



Promoting Safety and Awareness Through Animation: Educating Students About the Effects of Heavy Rainfall on Attendance and Academic Performance

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ABSTRACT :

Heavy rainfall can disrupt students' attendance, academic activities, and safety when traveling to and from school. Existing studies have examined the effects of rainfall and flooding on education, disaster preparedness, and the use of animation as an educational medium. This study aims to produce an eight-minute 2D animated educational material for students from the College of Computing and Information Sciences (CCIS) of Systems Plus College Foundation (SPCF), presenting the possible effects of heavy rainfall on attendance and academic performance, along with appropriate safety and preparedness measures. The production will follow a structured animation process involving content research, scriptwriting, concept development, storyboarding, asset creation, animation, audio production, editing, and final rendering. The content will be based on relevant literature concerning rainfall-related educational disruptions, disaster preparedness, and animation in education. The resulting animation is intended to provide accessible information to CCIS students while serving as an additional educational resource for teachers, parents, and guardians.

Keywords: 2D Animation, Heavy Rainfall, Disaster Preparedness, Student Safety, Attendance, Academic Performance, Educational Material

CHAPTER 1

THE PROBLEM AND ITS SETTING

1.1 Introduction

Heavy rainfall is a common weather condition that can affect students' ability to safely and consistently participate in their education. During periods of intense rainfall, students may experience difficulties traveling to and from school, interruptions in classes, and challenges in completing academic activities. Flooding and other weather-related hazards may also expose students to safety risks, particularly when they are required to travel under unsafe weather conditions. As climate related changes continue to influence weather patterns, understanding how to respond to heavy rainfall and other related hazards has become increasingly important for students.

Previous studies have examined the relationship between rainfall, flooding, student attendance, learning outcomes, and educational experiences. Research has shown that unfavorable weather conditions can affect school attendance and may contribute to difficulties in learning and academic performance (Bekkouche et al., 2023; Ngari et al., 2025; Samad, 2025). Flooding can also affect students' well-being and their ability to access and participate in education (Mfon, 2024; Samman et al., 2026). These findings demonstrate that heavy rainfall and related weather hazards are not only environmental concerns but can also affect students and their education.

However, existing research primarily focuses on identifying and discussing the effects of climate-related events rather than presenting these findings through accessible and engaging educational materials specifically designed for students. This study addresses this gap by producing a 2D animated educational material that communicates the possible effects of heavy rainfall on attendance and academic performance while also presenting appropriate safety and preparedness measures.

Therefore, this study aims to produce an animated educational material that can help students, teachers, and parents better understand the risks associated with heavy rainfall. Through animation, the study seeks to present information in a visual, understandable, and engaging format that can serve as an additional educational resource for promoting safety, awareness, and preparedness.

1.2 Background of the Study

Climate-related changes have increasingly become a concern for education systems because weather conditions can influence students' ability to attend school and participate in learning activities. Ngari et al. (2025) reported that rainfall variability can influence primary school attendance, demonstrating how changes in weather can create barriers to students' participation in education. Similarly, Bekkouche et al. (2023) examined the relationship between rainy days and learning outcomes and found that weather conditions can be associated with differences in students' educational performance. The effects of weather are not limited to attendance. Extreme weather conditions may also affect students' academic experiences and performance. Samad (2025) discussed the impact of climate change on students' academic performance, while Bekkouche et al. (2023) found that learning outcomes can vary in relation to rainy weather. These findings suggest that weather-related disruptions may affect students both directly, through difficulties in attending school, and indirectly, through interruptions to their learning experiences.

Flooding presents additional challenges for students. Mfon (2024) examined the implications of flooding on children's well-being and school attendance and emphasized how climate-related events can interfere with access to education. Kubra (2024) also discussed the effects of flooding on students' performance and highlighted the importance of disaster education in helping students understand and adapt to weather-related risks. More recently, Samman et al. (2026) examined the educational experiences of students affected by flood disasters and found that flooding can contribute to cognitive strain and difficulties in students' educational experiences.

