Edumation: The Development of an Animated Storytelling

Johrene May G. Adil, Monera A. Salic-Hairulla, Angeline P. Dinoro, Vanjoreeh A. Madale, Ariel O. Ellare

Mindanao State University-Iligan Institute of Technology/College of Education, Department of Science and Mathematics Education

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ABSTRACT

This study aimed to develop an animated storytelling instructional material to enhance learners' understanding of the Effects of the Sun to Human Activities, a topic in Grade 4 Science aligned with the Department of Education's Most Essential Learning Competencies (MELCs). The needs assessment involved two teachers and thirty-two learners, gathering insights into their pedagogical approaches, familiarity with animated storytelling, and experiences with multimedia-based learning. Teachers reported using inquiry-based learning, experiential methods, and multimedia, particularly videos, to enhance the teaching process. However, they faced challenges with videos containing excessive information, poor-quality animations, and distracting voice-overs. Despite lacking formal training in animated storytelling, teachers recognized its educational value, noting its ability to engage learners and improve information retention. On the learners' side, all 32 participants reported using videos in science lessons, with a significant portion expressing positive feedback on animated storytelling, describing it as engaging, fun, and helpful in understanding and retaining information. These findings highlight the potential of animated storytelling as a valuable tool for enhancing science education, emphasizing the need for high-quality, well-designed resources that can further enrich the teaching and learning experience.

Keywords: Animated Storytelling, Animation, Videos

INTRODUCTION

Science education has garnered significant attention in the Philippines, as educators strive to enhance their pupils' scientific knowledge and competencies (Faustino et al., 2024). From this viewpoint, science education is the cornerstone for cultivating scientific literacy among students (Permanasari, 2016). Cordon & Polong (2020) stated that scientific literacy is essential for students' educational advancement. Thus, Educators at all educational tiers significantly contribute to students' scientific literacy development (Walag et al., 2022). Therefore, Science, a topic taught in all schools, should facilitate the advancement of scientific literacy (Palines et al., 2021). According to PISA (Program for International Student Assessment), scientific literacy is defined as the capacity of individuals to address science-related issues by applying scientific concepts and functioning as reflective citizens (OECD, 2019). Additionally, a scientifically literate individual can articulate scientific phenomena, evaluate and design research, and accurately analyze data and evidence (DepEd, 2019). Bernardo et al. (2023), stated that Filipino students consistently exhibit poor performance in global evaluations of science literacy, as reaffirmed by the PISA 2018 results, when their average scores ranked second to last among 78 nations. The PISA 2018 results found that Filipino students were among the lowest performers in reading, mathematics, and science, attaining an average score of 340 points in science (OECD, 2019). Moreover, Cabural (2024) indicated that the Philippines had significant challenges in global education assessments in 2022; it was positioned 77th out of 81, raising concerns about its ability to promote scientific literacy and prepare students for 21st-century challenges. The PISA 2022 results also revealed no progress, with a science score of 356 points, much below the international average (Garcia et al., 2024). Furthermore, just 22% of Filipino students achieved at least proficiency level 2 in science, in contrast to the OECD average of 78%, highlighting the urgent need for improved science education (OECD, 2023).

According to several studies, the results of the Programme for International Student Assessment (PISA) highlight the persistent challenges in student performance in the Philippines, particularly in science. Despite various initiatives to improve science education, including preparations for participation in global assessments such as PISA, studies reported that Filipino learners struggle with scientific literacy. This persistent issue points to a critical gap in instructional strategies that effectively engage students and enhance their understanding of scientific concepts. To address this gap, this study aims to develop animated storytelling as a pedagogical tool to improve students' scientific literacy. The study reported that animated storytelling integrates two fundamental components—animated video and storytelling—both of which can enhance student engagement, comprehension, and retention of scientific knowledge. According to Samosa et al. (2021), animated video is a sequence of images, original designs, drawings, illustrations, or computer effects that are made to be eye-catching using any number of artistic styles. On the other hand, Srimala et al. (2023) describe storytelling in digital form as using digital technology to create, transmit, and share stories. Sumi and Nagata (2006) noted that animated storytelling functions by merging animation and dialogue, enhancing students' understanding of the story. Their study indicates that animated storytelling promotes comprehension and facilitates language acquisition by enhancing students' pronunciation.

