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Research Article

Design of Google Sites-Based Learning Media Using the Group Investigation Model on Convection Concepts and Its Effect on Students' Learning Outcomes

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Abstract.

This paper aims to design learning media using Google Sites by applying the group investigation (GI) cooperative learning model on convection material for students and to determine the effect of Google Sites-based learning media on improving student learning outcomes. The method used is a literature study that reviews several journals. The results concluded that: 1) Google Sites learning media that applies the GI cooperative learning model are designed by the flow of activities used for students. 2) With an increase in the average score of students from pretest to posttest, the use of Google Sites as a learning media seems to have a good effect on improving student learning outcomes.

Keywords: Google Sites, GI cooperative, convection, learning outcomes

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1. INTRODUCTION

Along with the changing times, education and learning will continue to develop. Today, cognitive abilities are used as a reference in learning, and other abilities, such as personal and social skills, are also used in learning (1,2). These skills include critical thinking, creativity, collaboration and communication (3). As times develop, technology will be more sophisticated, so educators in the current era must have skills in using more sophisticated technology as a learning medium that helps the learning process (4). Learning media is a tool used to support the learning process (5). With this media, the message can be conveyed more clearly to achieve educational goals more effectively and efficiently (6). Learning media will make the teaching process more interesting and increase students' understanding (7).

One of the media that can support learning activities is Google Sites. Google Sites is a service on the Google platform offering features similar to conventional websites (8). Websites created on Google Sites can be set up with a variety of text views and animation, audio, and video elements can be added to enrich their content (9). The Google Sites app also allows students to provide comments and questions to teachers through shared links. This feature facilitates interaction between students and educators and helps assess students' activeness in accessing materials (10,11). Google Sites is a platform that allows you to combine different types of data and information in one place interactively (11). The platform provides features such as explainer videos, attachments, animations, audio, and more, easily customized and shared according to the user's needs (12). Some features of Google Sites include uploading docs, creating a new page, connecting with other Google apps, selecting Background, and others. With these features, users can more easily manage and publish content on the website (13).

There are several advantages to using Google Sites in education, including the fact that the media can be used without downloading an application so that students can access learning directly from their respective devices (14). Multimedia through Google Sites is expected to help students understand the material properly and correctly even though learning is conducted remotely (online). Google Sites can also be accessed through various electronic devices (3). Another advantage is the ease of creating a classroom website. With templates available for different kinds of pages, one can quickly create a classroom site without the need for complicated tech knowledge (15). In addition to the advantages, Google Sites has areas for improvement, namely a less attractive interface and the lack of video-based learning on the platform (16).

In its application to physics subjects, especially in convection materials, this Google Site can help teachers convey learning. Examples include showing videos from YouTube/drive, linking Google Forms, and experimental videos about convection heat transfer.

GI Cooperative learning model is a learning approach in which students can work together collaboratively in groups (17). This model is based on constructivist theory, which emphasises that students develop their understanding through interaction with others and personal experiences (18). In this model, teachers play the role of providers of meaningful learning experiences for students (19). According to Slavin (in (20)), the GI cooperative learning model is divided into six stages, as seen in Table 1.

TABLE 1: The Stages of the GI Cooperative Learning Model.

Stages	Description
I (Determining the theme and dividing students into several groups)	Teachers will divide groups based on the diversity of students, and students will be allowed to participate in the investigation.
II (Planning tasks)	Each group will share a subtheme with all its members. Afterwards, each group will plan what is needed and how to conduct the investigation.
III (Initiating the investigation)	The students will conduct investigations and analyses based on their obtained information.
IV (Preparing analysis results)	Each group will plan a strategy for presenting their tasks.
V (Presenting/presenting the analysis)	Each group will present their task, while the other group will give feedback and follow the course of the presentation.
VI (Evaluation)	Repetition of assignments with previously researched and presented material.