Aside from its effects on education, heavy rainfall may also create safety concerns. Students may encounter flooded roads, difficult transportation conditions, and other hazards while traveling to and from school. Rones et al. (2024) emphasized the importance of understanding how people adjust their commuting activities in response to climate-related conditions. This is relevant to students because their daily travel to school can be affected by changes in weather conditions.

As these issues continue to affect education, schools and communities need ways to provide students with information about weather-related risks and appropriate preparedness measures. Reimers and Wang-Aghania (2026) emphasized the importance of preparing education systems for a future affected by climate change, while Ameer and Ghannam (2026) highlighted the need for educational systems in low- and middle-income countries to adapt to changing climate conditions.

Although research has established the effects of rainfall, flooding, and climate related events on education, there remains an opportunity to communicate this information through accessible and engaging educational materials. Animation can combine visual storytelling, characters, illustrations, movement, narration, and other multimedia elements to present information in a way that may be easier for students to understand and remember. Thus, this study proposes the development of an animated educational material focused on heavy rainfall, its potential effects on students' attendance and academic performance, and appropriate safety and preparedness measures.

1.3 Objectives of the Study

The general objective of this study is to produce an animated educational material that promotes awareness of the effects of heavy rainfall on students' attendance and academic performance while providing appropriate safety and preparedness measures.

The specific objectives of this study are the following:

1. **To inform students, teachers, and parents** about the possible effects of heavy rainfall on students' attendance and academic activities.
2. **To raise awareness of potential hazards** associated with heavy rainfall and related conditions that students may encounter when traveling to or from school.
3. **To demonstrate appropriate safety and preparedness measures** that students can follow before, during, and after periods of heavy rainfall.
4. **To present weather-related information through animation** in a clear, accessible, and engaging format that can be used as an additional educational material.

1.4 Scope and Limitation of the Study

Scope of the Study

This study focuses on the production of a 2D animated educational material concerning the effects of heavy rainfall on students' attendance and academic performance. The study specifically targets **students from the College of Computing and Information Sciences (CCIS) of Systems Plus College Foundation (SPCF)** as the primary student audience of the educational material.

The animated material will present information on how heavy rainfall and related conditions may affect students' ability to attend classes, participate in academic activities, and travel safely to and from school. It will also discuss potential hazards associated with heavy rainfall and demonstrate appropriate safety and preparedness measures that students can follow before, during, and after periods of heavy rainfall.

The study will use 2D animation as the primary medium for presenting information in a visual, accessible, and engaging format. The produced material will have a duration of approximately eight (8) minutes and may also serve as an additional educational resource for **CCIS students, faculty members, and parents or guardians** who may use the material for awareness and preparedness purposes.

The study focuses specifically on heavy rainfall and its possible effects on attendance, academic performance, and student safety. It will not cover all types of climate-related hazards and will instead concentrate on information relevant to heavy rainfall and its effects on students within the identified setting.

Delimitations

The study is delimited to **CCIS students of Systems Plus College Foundation** as its primary target student population. It does not include students from other colleges, departments, or institutions as the main target population. The study is also limited to the context of students' experiences and concerns related to heavy rainfall, particularly its possible effects on attendance, academic activities, and safety.

The study focuses on the production of an approximately eight (8)-minute 2D animated educational material and does not attempt to create a weather forecasting, flood prediction, or emergency response system. The animation will provide general safety and preparedness information and is not intended to replace official announcements, school policies, or instructions from local authorities during severe weather conditions.

Furthermore, the study does not directly measure long-term changes in students' actual attendance or academic performance after viewing the animation. Therefore, the study does not claim that the material will directly improve academic grades or attendance. Factors such as students' prior knowledge, level of engagement, access to the material, and individual learning preferences may also influence how they respond to the educational material.

1.5 Significance of the Study

The study may provide benefits to the following groups:

Students

The animated educational material may help students understand how heavy rainfall can affect their attendance, academic activities, and safety. It may also provide them with simple and practical information about how to prepare for and respond to heavy rainfall.

Teachers

The animation may serve as an additional instructional material that teachers can use when discussing weather related hazards, disaster preparedness, student safety, or the effects of climate related conditions on education. Its visual format may also provide another way of presenting information aside from conventional text based materials.

