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Science Fiction Movie Scenes: Its Impact on Students' Achievement Scores in Learning Newton's Laws of Motion

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Abstract

Science fiction fosters students' curiosity, creativity and innovation, and interest in science by combining real-world and fantastical aspects of science and technology. This study aimed to determine the difference of the pretest and posttest scores of both control and experimental groups with and without the integration of science fiction movie scenes. Methodology was pre-experimental research. The participants were the two sections of Grade 8 junior high school in Lugait National High School. The findings revealed that integrating science fiction movie scenes in teaching Newton's 3 Laws of Motion, significantly affects the academic scores of students. The finding inferred that the group of respondents who undergo the intervention has higher results of posttest compared to those groups of respondents who were taught without the intervention. Notably, the integrated method shows a lower percentage in the beginning level and higher percentages in developing, approaching proficiency, and have an equal percentage in advanced levels compared to the traditional method. Post-test scores reveals that the traditional method has more students in proficient and advanced levels, while the integrated method excel in these categories. Statistical analyses indicate no significant difference in pre-test scores, but a substantial improvement in post-test performance for the traditional method. Similarly, the integrated method demonstrates significant improvement in post-test scores, reinforcing its meaningful enhancement in student performance. Integrating movie scenes into the teaching of Newton's laws of motion offers numerous benefits, from increased engagement and improve conceptual understanding to enhanced memory retention and critical thinking skills. By leveraging the power of multimedia, educators can create more dynamic and effective learning environment that caters to diverse learning styles and brings the fascinating world of physics to life.

Keywords: Science Fiction Movie Scenes, Achievement scores, Science proficiency, Performance, Laws of Motion

1. Introduction

Globally, most science curricula aim for students to develop conceptual, procedural, and epistemological understandings (Abrahams & Millar, 2008; Moeed, 2016; Hodson, 2014; Millar, 2010). Science fiction fosters students' curiosity, creativity and innovation, and interest in science by combining real-world and fantastical aspects of science and technology. In the classroom, every learner aspires to acquire knowledge and develop analytical skills. He has his own behavior, capabilities, attitudes and learning style which are different from his peers (Alia & Dolotallas). For more than a century, science fiction movies and films have captivated audiences of all ages worldwide. Some people watched it for entertainment or as a form of escape, while others were so inspired by it that they enrolled in science-related courses (Czerneda, 2006; Brake, and Thornton, 2003).)

Science education must evolve over time to meet the needs of a changing world. One of the most widely claimed goals of science education is to produce citizens who are scientifically literate. Such changes often lead to reforms in the science curriculum and revisions of the way science is taught and learned in many countries (Eilks & Hofstein, 2017). In the study of the Pairat et.al (2024) shows that the integration of the Music method significantly outperforms than the traditional method. At present, most countries aim to develop responsible citizenship in their society through education, and scientific literacy is an important aspect of this core outcome (Metin et al., 2020; Yuenyong & Narjaikaew, 2009). Another study that supports science education are the used of teaching pedagogy that students demonstrated and students satisfactory level of mastery when subliminal messages were incorporated, and the use of subliminal messages had a positive impact on the students' performance on teaching science (Arnoza et.al, 2024).

Most experts dismiss the genre as unserious, a teenage distraction at best. According to its critics, science fiction is barely science and usually involves poor writing. This bad reputation is largely undeserved and science fiction is often misunderstood. Most people are becoming more and more difficult to distinguish fact from fiction. According to National Science Foundation (2000), the blurring of fact and fiction by visual media has corroded the public's critical-thinking skills and hindered.

