos as highly useful in improving their understanding of general physics. Visualizations of complex concepts (e.g., motion, forces, energy) that are hard to imagine through static images or verbal explanations alone. The ability to pause, rewind, and rewatch content, allowing for self-paced learning and better comprehension. A more engaging format compared to traditional lectures, which helped maintain attention and interest in the subject. Many students reported feeling more confident in their understanding after watching well-designed educational videos, and this confidence translated into better performance on assessments and class participation.

Table 3: Students perceived usefulness of educational videos in understanding general physics

Pre-Test

S. No		SD	X1	D	X2	N	X3	A	X4	SA	X5	WM	V.I
8	I believe educational videos can help me learn physics concepts more easily.	0	0	0	0	0	0	13	52	7	35	4.35	Agree
9	I expect that watching physics videos will improve my problem-solving ability.	0	0	3	6	5	15	5	20	7	35	3.8	Agree

Posttest

S. No		SD	X1	D	X2	N	X3	A	X4	SA	X5	WM	V.I
10	I will recommend watching educational videos to my classmates as a learning tool to improve their understanding of general physics.	0	0	0	0	3	9	10	40	7	35	4.2	Agree

Analysis

The pretest result show that student already had a very high expectations and confidence in this learning tool. A weighted mean of (4.35) for question 8 states that respondents strongly agree that educational videos van help them learn physics concepts more easily. The high pretest scores signify that students were not only open to this learning method but also have strong conviction that is would be beneficial for improving conceptual understanding. the post rest result shows a clearer and more positive outcome, the weighted mean of 4.2 for statement 10 where respondents agreed that they would recommend educational videos on their classmates give a confirmation of videos perceived value. the high scores on post-test suggest that the positive result from pretest expectations were not met but exceeded. by recommending educational videos to their peers the respondents demonstrate a high level of satisfaction and belief that this tool is effective way to enhance understanding of general physics.

The barriers students face while using educational videos to learn physics

Despite their effectiveness, educational videos are not without challenges. **Access issues**, such as poor internet connectivity or lack of devices, particularly among students in remote or underserved areas. Some students watched videos without engaging with the content, leading to superficial learning. Without accompanying practice or guided instruction, videos alone were sometimes insufficient. **Some** videos that were too fast, too slow, or not in the students' preferred language hindered understanding for some learners. These challenges suggest that while educational videos are powerful tools, their effectiveness depends heavily on teaching, and learner engagement strategies.

Table 4: Barriers faced by students using educational videos to learn general physics

Pre-Test

S. No		SD	X1	D	X2	N	X3	A	X4	SA	X5	WM	V.I
10	I worry about technical issues (slow internet) while watching videos.	5	5	2	4	3	9	5	20	5	25	4.35	Agree

Post-Test

S. No		SD	X1	D	X2	N	X3	A	X4	SA	X5	WM	V.I
6	The videos I have watched explained the topic simpler and easier to understand	0	0	1	2	6	18	12	48	2	10	3.71	Agree
7	I would rather watch educational videos to learn about General Physics.	0	0	5	10	10	30	4	12	1	5	2.85	Agree

In the statement number 10, the respondents agreed that they have encountered different barriers when using educational videos with the weighted mean of 4.33 In the statement number 6, showed significant changes in their scores from pretest to post test the weighted mean for this statement slightly decreased from 4.35 to 3.71. The result suggest that the intervention was effective in reducing some significant barriers related using educational videos for learning Physics.

4. Summary, Conclusions and Recommendations

Summary of Findings

4.1 The level of understanding of general physics among STEM students before the implementation of educational videos

This study focuses on the impacts of educational videos when learning physics. The level of understanding of general physics among STEM students before the implementation of educational videos is split by three following questions.

4.1.1 Conceptual Understanding

Before implementing the use of educational videos, some students show familiarity with the definition and formula about physics however some students show low conceptual understanding. The students during the pre-test struggled to apply these concepts in real-world settings, suggesting that traditional teaching methods may not be effective to some students. The visual content is most like limited their ability to use their imagination to relate about physics and phenomena. After the implications of the educational videos, the researchers noticed that most of the students gained more knowledge when visualization is involved when studying general physics. Nonetheless, the educational videos may affect the students' conceptual understanding positively.

4.1.2 Students' Problem-Solving Skills

In terms of problem-solving skills, the students showed difficulty in identifying appropriate strategies and applying theoretical knowledge to different types of physics

problems. Students were able to follow work examples during class but had trouble transferring said knowledge to problems that were unfamiliar to them indicating a reliance on note learning rather than actual understanding.