Learning outcomes are a way for teachers to measure students' cognitive abilities (21). Learning outcomes also reflect changes in a person's attitudes, abilities, and behaviours after acquiring learning experiences (22). The factors that can affect student learning outcomes are internal and external factors. Factors that come from within the individual and affect their learning outcomes are called internal factors (23). These factors consist of physiological, psychological, and fatigue factors. Factors that come from outside the individual are called external factors. For example, such as from school, community and family (24). Thus, this paper was written to design Google Sites-based learning media by applying the GI cooperative learning model to convection materials for students and to determine the influence of Google Sites-based learning media on improving student learning outcomes.

The focus questions in this writing are: 1) How can learning media using Google Sites be designed by applying the GI cooperative learning model to the concept of convection for students? and 2) how does Google Sites-based learning media affect the improvement of student learning outcomes?

2. METHOD

The method used in writing this paper is a literature study followed by designing the tools. Various journals and articles have been used as a reference to design learning media using Google Sites by applying the GI cooperative learning model to convection

materials for students. In addition, five prominent journals have been selected for review to determine the influence of Google Sites-based learning media on improving student learning outcomes. Designing media is conducted to complete the result of the studied research. This design also can be used as the referee for others in designing the learning media based on GI.

3. RESULTS AND DISCUSSIONS

The influence of learning media using Google Sites is to improve student learning outcomes. Five research studies have shown that Google Sites has a positive impact on enhancing student performance.

A study conducted by Ningsih & Bukit (3) aims to analyse the influence of using Google Sites as a learning medium on the learning outcomes of high school students. This research was conducted at MAS PAB 1 SAMPALI, North Sumatra. A sample of 30 students was used to collect data on their learning outcomes through pretest and posttest. Students must do 15 multiple-choice questions in Newton's Law material. Data show that in the initial trial (pretest), the lowest score was 10, and the highest score was 90, with the participation of 30 students, so that the average score achieved was 48.33 and the standard deviation was 18.95. Meanwhile, in the posttest, a minimum score of 60 and a maximum score of 30 students were obtained with a sample of 100 students, so the average score obtained was 82.66, and the standard deviation was 11.72. This means that this Google Site learning media positively influences student learning outcomes. This result was also supported by a significance value of 0.879, exceeding the significance limit of 0.005. Thus, using Google Sites as a learning medium has a good effect on improving student learning outcomes.

Another research conducted by Mahardika, et al., 2022 (25) aims to evaluate how effective Google Sites learning media is in improving student learning outcomes. This research was conducted at Al Hidayah Islamic High School, Jember Regency. Before implementing the planned learning method, each student is given a pretest to measure their initial understanding. After that, students receive learning through Google Sites, which contains materials and videos. At the end of the lesson, learners are tested with a posttest to assess how well they have learned using Google Sites. The pretest and posttest consisted of 10 multiple-choice questions with 5 choices on Newton's law material. There were 20 students used as samples. Based on the data, it can be seen that using Google Sites as a learning medium affects student learning outcomes. This

can be evidenced by the increase in the number of students who answered correctly and the decrease in the number of students who answered incorrectly. As a result, a score of 40.5 was obtained as the average pretest score, and a score of 51 was obtained as the average posttest score. This shows that there was an increase in the average score of 10.5. Therefore, this shows that learning media using Google Sites effectively improves student learning outcomes.

Research by Japrizal & Irfan (2021) (26) aims to determine the influence of using Google Sites as a learning medium in online learning. This research was carried out at SMK Negeri 6 Bungo. This study involves comparing learning outcomes between students in the control group and the experimental group through tests on students who participate as respondents. The test is conducted twice: first, the pretest, which is given before the student uses the developed learning media, and second, the posttest, after the student receives learning using the media. Student learning outcomes are assessed through pretest and posttest consisting of 20 multiple-choice questions. Based on the data, the number of students who were sampled in the control class as many as 18 and in the experimental class as many as 17. At the time of the pretest, there were 5 (27.2%) students in the control class who completed it, while in the experimental class, there were 6 (35.3%) students who completed it. At the time of the posttest, where the experimental class was given special treatment, namely using Google Sites as a learning medium, the results were obtained that in the control class, there were 11 (61.1%) students who completed. In the experimental class, 15 (88.2%) students completed it. Based on this data, it can be said that more than 75% of students in the experimental class achieved completeness in learning using Google Sites. These findings show that using Google Sites as a learning medium effectively improves student learning outcomes.