The development of a scientifically literate citizenry. During the past three decades, the educational research community has accumulated a wealth of knowledge regarding student understanding of scientific concepts. For example, Pfundt and Duit (2004) misconceptions bibliographical research database lists 5956 studies that have examined student understanding of scientific concepts. These studies have found that from an early age children strive to understand the natural world and in the process develop their own theories and mental models to explain their experiences and observations. In general, these studies have reported that students' theories and models are contrary and in conflict with currently accepted theories and models of the scientific community. Many studies have also revealed abundant misconceptions on the dynamics. Most students have misconceptions on restoring force and they have difficulties connecting mathematical solutions to real motions (Bunprom et.al., 2019; Jimakorn and Yuenyong, 2018; Patho et.al., 2018; Phaikhumnam and Yuenyong, 2018). Some students believe that heavier objects fall faster than lighter ones, ignoring the fact that acceleration due to gravity is the same for all objects in the absence of air resistance (Somroob and Wattanakasiwich, 2017).This concern was further expounded upon by Nowotny (2005), the chair of the European Research Advisory Board, who noted that the past few years have seen an increasing proliferation of images and symbols via high-tech-driven media entertainment that is deliberately designed and intended to meet the public imagination about science, but often creates misunderstandings regarding the nature of science and leads to blurring between facts and fiction.

Research on the production of modern science fiction visual media reveals that film makers strive to ensure that their depictions of scientific phenomena have a basis in reality, and that the images put forth in the film or television show appear as realistic and plausible as possible (Kirby, 2003b). Students are more motivated to learn when they see the relevance of Newton's laws to everyday experiences, such as driving a car, playing sports, or understanding how objects move in space. Making connections between the laws of motion and practical applications can enhance intrinsic motivation. Educators can address the fallacies of science fiction media by using them as opportunities to teach students how to extract and analyze the science that is portrayed. A good strategy would be to show these films so that students can be engaged and then to teach them how to critique the science in science fiction (Barnett, 2006). It is inevitable that students will be exposed to the flawed science of science fiction films, so educators should attempt to teach them how to compare what they watch to what they actually learn in the science classroom.

The objective of this study is to have an eye opener to deal with students who are least learners and have a hard time in understanding a specific concept of science. Science fiction can be a good source of inspiration for future studies as it continually asks the question: what if? Science fiction films can also be used to prevent the worst from happening by presenting possible future problems that today's government agencies and employees decide to ignore. This study will help to lengthen the patience, understanding, and to strengthen the learning materials to be used of the facilities of the school.

2. Methodology

This study employs a pre-experimental design as a quantitative research strategy to investigate the impact of science fiction movie scenes on Grade 8 students' achievement scores in learning Newton's Laws of Motion. The research design is structured to provide a systematic and controlled method made by means of pre-experimental design as a quantitative research strategy. The performance of students is measured through giving of pretest and posttest before and after the implementation of the study. Pre- experimental design serves as a valuable tool for preliminary research in educational settings, particularly when investigating new interventions or instructional methods. Although they have limitations in terms of internal and external validity, they provide initial insights that can inform more rigorous future studies. By carefully considering the design's strength and weakness, researchers can effectively use them to explore innovative teaching strategies and its potential impact on student learning. The researchers used simple random sampling in selecting the respondents. Simple random sampling is a probability sampling method that allows the researchers to select respondents randomly who were able to provide the richest information and those who possess the characteristics based on the researchers' interests. The participants are forty-five (45) grade 8 students in Lugait National High School enrolled in SY 20232024. In this procedure, a letter of request would be sent to the school principal of Lugait National High School to conduct the study. Then, a letter of permission is secured to the class advisers of Lugait National High School for the implementation of the study. The respondents of the study comprised the entire sections of Grade 8 Amazing and Grade 8 Admirable, each consisting of 30 students, one group received the science fiction movie scenes-integrated teaching while the other group received traditional teaching method. Students in the two sections were administered a pre-test and post-test on their understanding of Newton's Laws of Motion. Multiple-choice questions were chosen as they allow for efficient and objective assessment of knowledge retention and comprehension. The pre-post content exam for both the traditional teaching method and integration had 30 questions that asked the students about the concept of Newton's laws of motion. 10-item questions for the law of inertia, 10-item questions for the law of acceleration, and 10-item questions for the law of action-reaction. The

objectives of these questions are to state the law of inertia, law of acceleration, and law of action-reaction and to also cite situations where these laws of motion apply. Then, the determination of pre-test and post-test scores would follow the conduction of the study. After the respondents answered the questionnaire, the researchers collected and tallied the data for interpretation. The researchers asked a statistician to help in determining the appropriate statistical tools to be used and in interpreting the data.