This study explores the DepEd MELCS for Grade 4 pupils during the fourth quarter, specifically detailing the effects of the sun to human activities (S4ES-IVj-11). Grade 4 was chosen as the target level because, according to Piaget (1952), it is a vital period in children's cognitive growth when they begin transitioning from concrete to more abstract thinking. He also mentioned that this transition makes children more suited to grasp cause-and-effect relationships and provides an ideal opportunity to introduce scientific concepts engagingly and interactively. Additionally, elementary school science instruction strongly influences students' scientific motivation and performance (Eshach & Fried, 2005). This study focuses on Grade 4 to increase students' early exposure to scientific literacy and develop skills needed for higher-level science. This research also supports Sustainable Development Goal 4 (SDG 4), which promotes inclusive, fair, and high-quality education for lifelong learning (UNDP, 2024).

METHODS

Research Design

Following Creswell's (1999) mixed-methods research approach, this study employed both qualitative and quantitative methods for data collection and analysis. A needs assessment was conducted in the initial phase using survey questionnaires administered to Grade 4 Science teachers who were not yet familiar with animated storytelling and to Grade 4 learners who had not yet studied the topic of the effects of the sun to human activities. This assessment aimed to determine the necessity and potential impact of animated storytelling as an instructional tool in science education.

Research Subjects and Participants

The research subjects of this study consisted of Grade 4 learners from Miguel Obach Memorial Elementary School, selected through purposive sampling. The inclusion criteria for participation were as follows: (a) current enrollment in Grade 4, (b) no prior formal instruction on the topic of the effects of the sun to human activities, (c) absence of medical or learning conditions that could impact their ability to learn, and (d) secured parental or guardian consent. Learners were excluded from the study if they (a) had previously received structured instruction on the topic, (b) had medical or learning conditions that could affect comprehension, or (c) lacked parental or guardian consent.

Additionally, the needs assessment phase involved a group of Grade 4 learners from selected public schools in the Division of Iligan City who had not yet studied the effects of the sun to human activities. Exclusion criteria for the needs assessment included (a) Grade 4 learners who did not participate in the survey and (b) those without parental or guardian consent. Moreover, science teachers were excluded if they (a) had less than five years of teaching experience in science or (b) did not actively participate or provide detailed feedback during data collection. By establishing clear inclusion and exclusion criteria, this structured approach ensured the validity and relevance of the study’s findings, thereby strengthening the reliability of the research conclusions.

Data Gathering Procedure (4D Model)

The data-gathering procedure was carried out through a systematically structured process, beginning with a needs assessment conducted during the Define stage of the 4D model. This phase involved two (2) Grade 4 Science teachers and thirty-two (32) Grade 4 learners who had not yet received instruction on the topic of the effects of the sun to human activities. The process progressed through the Design and Develop stages, which included the creation and validation of the animated storytelling intervention and concluded with the Dissemination phase.

Define Phase (Needs Assessment Phase)

The needs assessment phase involved the meticulous adaptation of questionnaires specifically designed for Grade 4 science teachers and Grade 4 learners who had not been exposed to the topic of the effects of the sun to human activities. Subsequently, a modified version of a questionnaire adapted from Salic et al., (2025) was administered, with the knowledge and consent of both the science teachers and learners.

