The Effectiveness of the PjBL Model Assisted by Story Maps Media: The Creative Thinking Skills of High School Students

Nurul Laeli, Pradika Adi Wijayanto
[1, 2] Program Studi Pendidikan Geografi, Universitas Negeri Semarang, Indonesia

ABSTRACT

Students tend to be passive in expressing new ideas or providing opinions that differ from other students when learning disaster mitigation material takes place. In addition, the learning media used are limited, such as textbooks, YouTube videos, and PowerPoints that do not fully support the development of students' creative thinking skills. Therefore, the study was conducted with the aim of determining the effectiveness of the Project Based Learning model assisted by Story Maps media on the creative thinking skills of grade XI students on disaster mitigation material. This study used a pre-experimental quantitative research type. The sample of this study was class XI E2 at Public High School 1 Purbalingga, with a total of 36 students as the experimental class. The average score of the observation sheet was 79.51%, which means that students' creative thinking skills were "good" in the project-based learning model assisted by Story Maps media on disaster mitigation material. Meanwhile, the average score of the student response questionnaire was 79.61%, so it was concluded that students "agreed" to the learning of disaster mitigation material implemented using the project-based learning model assisted by Story Maps media. This shows that the use of the project-based learning model, assisted by Story Maps media, to develop creative thinking skills in disaster mitigation material is effective in high school.

Corresponding Author:

Nurul Laeli,
Program Studi Pendidikan Geografi, Universitas Negeri Semarang, Indonesia
Email: nurullaeli876@students.unnes.ac.id

1. INTRODUCTION

Education is one of the foundations for individuals to face the various influences of globalization. With this influence, it is hoped that everyone will have the ability to think more critically, rationally, creatively, and innovatively, as well as the ability to adapt to the various demands and circumstances of this century, thereby evolving with the times (Niswah et al., 2024). In 21st-century learning, schools must shift from an educator-centered approach to a student-centered one in accordance with the currently designed curriculum (Pinatih, 2020; Dada et al., 2023).

Soft skills in the 21st century include the 6C skills, which include critical thinking, collaboration, communication, creativity, culture, and connectivity (Anugerahwati,

2019; Hasbi et al., 2019). 21st-century learning strategies focus on developing creative thinking skills and implementing student-centered learning (Dilekçi & Karatay, 2023). This approach is designed to teach skills relevant to the digital age, such as creativity, collaboration, critical thinking, communication, and problem-solving (Wanggi et al., 2023). Students are expected to think creatively in facing various challenges. One way to prepare students to be more creative and innovative and have integrity is by utilizing technological advances to provide more enjoyable learning (Pinatih, 2020; Patra et al., 2022; Dai et al., 2023).

The lack of creative thinking skills in students is currently a problem facing the world of education (Weng et al., 2022; Karunarathne & Calma, 2024). Students are not encouraged to develop their thinking skills during the learning process. It is crucial for students to actively participate in the learning process, utilizing their physical and cognitive intelligence, as well as their emotional intelligence (Estrada et al., 2021; Harahap et al., 2022). The learning process must be systematic, interactive, inspiring, enjoyable, and encouraging, inspiring students to actively participate while providing space for creativity, initiative, and independence (Setyowati et al., 2023).

In a preliminary study with observations conducted with geography teachers at High School 1 Purbalingga, it was identified that several challenges existed in the learning process. Teachers continue to utilize limited learning media in their teaching activities, including textbooks, YouTube videos, and PowerPoint presentations. Their monotonous use, often involving only staring at a screen and lacking interactivity, does not fully support the development of creative thinking skills in geography learning, thus hindering students' creative thinking skills. This effect is evident in learning activities, where students tend to be passive in expressing new ideas or expressing opinions that differ from those of other students.

In previous lessons, particularly on disaster mitigation, teachers used the Problem-Based Learning model with a 5W1H analysis and then practiced it in groups, discussing the stages of natural disaster mitigation: pre-disaster, during, and post-disaster. However, some groups still found similarities in ideas, solutions, and opinions with other groups. This issue was because the learning model focused more on analyzing problems and logical arguments than on encouraging students to explore creative ideas in visual forms. The challenge also arose from teachers' lack of innovation in utilizing and developing digital technology media to support the learning process, especially in fostering students' creative thinking skills in today's era. This impacted students' creative thinking skills, resulting in students' limited exploration of geography material, limitations in creating interactive visualizations, and a lack of innovative ideas.