3. Results and Discussions

3.1 Pretest scores of the students when grouped according to Traditional Method and Integration of Science Fiction Movie Scenes

Figure 1 shows the percentage distribution of the pretest score in physics among grade 8 students using traditional method and integration of science fiction movie scenes as a learning strategy. In traditional method the result reveals that 33.30% of the students were in the beginning level which means that these respondents did not meet the expectation, 13.30% of the students were in the developing level, 6.70% of the students were in approaching proficiency level, 30% of the students were in the proficient level, and 16.70% of the students that were taught using the traditional method as a learning tool were in the advanced level.

In integration of science fiction movie scenes the result reveals that 6.70% of the students were in the beginning level, 33.30% of the students were in the developing level, 23.30% of the students were in the approaching proficiency level, 20% of the students were in the proficient level, and 16.70% of the students that were taught using the integration of science fiction movie scenes as a learning tool were in the advanced level.

Physics major is hard because of the vast amount of information required to learn but also involves a lot of unfamiliar concepts (some of which are difficult) and require mastering an unfamiliar vocabulary (which is true of any science). Understanding physics-related systems and processes is also difficult for students. Learning physics is a cumulative process, so before they can understand more complex physics concepts and processes, they must understand the basics. The reason being physics makes so much sense when you understand the fundamental principles well enough. (Andrew, 2021).

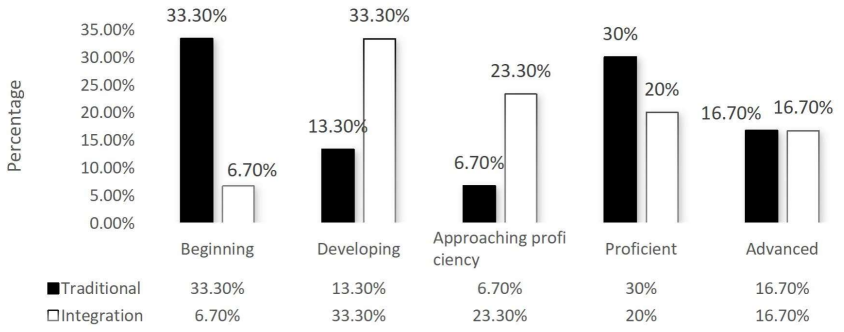

Figure 1. Percentage distribution of the Pretest Score when grouped to Traditional Method and Integration of Science Fiction Movie Scenes.

3.2 Pretest scores of the students when grouped according to Traditional Method and Integration of Science Fiction Movie Scene

Figure 2 shows the percentage distribution of the posttest score in physics among grade 8 students using traditional method and integration of science fiction movie scenes as a learning strategy. In traditional method the result reveals that 6.70% of the students were in the approaching proficiency level, 40% of the students were in the proficient level, and 53.30% of the students were in the advanced level. There were no students who got to the beginning and developing level.

In integration of science fiction movie scenes the result reveals that 43% of the students were in the proficient level, and 56.70% of the students were in the advanced level. There were no students who got to the beginning, developing, and approaching proficiency level. The highest score which has the percentage of 56.70% with integrating science fiction movie scenes has a good impact that shows improvement rather than the highest score of lecture method with has the score of 53.30%. which implies as what Diana K. Riser promotes (2020), compared to the simple teaching of lecture method, science fiction movie scenes help students develop critical thinking and scientific literacy, as well as their ability to apply course concepts to everyday life and share those applications with others. Student outcomes from several sections of Lifespan Development those with the science fiction movie scenes versus those with a traditional ones, were analyze for differences in quantitative measures of student success. Students' reflections were also assessed for common themes. Findings suggest advantages of social media and internet using science fiction movie scenes with regard to students' sense of purpose, experience with scholarly discourse, and student growth, and may inspire creation of additional innovative assignments that promote student learning and application.