Parents and Guardians

The study may help parents and guardians become more aware of the possible risks students may encounter during heavy rainfall. The material may also support discussions between parents and students regarding preparedness, safe travel, and appropriate actions during severe weather.

Schools and Educational Institutions

The animated material may serve as an additional awareness and educational resource that schools can use during discussions, orientations, preparedness campaigns, or other activities related to weather safety and disaster preparedness.

Future Researchers

The study may provide a reference for future researchers who intend to explore the use of animation and other multimedia materials for communicating climate-related, safety, and educational information. It may also serve as a basis for future studies that evaluate the effectiveness of animated educational materials in improving knowledge, awareness, or preparedness.

1.6 Definition of Terms

For clarity and consistency, the following terms are defined conceptually and operationally as they are used in this study:

- **Educational Material.** In broad terms, these are a variety of tools or resource material that are used by Teachers and Professors for their students to acquire knowledge. But in this study, the educational material that will be referred to is a 2D animation film that will provide teachable and entertaining contents.
- **2D Animation.** Generally, 2D animation is a form of animation in which characters, objects, and visual elements are created and presented within a two-dimensional space. In this study, 2D animation refers to the primary medium used to produce the educational material, including animated characters, environments, objects, movements, transitions, and other visual elements.
- **Heavy Rainfall.** Defined as high amounts of rainfall occurring within a short period of time, which can cause water levels to rise leading to floods. In this study, this is referred to as the factor that affects the students' attendance and academic performance, as well as the phenomenon that the 2D animation aims to promote awareness of.
- **Climate related Changes.** Which refers to a shift in environmental conditions in weather, temperature and habitable grounds. In this Study, its focus is heavy rainfall, this includes typhoons and hurricanes. This will conclude as a cause for the disruptions of students' academics.
- **Awareness.** Generally, awareness refers to having knowledge or understanding of a particular situation, condition, or potential risk. In this study, awareness refers to students' understanding of the possible effects of heavy rainfall, related safety hazards, and appropriate preparedness measures presented through the animated educational material.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction to the Review

This section presents a review of related literature and studies that provide evidence supporting the use of animation as an educational material to teach students and raise awareness about the effects of heavy rainfall. The reviewed literature is organized into three themes: (1) the effects of heavy rainfall and climate-related hazards on education, (2) disaster preparedness and safety awareness among students, and (3) the use of animation and multimedia as educational materials. These themes provide a structured discussion of the effects of weather-related hazards on education, the importance of preparedness and safety awareness, and the potential of animation as a medium for communicating educational information.

2.2 Review of Related Literature and Studies

Effects of Heavy Rainfall and Climate-Related Hazards on Education

Climate-related hazards can affect education through disruptions in attendance, learning outcomes, academic performance, and students' access to educational activities. Bekkouche et al. (2023) found that students exposed to more rainy school days in Sub-Saharan Africa had lower test scores and were more likely to repeat a grade, while teacher absence was also more common in areas experiencing more rainy days. Similarly, Ngari et al. (2025) reported that rainfall variability was associated with increased absenteeism among primary school pupils in Mbeere North Constituency. Together, these findings suggest that changes in rainfall conditions can interfere with consistent participation in education and may also affect the conditions under which learning takes place.

The relationship between extreme rainfall and academic performance has also been observed in other contexts. Ferreira de Lima et al. (2024) found that prolonged periods of high-intensity rainfall had adverse effects on mathematics and language performance among vulnerable urban students in Brazil. Their findings further indicated that the effects varied according to students' characteristics and socioeconomic conditions. Bekkouche et al. (2023) similarly reported differences in learning outcomes associated with rainy school days, while Samad (2025) identified climate-related conditions as a factor that can negatively influence students' academic performance. These studies collectively indicate that weather-related disruptions may affect not only whether students attend school but also their ability to achieve expected learning outcomes.