Determining an appropriate learning model and implementing student-centered learning are the first steps educators must take to achieve learning objectives (Soubra et al., 2022). A learning model is a step-by-step plan established as a guide for educators and students in learning the material (Apriliani et al., 2023). Project-based learning is a learning method that involves observing problems while carrying out projects to gain a deeper understanding of the subject matter. This encourages students to acquire new knowledge, improve thinking skills, and acquire problem-solving skills (Evinsia et al.,

2023). This model has many benefits, including increasing student enthusiasm for learning, increasing peer collaboration, and improving problem-solving skills and students' creative thinking skills (Panjerina et al., 2023). This model will be very interesting in geography learning when used with supporting media such as Story Maps.

The media needed for learning in today's era must be easily accessible to students anytime and anywhere (Sudarmo et al., 2021). Furthermore, the media used must be selected optimally to maximize its use. Therefore, strategies are needed to mitigate existing weaknesses and increase its effectiveness (Wijayanto et al., 2021). Teachers must select learninthat is appropriate for the material being taught; if the learning media does not align with the content being presented, the effectiveness of the classroom learning process may decreaseeffective (Lubis et al., 2023; Asari et al., 2023). Currently, students can learn geography easily using their smartphones and laptops.

Story Maps is a geospatial information system (GIS) application developed by ESRI using the web-based ArcGIS Online platform. Esri Story Maps has the ability to tell stories based on location (Suni & Muis, 2023). Story Maps is an application for presenting stories using maps and various media and narratives. Some of the advantages of Story Maps include a wide variety of basic templates available for use and download via the ArcGIS website (Marta & Osso, 2015). Furthermore, users can use Story Maps free of charge; they simply need to register an account to start using ArcGIS Web. Story Maps also features a widget interface that makes it simple for users to publish and supports ease of use, allowing the public to benefit from the information created (Panjerina et al., 2023).

To address the above description, the use of story maps in the project-based learning model may be a solution to challenges in the learning process. The use of this media and learning model is expected to engage students, generate new, creative ideas in geography learning, and foster their creativity in using digital technology as a learning tool. Furthermore, the use of this media and learning model is also expected to help students understand complex material, particularly disaster mitigation. Based on this description, the purpose of this study was to determine the effectiveness of the project-based learning model, assisted by story maps, on the creative thinking skills of eleventh-grade students in disaster mitigation.

2. METHOD

This research is a quantitative pre-experimental study using a single group of subjects (One-Group Pretest-Posttest Design). There was no control class, but rather one class, which directly served as the experimental class. The population in this study included all eleventh-grade students at High School 1 Purbalingga who were taking geography. The sampling technique used in this study was random sampling. In this case, the researcher randomly selected one class to serve as the experimental class, class XI E2, with 36 students. The research design used is presented below in Figure 1.
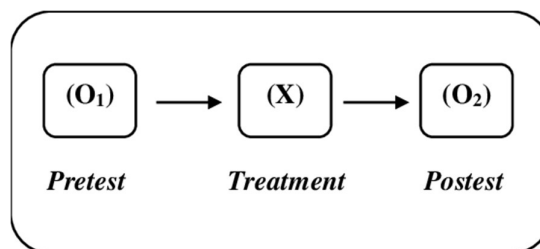
Figure 1. One-Group Pretest-Posttest Design

Data collection techniques in this study used observation sheets and student response questionnaires. Assessment using the observation sheets was based on observations of student attitudes during ongoing learning activities. Each item of the observation sheets was scored between 1 and 4, validated by experts, according to indicators of creative thinking ability: fluency, flexibility, originality, and elaboration. To simplify data presentation, the obtained values are then created into a criteria table through several stages. The following is the score interval for the creative thinking ability observation sheet in Table 1.

Table 1. Interval Score of Creative Thinking Ability Observation Sheet

Criteria	Percentage Interval
Very good	$81,26\% \leq NR \leq 100\%$
Good	$62,51\% \leq NR \leq 81,25\%$
Sufficient	$43,76\% \leq NR \leq 62,50\%$
Poor	$25,00\% \leq NR \leq 43,75\%$

Description:

NR = Average Score

The questionnaire contains 10 statement questions. The purpose of this questionnaire is to determine students' responses to the implementation of project-based learning using the Story Maps media. Answers to the statements are checked against the Strongly Agree (SS), Agree (S), Disagree (TS), and Strongly Disagree (STS) columns. The score obtained is calculated by adding the total scores. To simplify data presentation, the obtained scores are then created in a criteria table through several steps. The following is the score interval for the student response questionnaire in Table 2.