Design and development of an Animated Storytelling

The development of animated storytelling follows a structured approach, beginning with the design phase and then transitioning into the development phase. In the design phase, the SCVAS step-by-step process is to be followed. The script is the first step, outlining the dialogue, narration, and essential content that will guide the animation. Following this, the characters are designed, ensuring that each one fits within the storyline and plays an important role in conveying the educational message. The voiceover is then planned, deciding on the tone, pacing, and emotion to complement the visuals and enhance the audience's understanding. The animations are designed next, focusing on the movement and visual effects that will make the characters and scenes dynamic and engaging. Finally, the storyline is mapped out in the design phase, establishing the sequence of events that will unfold and ensuring it aligns with the educational goals.

In the development phase, the development of animated storytelling takes place. This involves bringing all the design elements together: the script is brought to life through animation, characters are animated with fluid movements, and the voiceover is synchronized with the animation. The animations are finalized, with effects added to enhance the visual experience. The final product is then to be validated by the ICT experts and Science teachers who are experts in the content to be tested and refined to ensure it effectively communicates the intended message and engages the learners.

Data Analysis

Various statistical tools were employed in the data analysis, including the utilization of content analysis to analyze and evaluate the qualitative data from open-ended responses of learners and teachers in identifying the specific insights regarding the Animated Storytelling throughout the needs assessment. This analysis helped highlight specific needs, challenges, and perceptions of animated storytelling as a teaching and learning tool in science education.

RESULTS AND DISCUSSIONS

Needs Assessment for Science Teachers

The needs assessment was conducted with two (2) Grade 4 science teachers to gather insights into their teaching Approaches, problems, familiarity, training, and benefits of Animated Storytelling particularly in teaching the topic of the Effects of the Sun to Human Activities. Table 1 presents an overview of the teachers' responses focused on pedagogical approaches used in teaching science, the video utilized in teaching the topic, and the problems they have encountered in utilizing the video.

Table 1 Summary Responses of the Needs Assessment for Science Teachers

Codes	Mentions	Utterances
Pedagogical Approaches Used in Teaching Science	2	*"I used inquiry-based learning, experiential learning, and the integration of multimedia. I also used video lessons (T1)."* *"Technology integration is helpful in imparting knowledge on the Effects of the Sun to Human Activities to learners using videos in teaching enhances the teaching-learning process (T2)."*
Problems Encountered in Utilizing the Videos	1	*"Some videos have too much information, poor-quality animations and distracting voice-overs (T1)."*
Familiarity with Animated Storytelling	2	*"It is a digital learning with animated characters, visuals, and narration" (T1)."* *"Animated Storytelling in teaching widens the listener/viewer's imagination, as it shows visual effects, leaners will easily understand the story being told (T2)."*
Training on Animated Storytelling	2	*"I havent attended any yet" (T1,T2)."*
Benefits of Animated Storytelling	1	*"Yes! It helps my learners retain information effectively and ignites their interest to watch and learn (T2)."*

Table 1 presents the responses of science teachers towards animated storytelling. Their responses revealed several key codes. In terms of pedagogical approaches, teachers reported using inquiry-based learning, experiential learning, and multimedia integration, particularly video lessons, to teach the topic "Effects of the Sun to Human Activities." Technology played an important role, with YouTube being a primary source of instructional videos. However, teachers encountered challenges such as videos containing too much information, poor-quality animations, and distracting voice-overs. Both teachers expressed familiarity with animated storytelling, defining it as digital learning that features animated visuals, characters, and narration, which help learners better understand concepts and stimulate imagination. Although they had not attended any seminars or webinars on the topic, they acknowledged the educational value of animated storytelling in enhancing learner engagement, supporting information retention, and contributing to meaningful learning experiences. Animated storytelling is seen as a valuable tool for engaging learners and enhancing understanding, despite limited training. This supports the need for a well-designed animated storytelling resource on the Effects of the Sun to improve teaching and learning outcomes. Munawar et al. (2023) revealed that students utilizing digital storytelling or animated storytelling showed better comprehension, involvement, and retention than those taught using conventional techniques. Kartadiwangsa et al. (2024) claim that by allowing students to visualize narratives better and therefore bring stories to life, animation videos can make story lessons more interesting. This supports the need for a well-designed animated storytelling resource to enhance the teaching and learning of the topic *Effects of the Sun to Human Activities*.