Figure 2. Percentage distribution of the Post test Score when grouped to Traditional Method and Integration of Science

3.3 Difference between the pretest score of the students when grouped according to Traditional Method and Integration of Science Fiction Movie Scenes

Since the p-value is 0.500 which is greater than 0.05, we fail to reject the null hypothesis. This means that the pretest scores of the students when grouped using sci-fi movie scenes as a learning method and traditional method are not significantly different. In practical terms, this suggests that there is no sufficient evidence to claim a significant difference in the pre-test scores between students who were exposed to sci-fi movie scenes as a learning method and those who experienced the traditional teaching method.

Based on the result below, the pre-test scores of the students assigned to integrate (use of sci-fi movie scenes) method shows greater mean scores than the traditional. It means that in the beginning of the experiment, the experimental group has an edge over the control group showed difficulty as regards on the subject matter especially that the

students only had a small background on physics-related concepts vital to the understanding of laws of motion. This confirmed the study of Dede et al., (2013) that it was hard to understand scientific concepts when one did not have a prior experience or knowledge in the field.

Table 2. Difference between the pretest scores of the students when grouped using science fiction movie scenes as a learning method and traditional method before the intervention.

Variable	Mean	Mean difference	Mann-Whitney U Value	p-value
Integrated (use of science fiction movie scenes)	15.40	1.5	404.500	0.500
Traditional method	13.90			

With 0.05 level of significance

3.4 Difference between the pre-test and post-test scores of the students taught using integrated method

Table 4 shows the difference in the science fiction movie scenes as a learning strategy between pre-test and post-test. The analysis reveals that there is a significant difference in pre-test and post-test score in favor of post-test score, since the t-value is -11.33 that correspond to the p-value which is 1.48x10 -11 is lesser than 0.05 level of significance. Therefore the null hypothesis is rejected which indicates robust evidence supporting the claim that the post-test scores of students, when instructed using the integrated method, are significantly greater than their pre-test scores. In practical terms, this suggests a substantial improvement in the post-test performance of students who were exposed to the integrated method, and the rejection of the null hypothesis signifies that this observed difference is unlikely to have occurred by random chance alone. The statistical significance reinforces the conclusion that the integrated teaching method has led to a significant and meaningful enhancement in the students' post-test scores. The literature suggested that when they published a study that suggests that teaching needs to be creative in order to be successful in the ever-changing classroom dynamics of the twenty-first century. Members of virtual communities interacting mainly through the digital medium are the youth of the present era. This digital contact has its influence on conventional lectures in the classroom. Teaching and learning of today faces more challenges because technology continues to upgrade itself. Teachers are expected to incorporate as many technology items as possible to facilitate the participation of students in classroom activities (Arnoza et.al., 2024; Berk, 2009; Pairat et.al., 2024).

Table 3. Difference between the pre-test and post-test scores of the students when taught using integrated method

Lecture Method	Mean	Mean difference	T-value	p-value	Remarks
Pre-test	11.26	-8.00	-11.33	$1.48X10^{-11}$	Significant

4. Conclusion

Based on the findings presented, the following conclusions were formulated:

1. The integration of science fiction movie scenes as a learning strategy resulted in a higher percentage of grade 8 students reaching proficient and advanced levels in posttest scores compared to traditional teaching methods, indicating a more significant improvement in student performance.

2. The study's findings indicate that while there were higher mean scores in both pretest and posttest outcomes for students exposed to the integrated method using sci-fi movie scenes, these differences were not statistically significant compared to the traditional teaching method, suggesting that the integration of visual media like science fiction films may not significantly impact student performance in physics assessments.

3. The analysis demonstrates that there is a significant improvement in post-test scores compared to pre-test scores for both traditional teaching methods and the integration of science fiction movie scenes, with robust evidence supporting a substantial enhancement in post-test performance for students exposed to the integrated method.

The researchers therefore conclude that variations in pretest and post test score distribution indicate different outcomes between the two teaching approaches. While there are variations in pretest score distribution between the traditional and integrated methods, both methods show significant improvement in post-test scores, reinforcing the efficacy of each approach in enhancing student performance and further consideration of the practical implications and effectiveness of each teaching method is warranted.

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