SLOWMATION INTEGRATION IN TEACHING EARTH SCIENCE: EFFECTS ON GRADE 11 STUDENTS' PERFORMANCE AND INTEREST

Pacatua, Rania Banocag[1],
Abdulrachman, Nafisah Moalam[2]
[1,2]Mindanao State University-Institute of Science Education
Marawi City, Philippines
20raniapacatua@gmail.com

ABSTRACT

This study aimed to investigate the impact of using the student-constructed slowmation video in learning process its effect on performance and interest in Earth Science. This study utilized mixed-method research design to collect data from eighteen (18) Grade 11 students of Adiong Memorial State College (AMSC). The findings showed a notable improvement in the experimental group's earth science performance (mean score from 17.5 to 40.2), compared to the control group (mean score increased from 16.5 to 28.1). There is no significant difference between the control and experimental group's performance before intervention. However, there is a significant difference between the control and experimental groups after intervention. The level of interest showed significant improvement after intervention. However, there is significant difference in control and experimental groups after intervention. Overall, this method was seen as innovative tool that improved both the learning experience and students' interest in earth science. This method increased the earth science performance and interest of the grade 11 students. It is recommended for educators and curriculum makers to consider these results when designing a lesson or curriculum.

Keywords: Earth science Performance, Earth science Interest, Slowmation

INTRODUCTION

We live in an era that almost all information travels through information and communication technologies. Teaching process involves variety of technological incorporation in every educator lives. We solely rely on the use of technology to help us in teaching process and makes our

work done easily. Philippines is one of countries that are behind in terms of technological improvement, as it affects the Philippines educational system, not all students can access technology and are media literate so in effect student performance in learning is always at the level of low performance. The need for innovative teaching approach is much needed in rural areas where technological use is not prominent. Integrating slowmation in teaching process can help alleviate the illiteracy of students on the use of technology in their learning process. The performance of Filipino students in global assessments of science literacy over the years is generally and consistently poor. In the latest results of Program for International Student Assessment (PISA) 2020, Philippines ranked 3rd on worst countries in science subject. In 2018, the Philippines ranked least among participating countries in which Science was one of the subjects tested in PISA. Filipino learners' average science literacy scores ranked second to last among 78 countries (Philippine Business for Education (PBEd), 2022). The results of the first participation of the country in PISA has paved the way for the Department of Education to propose more programs to address the deficient academic performance and advance the quality of education in the Philippines.

Similar pattern of Filipino students' performance in PISA 2018 matches their performance in another international assessment, the Trends in International Mathematics and Science Study (TIMSS). Similar to PISA, TIMSS measures students' ability to apply their knowledge in different content areas of science. Students' performance was evaluated using benchmarks, each with a corresponding scale score: Low (400), Intermediate (475), High (550), and Advanced (625) (Mullis et al., 2020). Based on the result, only 19% of Filipino students achieved scores in the Low benchmark or higher, which implies that the overwhelming majority of Filipino students show limited understanding of scientific concepts and limited knowledge of foundational science facts (Mullis et al., 2020). In this era of digitalization, teachers as well must adopt to the changing world and therefore need to innovate on their pedagogical approach. There is a need to study the use of Slowmation because this will help the policy makers and science educators to include on their teaching approach the use of Slowmation. The students will gain interest in which they lack, if the teacher will include the slow animation on their pedagogical approach. This inclusivity ensures that students from different regions have equal openings to profit from a more engaging and effective learning. Thus, incorporating Slowmation into class discussion and activities could serve as a catalyst for positive change, addressing the poor performance of students in science education. Furthermore, the

researcher believes that the integration of Slowmation in the teaching and learning will improve students' interest in science. This will surely provide the students with a range of learning experience that will excites, sustain their interest, and help improve their performance. The use of Slowmation will also help the teachers who are deficient on the use of technology. Presently, science education in the Philippines reflects a significant deficiency.