Needs Assessment for Grade 4 learners

A total of thirty-two (32) Grade 4 learners from a class also participated in the needs assessment survey. These learners represented a diverse group with varying academic backgrounds, learning abilities, and interests. Their

responses provided valuable insights into their perspectives on the topic of the Effects of the Sun on Human Activities and their preferences for different types of instructional materials. The inclusion of such a diverse group of students ensured that the survey captured a wide range of needs, challenges, and expectations, which were crucial for developing instructional materials that are both effective and engaging for all learners.

Table 2 Summary responses of the Needs Assessment for Grade 4 Learners

Codes	Mentions	Utterances
Pedagogical Approaches Used in Learning Science	32	*"Yes, They used videos from youtube (S1, S2, S3, S4, S5,S6,S7, S8, S9, S10, S11, S12, S13, S14, S15, S16, S17, S18, S19, S20, S21, S22, S23, S24, S25, S26, S27, S28, S29, S30, S31, S32)."*
Experiences in Animated Storytelling	32	*"No (S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, S13, S14, S15, S16)* *-"Yes (S17, S18, S19, S20, S21, S22, S23, S24, S25, S26, S27, S28, S29, S30, S31, S32)."*
Perception towards Animated Storytelling	32	*"Animated Storytelling are amazing (S2,S3,S4,S16, S27, S28,)."* *"Nice to watch (S6,S8)."* *"To retain what you learn" (S1, S7)."* *"It's a story that makes us comfortable (S10)."* *" It is like a show but drawing version(S13)."* *"It is like a show entertaining" (S14, S15,S16)."* *"Stories that are animated" (S18,S20)."* *"It is fun because it helps understand things (S19,S20, S21, S22)."* *" For kids, no age limit (S23)."* *"Describe about the character (S29, S30, S31,S32)."*

Table 2 shows the responses of the Grade 4 learners towards animated storytelling. It revealed that teachers commonly used YouTube videos to explain science lessons, with all 32 respondents confirming the use of such videos in class. Most learners stated that these videos helped them understand the lesson better, highlighting the effectiveness of multimedia in supporting comprehension. When asked about animated storytelling, about half of the learners (S17–S32) reported having watched it during a lesson, while the rest (S1–S16) had not yet encountered it in class. Despite this, students who were familiar with animated storytelling described it positively using phrases such as "amazing," "fun," "nice to watch," and "helps understand things." They associated it with enjoyment, better understanding, and knowledge retention. Nearly all students agreed that animated storytelling makes learning easier and more fun, with only one learner responding otherwise. These findings indicate a strong preference for visually engaging content and suggest that animated storytelling has the potential to enhance student interest, comprehension, and motivation in learning science concepts such as the *Effects of the Sun to Human Activities*. Cognitive Load Theory (CLT) and Multimedia Learning Theory (MLT) help one to appreciate better the value of animated storytelling for Grade 4 students. Developed by

Sweller (1994), CLT suggests that learning materials should be created to maximize relevant cognitive burden and reduce unnecessary cognitive load, hence supporting schema building and meaningful learning. and showing material through coordinated images and narration, animated storytelling achieves this and helps students to concentrate on the fundamental ideas and so lowering superfluous mental strain. Expanded by Mayer (2005, 2009), Multimedia Learning Theory holds that students gain more from information presented using both words and images rather than words alone. Mayer's main ideas—such as the modality principle (using spoken words rather than written text with images) and the coherence principle (removing extraneous information to improve focus)—were matched by the animated storytelling employed in this study. Especially when struggling with scientific concepts like the effects of the sun to human activity, these components enabled students to create mental models more precisely. Moreover, given Piaget's (1970) concrete operational stage, which most elementary pupils fall into, they learn best from concrete, visible representations. Animation helped anchor abstract scientific material in familiar, daily settings, therefore improving understanding and memory. Thus, animated storytelling turns up as a cognitively effective and developmentally appropriate method for improving science literacy among younger students.