Flooding can intensify these educational disruptions by affecting transportation, school accessibility, and students' well-being. Mfon (2024) reported that flooding in Bayelsa State, Nigeria, created difficulties in children's school attendance and affected their well-being. Kubra (2024) likewise found that flooding created difficulties in students' educational participation and performance and emphasized the importance of disaster education in helping students adapt to flood-related risks. In a study of flood-affected students in Pakistan, Samman et al. (2026) further found that flood disasters were associated with cognitive strain and difficulties in students' educational experiences. These findings demonstrate that the effects of flooding can extend beyond physical access to schools and can influence students' academic and cognitive experiences.

Evidence from the Philippines further demonstrates the educational consequences of weather-related disasters. Tan and Esporas (2021) found that typhoon disasters disrupted the educational experiences of children in Northern Barangays in the Philippines. Similarly, Lagmay and Rodrigo (2022) found that extreme weather conditions affected students' participation in online learning, showing that educational disruptions can occur even when learning is conducted remotely. Bista (2026) also examined attendance and learning quality in higher education and identified a relationship between student attendance and the quality of learning. Taken together, these studies show that weather-related disruptions can affect education through multiple pathways, including physical access, attendance, participation, and learning experiences.

Overall, the literature demonstrates that heavy rainfall and related hazards can affect students at different stages of the educational process. Rainfall can contribute to absenteeism and changes in learning outcomes, while more severe conditions such as flooding and typhoons can create additional barriers to access, participation, and student well-being. The findings across different countries and educational settings establish weather-related disruption as an important concern for students and educational institutions.

Disaster Preparedness and Safety Awareness Among Students

The effects of weather-related hazards have also led researchers to examine how individuals prepare for and respond to disasters. Disaster preparedness is influenced by how people perceive risks, understand protective actions, and intend to respond to potential hazards. In the Philippine context, Kurata et al. (2023) found that factors associated with risk perception and protective motivation influenced flood disaster preparedness and mitigation behavior in flood-prone communities. Pascual et al. (2024) similarly examined the intention to prepare for flash floods and found that individual perceptions and behavioral factors influence preparedness intentions. Together, these studies suggest that awareness of hazards and perceptions of risk are important components of preparedness.

Student preparedness has also been examined specifically within higher education. Matunhay (2022) investigated disaster preparedness and sensitivity among higher education students, while Malonecio (2023) examined disaster awareness, preparedness, and resiliency preparation among higher education students. Taja-on et al. (2025) further assessed disaster preparedness among college students at San Isidro College. Across these studies, disaster preparedness is treated as an important aspect of student safety and resilience, particularly because college students may encounter different hazards within and outside the educational environment.

Preparedness is also connected to how individuals respond to environmental conditions during their daily activities. Rones et al. (2024) examined climate-related changes in commuting patterns and adaptations and found that people may modify their travel activities in response to changing environmental conditions. For students, commuting can become particularly challenging during periods of heavy rainfall because of flooded roads, transportation disruptions, and unsafe travel conditions. At the institutional level, Daminar and Cabonce (2026) examined the implementation of the Disaster Risk Reduction and Management Act (RA 10121) in schools in Cabadbaran City, Philippines, emphasizing the role of educational institutions in implementing disaster risk reduction and preparedness measures.

The need for preparedness has also been discussed at the broader education-system level. Reimers and Wang-Aghania (2026) emphasized that education systems need to prepare for a climate-changed future by addressing climate-related impacts through broader educational and institutional adaptation. Similarly, Ameer and Ghannam (2026), through a systematic review focused on low- and middle-income countries, highlighted the challenges climate change presents to education systems and the need for educational adaptation. These studies suggest that climate preparedness is not limited to emergency responses but can also involve integrating climate awareness and preparedness into educational practices.

The way disaster information is communicated is another consideration in disaster education. Guo et al. (2023) developed a dynamic visualization based on conceptual graphs to capture and communicate knowledge related to flood disaster education. Their work demonstrates how visual representations can be used to organize and present disaster-related information. Overall, the literature indicates that effective preparedness involves both awareness of potential hazards and knowledge of appropriate responses, while educational institutions can play an important role in developing and communicating this knowledge.