The research conducted by Purba et al. (2022) (27) aims to determine the influence of learning using Google Sites on student learning outcomes. The researcher used 36 students from V SD RK. Budi Luhur, Medan Denai District, Medan, as a sample in this study. This research was carried out by giving students pretest questions at the beginning, and then students were given treatment, namely, online learning materials with Google Sites. Furthermore, post-test questions are given to students. Based on the data, only 8 students (22.22%) were declared complete in doing the pretest, and 28 students (77.77%) were declared incomplete in doing the pretest. The highest score achieved was 71, and the lowest score was 44. Thus, the average score of the pretest students was 61.75, with a KKM of 70. The data show that 34 students (94.44%) are declared complete in doing the posttest, and only 2 students (5.55%) are declared

incomplete in doing the posttest. The highest score achieved is 100, and the lowest score is 60. Thus, the average score of the post-test students was 85.27, with a KKM of 70. A comparison of the average pretest and post-test results shows that the average pretest score is 61.75, and the average post-test score is 85.27, which shows an increase of 23.52 points. This shows that the average posttest score is higher than the average pretest score. Thus, it can be concluded that the use of Google Sites as a learning medium affects improving student learning outcomes for the better.

Research conducted by Hasna & Sahronih (2022) (28) aims to determine how effectively interactive educational media using Google Sites improves student learning outcomes. This research was conducted at SD Negeri Penggung. This research was carried out by providing pretest questions at the beginning to determine the students' basic knowledge, then giving posttest questions at the end after students used Google Sites as a learning medium. Based on the data, it can be seen that the average pretest score of students is 66.72, while the average posttest score of students is 89.14, with a sample of 29 students. The average of these values shows an increase. This means students' average learning outcome score increases after using Google Sites as a learning tool. Thus, Google Sites as a learning medium effectively improves student learning outcomes.

Based on the discussion of the five leading journals used, with the increase in the average score of students from pretest to posttest, it can be said that the use of Google Sites as a learning medium has a good effect on improving student learning outcomes.

The design of learning media uses Google Sites by applying the GI cooperative learning model on the concept of convection. First, the compiler displays a page on the home page as the Google Sites page opener, as seen in **Figure 1**. There is a title and opening sentence to welcome students who open the page. The introduction page has several sub-pages, including Web Usage Guidelines. This page has instructions for using Google Sites so students can follow the instructions to participate in learning.

On the Concept Identity page, the identity of the material is mentioned, where the main sub-subject material presented is Convection with a Scientific learning approach (based on TPACK), the GI Cooperative learning model and the experiment-discussion learning method, as seen in **Figure 2**. Meanwhile, the learning objectives page is displayed so students can understand what goals must be achieved after participating in the lesson.

Figure 1: Home page on the Google Sites.

Figure 2: The Identity Page on Google Sites Website.

The next page is Activity Flow. A PDF file containing a table of learning activities is attached to this page. The table on the page explains in detail how the flow of learning activities is based on the approach, model, and learning method used. Because it uses the GI cooperative model, students at the beginning will be given trigger questions as a prerequisite for concepts, observe the phenomenon and formulate the problem and its hypothesis. Furthermore, students will be divided into GI 1 group and GI 2 group, and each GI group will have different concepts learned. After being divided into groups, teachers will distribute LKPD (Student Worksheets), and students will conduct experiments and discussions according to the LKPD that has been divided. After conducting experiments and discussions, students presented their work in front of the class together with their group members. After the presentation, students discuss the convection material resulting from learning with the teacher.