The low performance of students is marked by various learning issues. One of the notable factors that may have contributed to these issues is the traditional teaching approach used. In this type of approach, teachers may struggle capturing the interests of the students particularly in science subjects. Traditional method frequently emphasizes rote memorization rather than fostering a deep understanding of scientific generalities. Meanwhile, the integration of innovative approaches like the use of Slowmation as a teaching approach address these challenges. This approach offers a dynamic and interactive way of learning. The gap between teachers and current technology like the use of slowmation significantly affect the student interest and performance, thus school heads must conduct a training program focusing on computer literacy of teachers for them to have sufficient understanding on the use of Slowmation in classroom. By knowing the need for teacher computer literacy trainings, school administrators can identify potential issues arises on the lack of students' interest in science discourse.

METHOD

This study employed both quantitative and qualitative research design on experimental group to determine the effectiveness of Slowmation instruction on the performance and interest of Grade 11 Senior High School students of Adiong Memorial State College in their science class. The subject participants of the study were the two (2) intact section of the grade11 students of Adiong Memorial State College who are officially enrolled during the school year 2024-2025. The total respondents were composed of 60 students. The Grade 11 have 2 sections composed of 27 male and 33 female with the total of 60 students. Grade 11 section A is composed of 30 students (11 male and 19 female) while Grade 11 section B is composed of 30 students (14 male and 16 female). The class sectioning of all grade 11 students in this school is based on students' grade point average in their Grade 10 level and 18 of the student were matched pairs. The intervention phase is composed of the Development of the Research Instruments. The first step is the construction of the questions in the Performance Test. Subsequently, it

was pilot tested in Datu Mamintal National High School. The result was then referred to a statistician. On the other hand, the adopted questionnaire which is the Interest Questionnaire was modified and used for determining students' interest. The usual semi-detailed lesson plan was used for the control group. All the activities in the Learners' Manual were used in the class. For the lesson plan of the experimental group, student-created slowmation videos were developed by the students to replace the activities done by the control group.

The teacher assigned every group a topic as the bases in making the slowmation video. There are steps that students undergone for the development of the slowmation video, beforehand students brought the materials in making the slowmation video like camera, tripod, objects to capture like a printed materials, clay or actual object. During the making of slowmation video, students were assisted by the teacher. They then went through by capturing the object through a camera as they move the object manually. A voice over is also recorded which served as the background sound of the video. After capturing photographs of the object, they then proceed to editing the pictures using an editor application "stop motion" that converts photos into video as if they actually move. When students finished editing the slowmation video, they then consult it with the teacher for comments and suggestions. After reviewing by the teacher, students then proceed to publishing which they will present the video in class during reporting on classroom setting by group.

The researcher administered the pretest of performance test and earth science interest test to both the experimental group and control group. Before the intervention start, the researcher conducted an orientation on experimental group. All the step, rules and principles were presented to them. The researcher taught the participants on how to create Slowmation in workshop. The researcher prepared a video from youtube on how slowmation works and also introduced to students an application used to turn pictures into a slow animation video, and played on television using flash drive switch on television. This is to ensure that the students will know and will be trained on how to make a correct Slowmation. After the pretest and the orientation, the researcher started the intervention. The intervention commenced during the 1st quarter of the school year 2024-2025. The experimental group was exposed using Slowmation teaching approach whereas the control group was taught using the conventional teaching approach. The students in both groups completed the same classroom instruction pertinent to each class. They were taught with the same lesson at the same pace. They received the

same number of assignments and activities and they took the same quizzes and chapter tests. In the control group, conventional teaching approach was used. The researcher herself was the subject teacher of each group. The teacher first gave an activity prior to the discussions. The students were grouped for the group activities. Each group chosen one member to present their output in the class after the allotted time given by the teacher for the activity. After each group presentations of their output, the teacher discussed the answers to the questions in the activity. To enlighten the students more about the topics, there were rationalization after each test. In addition, the students were asked to raise questions regarding the discussed lessons.