4.1.3 Students' Retention of Knowledge

Before the intervention, knowledge retention was relatively weak with students often forgetting previously learned concepts when they are not revisited or done through engaging methods. This highlights the need for much more engaging methods and repeated exposure.

After the intervention it showed positive change in students' perception and abilities suggesting that educational videos help them understand the topics easily due to visuals simplifying complex physics topics. The results show that educational videos are a valuable tool in improving students' comprehension and their ability in retaining information.

4.2 The perceived usefulness of educational videos in helping STEM students understands General Physics

During the pre-test, most of the students believe that educational videos can help to gain knowledge about learning general physics. The students expect the usefulness of educational videos when it comes to their problem-solving skills in which the subject physics requires for. After the implication of educational videos, most of the students during post-test agreed that educational videos are effective and will recommend it as a tool for understanding general physics.

4.3 The barrier's students face while using educational videos to learn physics

During the pre-test, students expressed that barriers could affect their learning experience when it comes to utilizing educational videos. Most of the students worry that technical issues, such as internet connection may hinder their ability to watch educational videos when learning physics. Meanwhile in post-test, some students agreed that they would rather learn physics from educational videos rather than in real-life while majority of the students disagreed implying that educational videos is more an effective tool when learning physic.

5. Conclusion

In conclusion, the results of this study demonstrate a fascinating positive outcome from the use of educational videos in the students' way of learning. Based on the pre-test and post-test analysis presented in the study, it is evident that there is a significant improvement when using educational videos in studying general physics. The findings show that the students prefer the use of visuals and graphics rather than learning with words alone, as these make it easier for them to apply and explain general physics in real-life situations.

The students clearly recommend educational videos as a tool when learning physics, most of the students agreed that educational videos are helpful since it has more of a visual representation that can help students retention of knowledge, conceptual understanding, problem solving, and the use of creativity of mind that can help students to create solutions that will aid the understanding of physics as a whole.

6. Recommendation

For Students: Since the findings shows that educational videos will be a good use for students to improve in the subject of physics. It is normal to have a hard time understanding general physics, that why the researchers say it is recommended for them to use educational videos as a reviewer or learning tool to strengthen their understanding in physics.

For Teachers: Since we are living in a new generation using technologies, the teachers should be more flexible. That is why it is recommended for them to combine the old teaching methods and the use of educational videos to enhance their teaching style and make their class more engaging and help the students to understand the topic more easily.

For School Administrators: School Administrators are encouraged to support and implement the use of educational videos in their learning environment to have a more efficient and quality way of learning that can boost their students understanding and improve their school.

For Future Researchers: It is recommended for future researchers to test the long-term effects of educational videos. They are also recommended to test the effectiveness of educational videos on other subjects that they believe require greater attention.

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8. References

1. Kuhlmann SL, Plumley R, Evans Z, Bernacki ML, Greene JA, Hogan KA, *et al*. Students' active cognitive engagement with instructional videos predicts STEM learning. Computers & Education. 2024; 216:105050.
2. Mayer RE. Cognitive Theory of Multimedia Learning. In Cambridge University Press eBooks, 2014, 43-71. Doi: https://doi.org/10.1017/cbo9781139547369.005
3. Noetel M, Griffith S, Delaney O, Sanders T, Parker P, Del Pozo Cruz B, *et al*. Video Improves Learning in Higher Education: A Systematic review. Review of Educational Research. 2021; 91(2):204-236. Doi: https://doi.org/10.3102/0034654321990713
4. Oreed. What is Video-based Learning and What are its Benefits? Oreed Platform, September 20, 2023. https://oreed.org/en/article/what-is-video-based-learning-and-what-are-its-benefits#:~:text=Video%2Dbased%20learning%20theory%20is,video%20as%20an%20educational%20tool.
5. Pattier D. Teachers and YouTube: The use of video as an educational resource. Ricerche di Pedagogia e Didattica. Journal of Theories and Research in Education. 2021; 16(1):59-77.
6. Qomariyah SSA, Permana D, Hidayatullah H. The effect of YouTube video on studentsâ€™ listening comprehension performance. Jo-ELT (Journal of English Language Teaching) Fakultas Pendidikan Bahasa & Seni Prodi Pendidikan Bahasa Inggris IKIP. 2021; 8(1):67-73.
7. Villanueva D, Concepcion E. Interactive E-Learning materials in Physics for an Enhanced performance of Grade 10 students, 2023.