Developed Animated Storytelling

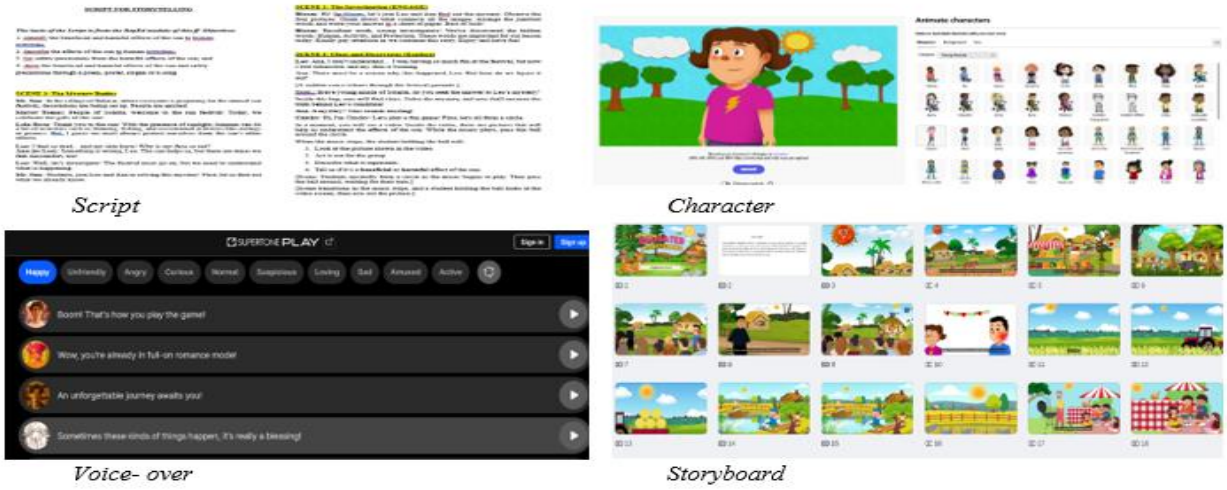

Figure 1 Developed Animated Storytelling on the Effects of the Sun to Human Activities

Figure 1 illustrates the step–by–step process in developing the Animated Storytelling as an instructional material in teaching the topic “The Effects of the Sun to Human Activities”. The researcher made the script, characters, voiceover, and storyboard for the animated storytelling. The material had been face-validated by the research panels and the adviser. Comments and suggestions have been incorporated and considered. The content and technical validation are ongoing, utilizing the Department of Education Learning Resources Management and Development System (LRMDS) among information and communication technology (ICT) experts.

Scan Here

Figure 2 The Face Validated Edumation QR Code

CONCLUSION AND RECOMMENDATION

The findings from both teachers and Grade 4 learners highlight the growing importance of multimedia, particularly video-based instruction, in teaching science concepts such as the *Effects of the Sun to Human Activities*. While YouTube videos are commonly used and generally effective, challenges in content quality and relevance persist. Animated storytelling emerges as a highly promising instructional tool, appreciated for its ability to enhance engagement, simplify complex concepts, and support knowledge retention. Both teachers and learners recognize its potential, despite limited exposure and training. These insights strongly support the development and integration of a well-designed animated storytelling resource tailored to the science curriculum, offering a more effective and enjoyable learning experience for elementary students.

It is recommended that educational institutions, curriculum developers, and teachers invest in the creation and implementation of curriculum-aligned animated storytelling materials, particularly in science. Training programs and professional development opportunities should also be provided to equip teachers with the skills to effectively integrate animated storytelling in their instruction. Furthermore, future research may explore the long-term impact of animated storytelling on students' academic performance and engagement across other subject areas.

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