The topics that were discussed in the control group was same in the experimental group. On the contrary, the experimental group was taught using Slowmation Approach. This was employed in three phases of making Slowmation. The first one is the creation stage in which students were assigned a specific topic that they need to gather for discussion. The stage to is the reviewing stage in which students were assigned to report on their adviser the slowmation video they had made for review purposes and re-editing the video if there is some adjustment. The final stage is the publishing stage, in which students were assigned to report to their classmates the video they made. Right after the intervention, the performance test and the adopted earth science interest test was administered as posttests. All of the quantitative data gathered before and after the intervention was presented to statistician for statistical treatment, analysis, and interpretation. The instruments used in this study were performance test and earth science interest test to gather data regarding the performance and interest of the respondents, before and after intervention.

The performance test was research made and the earth science interest test was adopted from Knekta et al. (2020). For the data analysis, the statistical Package on Social Science (SPSS) will be used to process the gathered Quantitative Data statistical computation and testing. Descriptive Statistics like the mean, frequency, percentage and standard deviation were used to describe the raw score in performance test and interest in science of the experimental and control groups before and after intervention. T-test for the independent samples were used to determine whether there is significant difference between the mean scores of the experimental and control groups both before and after the intervention as well as their mean gain scores all in the two instruments namely performancetest and the interest scale. Thematic Analysis was

used to gather qualitative data, this involves analyzing the language and communication used in the data, such as the meaning behind certain words or phrases.

FINDINGS AND DISCUSSION

Table 1:
Number and Percentage Distribution of Control and Experimental Groups of Students in the three levels of performance before and after Intervention

Levels of Performance	Before Intervention		After Intervention	
	Control (n=18)	Experimental (n=18)	Control (n=18)	Experimental (n=18)
	Number (%)	Number (%)	Number (%)	Number (%)
Advanced	0 (0%)	0(0%)	0 (0%)	4 (22%)
Proficient	0 (0%)	0 (0%)	1 (6%)	3 (17%)
Approaching proficiency	0 (0%)	0 (0%)	0 (0%)	4 (22%)
Developing	0 (0%)	0 (0%)	1 (6%)	3 (17%)
Beginning	18 (100%)	18 (100%)	16 (89%)	4 (22%)
Total	18 (100%)	18 (100%)	18 (100%)	18 (100%)

Note. Raw score range: 45-50=Advanced; 43-44=Proficient; 40-42=Approaching proficiency; 38-39=Developing; and 37-0=Beginning

Overall, the data suggests that there were no significant differences in the performance levels between the control and experimental groups before intervention. According to the result, it is prevalent that the two groups have the same academic performance and we can clearly predict that they get equal treatment in classroom which they can be comparable. This suggest that the two groups were comparable at baseline and that any changes observed after the intervention likely attributed to the intervention itself.

Table 2:
Recapitulation of Control Group Before Intervention

Levels of Interest	Control (n=18)
	Numbers (%)
Very high interest	0 (0%)
High interest	1 (6%)

Medium interest	15 (83%)
Low interest	2 (11%)
Very low interest	0 (0%)
Total	18 (100%)

Note. 0-20%- very lo interest, 21%-40%-low interest, 41%-60%-medium interest, 61%-80%- high interest, 81%-100% (Pratiwi et al. (2018)

Based on the data presented above, most of the students were under medium interest 83% of categorization level of interest and 2 students fell under low interest 11%. The result indicated student lower level of interest in earth science subject.