Table 2. Student Response Questionnaire Score Interval

Criteria	Percentage Interval
Strongly agree	$81,26\% \leq NR \leq 100\%$
Agree	$62,51\% \leq NR \leq 81,25\%$
Disagree	$43,76\% \leq NR \leq 62,50\%$
Strongly disagree	$25,00\% \leq NR \leq 43,75\%$

Description:

NR = Average value

This study employed a single analytical technique to assist in analyzing the established data, namely descriptive analysis. Descriptive analysis was used to analyze the data from the observation sheet and questionnaire.

3.   RESULTS AND DISCUSSION
Results

This data was measured using an observation sheet instrument that corresponds to four indicators of creative thinking ability: fluency, flexibility, originality, and elaboration. The creative thinking ability observation sheet data was obtained from the researcher's observations during the learning process using the Project Based Learning model assisted by Story Maps media in each group. Table 3 presents the observation sheet data for each group in the experimental class.

Table 3. Data from the Experimental Class Observation Sheet Results

Interval	Criteria	Frequency	(%)
81,26% - 100%	Very good	1	17 %
62,51% - 81,25%	Good	5	83 %
43,76% - 62,50%	Sufficient	0	0
25,00% - 43,75%	Poor	0	0

In Table 3, the data shows that 17% of the students from one group met the "very good" criteria, achieving scores between 81.26% and 100% in the Project Based Learning model supported by Story Maps. Meanwhile, 83% of the students, comprising five groups, met the "good" criteria, with a score range of 62.51% - 81.25%. The average score for all groups was 79.51%, which means it falls within the "good" criteria, with a score range of 62.51% - 81.25%. Therefore, it can be concluded that students' creative thinking skills are "good" in the Project Based Learning model, supported by Story Maps, on disaster mitigation.

This study also used a student response questionnaire to determine students' responses to the project-based learning model, supported by story maps, on disaster mitigation. Students filled out 10 statements in the questionnaire based on their individual responses. Table 4 presents the results of the student response questionnaire pertaining to the learning process.

Table 4. Data from the Questionnaire on Student Responses to Learning

Interval	Criteria	Frequency	(%)
81,26% - 100%	Strongly agree	12	33 %
62,51% - 81,25%	Agree	23	64 %
43,76% - 62,50%	Disagree	1	3 %
25,00% - 43,75%	Strongly disagree	0	0

Table 4 above shows that 33% of students stated "strongly agree," 64% of students stated "agree," and 3% of students stated "disagree" with the learning that has been implemented using the Project Based Learning model assisted by Story Maps media. The average score of all students was 79.61%, which means it is included in the "agree" criteria with a score interval of 62.51%–81.25%, so it can be concluded that students "agree" with the learning of disaster mitigation material implemented using the project-based learning model assisted by Story Maps media.

The average score derived from the observation sheets across all groups was 79.51%, categorizing it as "good." Consequently, it can be inferred that students' creative

thinking abilities are "good" inside the project-based learning framework utilizing story maps for disaster mitigation. Simultaneously, the mean score from the student response questionnaire was 79.61%, categorizing it inside the "agree" range. Consequently, it may be inferred that students "endorse" the project-based learning paradigm utilizing story maps for disaster mitigation. The findings demonstrate that the application of the Project-Based Learning model with Story Maps is effective in enhancing students' creative thinking abilities about disaster mitigation content.

Discussion

The use of appropriate learning models and media in the 21st century can positively impact students' creative thinking skills. Appropriate learning models and media can help students understand and learn complex material, one of which is disaster mitigation. In this disaster mitigation lesson, students are required to outline and develop a project related to natural disasters using Story Maps.

During the research process, researchers used observation sheets and student response questionnaires. The observation sheets were used to measure students' creative thinking skills, which were structured according to creative thinking ability indicators: fluency, flexibility, originality, and elaboration. The student response questionnaire was used to assess student responses to the learning implemented using the Project-Based Learning model with the aid of Story Maps.

Learning in grade XI E2 using the Project-Based Learning model with the aid of Story Maps was conducted. Researchers guided students to participate in each learning process and deliver learning activities using the Project-Based Learning model with the aid of Story Maps. The implementation of the project-based learning model using Story Maps media involves six stages: defining fundamental questions related to a problem, developing a project design, determining a project timeline, monitoring the project, assessing project results, and evaluating students' experiences in creating the project.

In the first stage, researchers posed fundamental questions regarding a landslide disaster. This aimed to elicit a variety of responses, solutions, and differing opinions from each student. According to Panjerina et al. (2023), these fundamental questions also enabled students to view a problem from different perspectives. Students were able to generate ideas or concepts regarding a given landslide disaster. This stage indirectly applied one indicator of creative thinking skills, namely flexibility.