Animation and Multimedia as Educational Materials

The use of animation and multimedia in education has been examined as an alternative way of presenting information through visual and dynamic elements. Kleftodimos (2024) reviewed the use of computer-animated videos in education and examined teachers' experiences with animation creation, demonstrating the application of computer animation across educational contexts. Lin and Yu (2024), through a meta-analysis of instructional video technologies, likewise examined evidence concerning the effectiveness of instructional videos in learning. Together, these studies demonstrate the increasing use of animated and video-based materials as part of educational instruction.

The potential advantages of animation become particularly apparent when learners need to understand information involving movement, change, or processes. Ploetzner et al. (2021) found that animations can be more effective than static pictures when learning involves understanding changes over time. This is complemented by the findings of Praveen and Srinivasan (2022), whose systematic review examined the relationship between animation, visual attention, and cognition. Their review identified evidence concerning the influence of animation on viewers' visual attention and cognitive processing, although they also identified areas requiring further research.

Animation has also been examined in relation to students' motivation and learning outcomes. Utaminingsih et al. (2024) developed a learning management approach incorporating animated videos and reported improvements in students' motivation and learning outcomes. These findings are consistent with the broader evidence concerning instructional videos and demonstrate that animated content can be incorporated into educational settings to support learning. The use of visual approaches has also been explored in disaster education, with Guo et al. (2023) demonstrating the use of dynamic visualization to represent knowledge related to flood disasters.

More specifically, Berliana and Wijayanto (2025) investigated the effectiveness of 2D animation videos for teaching flood disaster mitigation and preparedness to elementary school students. Their results showed that the experimental group achieved an average score categorized as moderate, while the control group scores categorized as low. The difference between the groups was statistically significant. These findings provide direct evidence that 2D animation can be used to improve students' knowledge concerning disaster preparedness.

The existing research therefore shows several benefits and applications of animation as an educational medium. Instructional videos can support learning, animations can represent dynamic processes, and visual approaches can assist in communicating complex information. Research on 2D animation and flood preparedness further demonstrates that animation can be used to communicate disaster-related knowledge effectively. However, the existing studies vary in their educational contexts, target populations, and subject matter, providing opportunities for further application of animation to climate-related educational concerns.

2.3 Conceptual Framework

The conceptual framework of this study proposes that an educational 2D animation about the effects of heavy rainfall on students should be produced through a structured animation production process that combines research-based information, educational content, and visual storytelling. The framework considers the importance of presenting information about heavy rainfall, its possible effects on students' attendance and academic performance, and appropriate safety and preparedness measures in an accessible and engaging animated format.

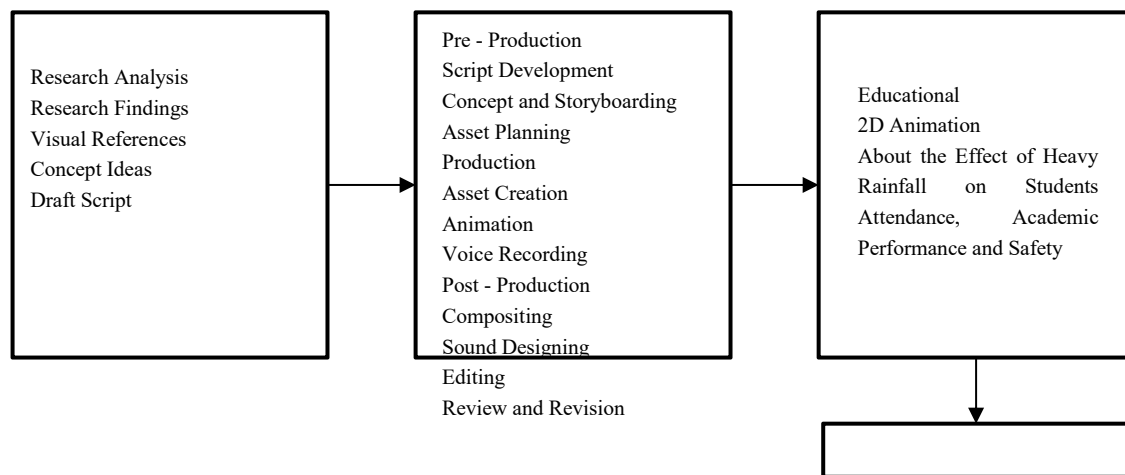
Figure 1*Conceptual Framework*

Figure 1 shows the conceptual framework highlighting the input, process, output, and evaluation of the proposed study. The input consists of the foundational information and resources required to produce the educational animation. These include research findings regarding heavy rainfall and its effects on students' attendance, academic performance, and safety, as well as safety and preparedness information. The inputs also include the visual references, concept ideas, and a draft of the script which provide the necessary foundation for the animation production.