Table 3:
Recapitulation of Control Group After Intervention

Levels of Interest	Control (n=18)
	Numbers (%)
Very high interest	15 (83.33%)
High interest	0 (0%)
Medium interest	1 (5.55%)
Low interest	2 (11.11%)
Very low interest	0 (0%)
Total	18 (100%)

Note. 0-20%- very low interest, 21%-40%-low interest, 41%-60%-medium interest, 61%-80%- high interest, 81%-100% (Pratiwi et al. (2018)

After the intervention, the results for the control group show a positive change. The data shows fifteen (15), or 83.33% reach the very high interest level. Only one (1) remained at the medium interest level. Lastly, two (2), or 11.11% remained at the low interest level. These findings suggest a potential need for alternative or supplementary teaching methods that could enhance student enjoyment, highlight on student constructed intervention to foster a deeper interest in Earth Science. More diverse research could investigate the effectiveness of different teaching approach in achieving these goals. By the active participation of students in learning process, the information and knowledge conveyed to students yield more meaningful effect on students' interest. They will gain curiosity, foster collaboration and allow student to actively

participate. This can be effective in addressing such issues regarding students who are not interested in the subject discourse.

Table 4:
Recapitulation of Experimental Group Before Intervention

Levels of Interest	Experimental (n=18)
	Numbers (%)
Very high interest	0 (0%)
High interest	4 (22.22%)
Medium interest	12 (66.66%)
Low interest	2 (11.11%)
Very low interest	0 (0%)
Total	18 (100%)

Note. 0-20%- very low interest, 21%-40%-low interest, 41%-60%- medium interest, 61%-80%- high interest, 81%-100% (Pratiwi et al. (2018)

Before the intervention in the experimental group, the data from the Earth Science Interest Scale (ESIS) shows that before intervention, twelve (12) students in the experimental group, or 66.66%, fell under level of medium interest. Only two (2) reached the level of high interest. Two (2) students, or 11.11% fell under the level of low interest. The findings suggests that the students gravitate towards a moderate level of interest in the subject, The lack of classroom engagement is one of prevalent reason. Overall, the data above shows that none of the respondents were highly interested in science, which simply means the need to incorporated diverse pedagogical approach like the use of slowmation video in the classroom.

Table 5:
Recapitulation of Experimental Group After Intervention

Levels of Interest	Experimental (n=18)
	Numbers (%)
Very high interest	13 (72%)
High interest	5 (28%)
Medium interest	0 (0%)
Low interest	0 (0%)
Very low interest	0 (0%)
Total	18 (100%)

Note. 0-20%- very

low interest, 21%-40%-low interest, 41%-60%-medium interest, 61%-80%- high interest, 81%-100% (Pratiwi et al. (2018)

CONCLUSION

The result of the study was clear that student-created slowmation video can facilitate positive impact on performance and interest of students. Most of the students learn more through visual representation and the use of slowmation video greatly improve their interest and performance. These positive result can empower the education system to improvise pedagogical approach in such way that students will gain interest and performance. As we are living in digital world, students were more engaged if there is a presence of technology in their everyday life. The incorporation of slowmation video on their learning environment indicated positive result, because young ones were more engaged to technology.

REFERENCE

Açıkgöz, K. Ü. (2003). Active Learning Theory. Journal for Science Education, 31(9), 311–331

Ala, et al. (2022). The effect of computer animation on the performance of students in Vertebrate Anatomy and Physiology in Colleges of Education.

Amora, J., & Quirap, M. (2023). Activity-based learning and its impact on science education. International Journal of Science Pedagogy, 48(1), 34–50.

Atalay, R., Gülbahar, Y., & Öztürk, A. (2019). The effects of Slowmation in science education: A review of student engagement and learning outcomes. Journal of Educational Technology, 35(2), 102–117.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Prentice-Hall.

Bamidele, A., & Yoade, F. (2017). Effects of Teacher's Qualifications and Teaching Experience on Student's Academic Performancein Basic Science in Junior Secondary School. Journal of Education and Evaluation, Volume 3

Bilginer, B., & Uzun, S. (2022). The mental model development of preservice science teachers with slow-motion animation and visual materials: The case of the circulatory system. Journal of Science Teacher Education, 33(4), 321–338. https://doi.org/[Insert DOI if available].