The second stage involved students developing project designs in groups. The 36 students in Class XI E2 were then divided into six groups of six members, each representing different landslide-affected areas, to create the Story Maps project. During this stage, students discussed the situation with all group members and contributed diverse ideas related to the problem. Students can search for literature from various sources to complete projects assisted by Story Maps media. At this stage, the role of Story Maps media is very necessary for students to design projects according to their creativity. With Story Maps media, students can add text, maps, images, and videos to enrich the project content components to make it more captivating and easier to understand. This can certainly encourage students' creative thinking skills. At this stage,

researchers observed how the process and results of student discussions and the process of compiling the project design are being carried out to measure indicators of students' creative thinking skills, namely fluency thinking and originality thinking.

The next step involves deciding on a completion time for the Story Maps media project under development. Given that the learning process takes place in a single session, the teacher and students reach a consensus to complete the project within 70 minutes. The fourth stage is project monitoring. During this stage, the teacher monitors the progress of each group's project. The teacher will provide assistance if any difficulties or obstacles arise during the Story Maps media project development process. Students begin to develop solutions to problems from various perspectives and design the Story Maps content outline as creatively as possible, adding various supporting components, such as images, maps, and videos, to the project. The more diverse the components included in the project, the more unique it will be. At this stage, the researcher observes each group for indicators of flexibility, originality, and elaboration.

The final stage is project outcome assessment and student experience evaluation. At this stage, each group presents the results of their Story Maps media project in an informative manner. Following the presentations, the teacher and students evaluate the experiences gained while developing the Story Maps project. The researcher then coordinated with the students to fill out a questionnaire to gauge their responses to the learning. Several students stated that learning using Story Maps was enjoyable due to their attractive design and ease of understanding disaster mitigation material. However, due to time constraints, the results of the Story Maps project were less than optimal. The researcher only outlined the buttons and features on the Story Maps, resulting in some students lacking a detailed understanding of their uses and functions.

Based on the comprehensive data processing, the average score from the observation sheets conducted across all groups was 79.51%, which falls within the "good" criteria. Therefore, it can be concluded that students' creative thinking skills are "good" in the project-based learning model using story maps for disaster mitigation. Meanwhile, the average score from the student response questionnaire was 79.61%, which falls within the "agree" criteria. Therefore, it can be concluded that students "agree" with the project-based learning model using story maps for disaster mitigation. These results indicate that the implementation of the project-based learning model using story maps is effective in improving students' creative thinking skills in disaster mitigation material.

This aligns with research conducted by Panjerina et al. (2023), which revealed a significant effect of using the project-based learning model, supported by story maps, on students' creative thinking skills. This model provides students with the opportunity to solve problems, fostering creative ideas and efficient solutions. The project-based learning model teaches students to express opinions, provide solutions, and solve problems from various perspectives within projects, which can increase student enthusiasm and engagement throughout the learning process (Mulyani et al., 2023). Geography learning using the Collaborative Project-Based Learning model creates a collaborative space for students to share new ideas and concepts to solve problems (Nurdin et al., 2021; Andini & Suharto, 2024). Ika et al. (2024) and Puspitaloka et al.

(2024) also stated that the implementation of the PjBL learning model, supported by the Edmodo application, impacted students' creative thinking skills regarding oral diversity as a national identity.

The implementation of the project-based learning model, supported by story maps, encouraged discussions among students, allowing them to exchange ideas for completing projects and solving disaster mitigation problems with diverse solutions. Media Story Maps combine project content components such as text, images, videos, and interactive maps, enabling students to creatively convey ideas about visualizing disaster mitigation projects. This helps students integrate various types of information and present it in an engaging and communicative manner, thereby developing creative thinking skills.

4.   CONCLUSION

The implementation of the project-based learning model, aided by story maps, was effective in improving students' creative thinking skills in disaster mitigation. The improvement was demonstrated by the average score of 79.51% for all groups, which falls within the "good" criteria. With an average score of 79.61%, students agreed with the disaster mitigation material taught using the Project-Based Learning model with Story Maps. Learning using the Project-Based Learning model with Story Maps provides students with the opportunity to collaborate, share innovative ideas and concepts related to disaster mitigation issues, and develop creative and engaging Story Map projects.

As a recommendation for teachers and future researchers, implementing the project-based learning model with story maps requires more time to maximize project results. Future researchers, when using Story Maps, should explain in detail the use and function of the buttons and features within the Story Maps so that students can better understand and utilize them effectively. With sufficient time and detailed student understanding of the media, project visualizations will be more engaging and effective.

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