The last step is for students to take the teacher's evaluation test. A grid file of evaluation questions and assessment rubrics is attached to this page. Students can see this file as a reference before participating in learning activities and working on evaluation questions. The attached file writes down what indicators are assessed, and the scores are listed so that students can pay attention to this rubric well to get the maximum score.

TABLE 2: describes the learning media design by the stages in the GI cooperative model.

Description	Note
Stage I. This stage begins with the presence of observing the phenomenon video, then formulating the problem and the division of the GI group	At the beginning of the activity, students can fill in their attendance information on the Google Form that has been provided. In the observation stage, students observe the video of the phenomenon that has been attached. Then they can describe their thoughts after observing the video on the Google Form that has been provided. At the questioning stage, students can formulate a problem based on the description of the thought and the formulation of the hypothesis and pour it out on the Google Form that has been provided. The next flow is group division. Because this learning uses the GI cooperative learning model, dividing the group into GI 1 and GI 2 groups is necessary. This page contains the Rakkotools website, which can be used to divide groups randomly.
Stage II. At this stage, students divide the subtheme into each group member and plan what to do during the experiment	A demonstration video of the convection heat transfer experiment is attached on the experiment page. This demonstration video is provided to direct students in conducting experiments with the group later
Stage III and IV. At this stage, students begin to conduct experiments and analyse them on the LKPD	At the analysis stage, students conduct experiments and discussions based on the LKPD that has been available on the page according to their group division. LKPD group GI 1 has a concept that is learned: the concept of convection. Meanwhile, LKPD GI 2 has a concept that is learned: the mathematical equation of the heat rate by convection. After working on the LKDP, students can collect the LKPD files that have been worked on on the available Google Form.
Stage V. Students present the results of their work in front of the class with their group members	At the stage of communicating, students can present the results of experiments and discussions in the LKPD in front of the class with their group.
Stage VI. At this stage, students conclude together with the teacher about the convection material and work on evaluation questions so that the teacher knows whether the learning objectives have been achieved or not	After the presentation, students did a short quiz about convection heat transfer on the Kahoot website, which is attached to the page. After the quiz, students conclude the learning material with the teacher with the help of the convection heat transfer material. The PowerPoint is attached to this page. At the end of the lesson, students work on the evaluation questions attached to this page. Answers to the evaluation questions completed by students are collected in the form of PDF files on the Google Form that has been provided. Before the learning ended, the teacher gave a group project assignment. In this group project, students were asked to make an experimental video about convection heat transfer as creatively as possible in groups. The video is then uploaded using the Google Drive link that has been provided.

Kahoot is used in this media for several reasons. Kahoot is an online platform that offers various educational features and can be used as a tool in the learning process (29). Kahoot, as an online learning platform, offers features in the form of quiz games (19). Kahoot provides features such as practice questions, quizzes, pretests, and posttests, which is very interactive when delivering the material. Application Kahoot It can be accessed via mobile phones, making it easier for students and teachers to use it in various situations (30). Use Kahoot It is expected to be able to maintain and increase the willingness and encouragement to learn from students to create an interesting, fun, and boring-free learning atmosphere for students (31). Thus, the author uses Kahoot So that learning becomes more interactive and students do not get bored.

Finally, the closing page has a closing sentence to end the lesson. With a series of activity steps that have been carried out, it is hoped that the learning objectives that were explained at the beginning will be achieved.

4. CONCLUSION

Based on the analysis of the discussion that has been explained, it can be concluded that (1) Google Sites learning media that applies the GI cooperative learning model to convection materials are designed in such a way that the flow of activities used for students is carried out; (2) With the increase in the average score of students from pretest to post-test, it can be said that the use of Google Sites as a learning medium has a good effect on improving student learning outcomes.

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