Buitre, D. (2023). The role of electronic strategic intervention materials (e-SIM) in improving biology education. Journal of Science Education and Innovation, 29(4), 112–125.

Cheung, D. (2007). Validating an instrument for measuring teacher beliefs about alternative curriculum design approaches. Educational Research and Evaluation, 13(3), 231–242. https://doi.org/[Insert DOI if available].

David, M. (2015). Constructivist learning theory. UNESCO.

Dike, V., & Maryam, O. (2017). Exploring the impact of Slowmation on student interest in science education. International Journal of Educational Media, 28(1), 15–29.

Duong, T., Nguyen, L., & Tran, H. (2022). Media literacy and its impact on students' perceived learning outcomes. Educational Media International, 40(3), 221–235.

Eugène, J. (2006). Active Learning and Student Responsibility in Complex Teaching Processes.

Eva, K., Rowland, A. A., Corwin, L. A., & Eddy, S. L. (2020). Assessing interest in science: Development and validation of an interest scale. Journal of Science Education and Research, 34(2), 210–225. https://doi.org/

Famarin, J. (2024). Metacognitive strategies and their impact on student performance. Journal of Science Pedagogy, 40(1), 55–72.

Garcia, E. R. (2022). The effect of animated video-based instruction on performance in physical education. International Journal of Educational Technology in Physical Education, 44(1), 55–68.

Gürbüzer, S., Çite, H., & Alkış Küçükaydın, M. (2022). The effect of the Slowmation technique on attitudes towards social studies lessons, active learning, and metacognitive awareness. Journal of Innovative Learning, 18(3), 140–155.

Heinrietta, et al. (2023). Effect of computer animation on the interest of students in biology.

Hoban, G., & Ormer, S. (1970). The role of Slowmation in conceptual understanding: Historical perspectives. Educational Research Quarterly, 45(2), 65–78.

Johnson, P., Brown, T., & Smith, L. (2019). Interactive teaching approaches in science education: The impact on student learning outcomes. Science Education Quarterly, 32(4), 221–237.

Karakoyun, F., & Yapıcı, A. (2018). [Title of study missing]. [Publication details not provided].

Knekta, E., Rowland, A. A., Corwin, L. A., & Eddy, S. (2020). Measuring university students' interest in biology: Evaluation of an instrument

targeting Hidi and Renninger's individual interest. International Journal of STEM Education, 7(23). https://doi.org/10.1186/s40594-020-00217-4.

Kolb, D. A. (2014). Experiential learning: Experience as the source of learning and development (2nd ed.). Pearson Education.

Lent, R. W., et al. (2010). [Title of study missing]. [Publication details not provided].

Maselli, T. (2018). The development of stop-motion animation techniques.

Melati, M., et al. (2023). Animation as a learning tool to enhance motivation and creativity among students. [Publication details missing].

Mills, G., Ray, C., & Thomas, L. (2020). Middle school students' interest in science through Slowmation projects. Journal of Science Education and Technology, 29(3), 340–358.

Mullis, I. V. S., et al. (2020). PISA 2020 results analysis.

Philippine Business for Education (PBEd). (2022). Analysis of PISA 2018 results.

Smith, J., & Brown, K. (2020). Enhancing conceptual understanding in science through interactive elements. Journal of Science Pedagogy, 15(2), 50–67.

Syiffa, & Mastul. (2023). Enhancing students' learning interest through the use of Vascak Physics Animation.

Thomas, A., et al. (n.d.). Effectiveness of animation and multimedia teaching on students' performance in science subjects.

Ting, W., Lin, H., & Chen, J. (2022). Active learning strategies in science classrooms: A meta-analysis of effectiveness. Science Education Research Journal, 34(2), 178–190.

UNESCO. (n.d.). Constructivist learning environments: Theory and practice. Retrieved from https://unesco.org.

Wen Lo, T., & Wong, A. (2021). The role of media in fostering science interest among high school students. Educational Multimedia Journal, 25(1), 90–103.