The process follows a three-phase animation pipeline consisting of pre-production, production, and post-production. During pre-production, the research information is organized and developed into the script, concept art, storyboard, and asset plan. The production phase involves asset creation, animation, and voice recording. Finally, post-production involves compositing, sound design, editing, and review and revision to ensure that the animation is complete and presents the intended educational information clearly.

After the initial animation is produced, feedback and evaluation are gathered to determine the effectiveness and quality of the educational material. Feedback may focus on the clarity of the information, understanding of the content, effectiveness of the animation, and suggestions for improvement. The gathered feedback is then used during the review and revision stage to improve the final animation.

The output of the study is a finalized and evaluated educational 2D animation that presents the effects of heavy rainfall on students' attendance and academic performance while promoting safety awareness and preparedness. The completed animation is intended to serve as an accessible educational material for students and may provide a useful basis for future educational animation projects addressing weather-related and climate-related concerns.

2.4 Synthesis

The literature reviewed in this chapter can be synthesized into three interconnected areas. The first area concerns the effects of rainfall and climate-related hazards on education. Studies from different countries consistently demonstrate that rainfall, flooding, and extreme weather can influence attendance, learning outcomes, academic performance, educational participation, and student well-being. The second area concerns disaster preparedness, where studies emphasize the importance of risk perception, awareness, protective behavior, and institutional preparedness. The third area concerns animation and multimedia, where research demonstrates the potential of instructional videos, animation, and visual representations to support learning and communicate complex or dynamic information.

The three areas collectively indicate a progression from identifying the educational effects of weather-related hazards, to understanding the importance of preparedness, to examining methods for communicating this information effectively. However, the reviewed studies generally examine these areas separately. Research on rainfall and education focuses primarily on educational outcomes, while disaster preparedness studies focus on awareness and preparedness behavior. Meanwhile, animation studies examine educational communication and learning, with relatively fewer studies combining animation with climate-related educational concerns for college students.

Berliana and Wijayanto (2025) provide a particularly relevant example by demonstrating that a 2D animated video can improve students' knowledge of flood preparedness. However, their study focused on elementary school students and flood disaster mitigation. The present study extends this area by focusing on heavy rainfall and its possible effects on attendance and academic performance, while incorporating safety and preparedness information into an animated educational material intended primarily for college students.

Overall, the reviewed literature provides evidence that weather-related hazards can disrupt education, that preparedness is an important component of student safety, and that animation can serve as a medium for communicating educational information. These findings provide the foundation for the development of an animated educational material addressing heavy rainfall, educational disruption, and student preparedness.

CHAPTER 3

METHODOLOGY

3.1 Research Design

This study will employ a descriptive-production research design with a quantitative evaluation approach. The descriptive component will involve reviewing and organizing existing literature and information concerning heavy rainfall, its possible effects on students' attendance and academic activities, related safety hazards, and appropriate preparedness measures. The information gathered from the reviewed literature will serve as the basis for determining the content and educational requirements of the animated material.

The production component will focus on the creation of an approximately eight-minute 2D animated educational material intended primarily for students from the College of Computing and Information Sciences (CCIS) of Systems Plus College Foundation (SPCF). The production will involve the development of the concept, scriptwriting, visual planning, storyboarding, creation of assets, animation, audio integration, compositing, editing, and final rendering.

The quantitative component will be used to evaluate the completed animated educational material through a structured evaluation questionnaire. The evaluation will assess selected criteria such as content quality, clarity and understandability, visual and animation quality, educational value, and overall quality of the material. The responses gathered from the evaluation will be summarized using appropriate descriptive statistical measures to determine the overall assessment of the produced animation.

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