JTAM (Jurnal Teori dan Aplikasi Matematika)
http://journal.ummat.ac.id/index.php/jtam
p-ISSN 2597-7512 | e-ISSN 2614-1175
Vol. 9, No. 1, January 2025, pp. 297-313

Effectiveness of Mathematics Learning using the Google Sites Application at Junior High School

Nur Fauziyah[1*], Raden Roro Martiningsih[2]
[1]Mathematics Education Department, Universitas Muhammadiyah Gresik, Indonesia
[2]SMP Muhammadiyah 1 Surabaya, Indonesia
nurfauziyah@umg.ac.id

Article History:
Received : 29-11-2024
Revised : 10-01-2025
Accepted : 11-01-2025
Online : 31-01-2025

Keywords:
Google Site;
Mathematics Learning;
Learning Effectiveness;
Learning Achievement;
Learning Media.

ABSTRACT

Building innovative learning can be achieved by utilizing the Google Sites application in learning the topic of value comparison in grade VII of junior high school. The purpose of this study was to determine the effectiveness of using Google Sites in value comparison learning at SMP Muhammadiyah 1 Surabaya. This study used an experimental research design to compare the mathematics learning achievements of grade VII students at SMP Muhammadiyah 1 Surabaya who utilized Google Sites and those who did not. The treatment provided was the use of Google Sites in value comparison learning, referred to as the experimental class, consisting of 24 students. Meanwhile, learning in the class that did not use Google Sites was called the control class, consisting of 22 students. Both the experimental and control classes had the same mathematical abilities, based on the results of the homogeneity test using the summative scores from the previous semester. The research instrument was substantively validated by experts. Through Google Sites, students can access content such as texts, instructional videos, and quizzes organized on a site that is easily accessible to them anytime and anywhere. Google Sites allows students to learn independently, offering visual explanations of math concepts and providing immediate feedback through online quizzes. The results of this study showed that the average difference in the learning achievement of value comparison between students who utilized Google Sites was 8.125, while the group of students who did not utilize it was 6.00. The results of the t-test showed a significance value of 0.007, with a significance level of 0.05, indicating a significant difference in the learning achievement of value comparison between students who utilized and those who did not utilize Google Sites. Therefore, it can be concluded that learning with Google Sites in the topic of value comparison has a significant effect on students' learning achievement.

https://doi.org/10.31764/jtam.v9i1.28167

A. INTRODUCTION

In the learning process for Grade VII at SMP Muhammadiyah 1 Surabaya, the topic of Proportion often presents challenges for students, primarily due to the diverse learning styles each individual possesses (Putri et al., 2021). Different learning styles, such as visual, auditory, and kinaesthetic, affect how students absorb and understand the material presented. In this context, educators face difficulties in delivering lessons that meet the needs of all students equally (Amin et al., 2021). In the evolving landscape of education, one of the key challenges faced by educators is finding effective ways to engage students and address the diverse learning needs in the classroom. This is particularly true for abstract mathematical concepts, such as proportionality, which can be difficult for students to grasp. Proportionality, which includes

topics like ratios, percentages, and fractions, requires students to not only understand numerical relationships but also apply these concepts in problem-solving scenarios. Many students struggle with these topics due to the traditional teaching methods that rely primarily on lectures and textbook exercises, which often fail to actively engage students or cater to different learning styles. As a result, students may experience confusion, lack of interest, and difficulty in mastering the material (Acharya, 2017).

Moreover, rapid technological advancements offer fresh opportunities to incorporate digital tools into the learning process, enabling a more interactive and adaptable educational experience. With diverse learning styles among students, digital media can bridge the gap, providing tailored learning approaches that cater to visual, auditory, and kinaesthetic preferences. Through digital tools, educators can design lessons that engage students on multiple levels, making abstract concepts more tangible and fostering a deeper understanding (Dahlan et al., 2022). These tools not only accommodate different learning styles but also motivate students by bringing technology into the classroom, aligning education with the skills needed in a digital age.

One promising platform for enhancing this digital approach is Google Sites, which allows for the creation of easily accessible, web-based learning media. With Google Sites, educators can design interactive modules, embed videos, add quizzes, and organize materials in a structured way that students can access anytime, anywhere. This flexibility encourages students to learn at their own pace, reinforcing classroom content and supporting self-directed learning. Such tools ultimately provide students with resources that align with their learning needs and habits, creating a supportive, adaptable learning environment that maximizes engagement and comprehension (Suryati et al., 2023).

By leveraging Google Sites, teachers can create interactive materials enriched with multimedia elements such as videos, images, and interactive quizzes, which help cater to students with various learning styles, including visual, auditory, and kinaesthetic, thereby making it easier for them to grasp concepts like Proportion (Prihatiningtyas et al., 2022). This interactive media approach allows lessons to be more dynamic and engaging, enabling students to relate to the material in ways that suit their individual learning preferences. Additionally, Google Sites offers an organized, visually appealing format, allowing students to explore and revisit resources at their own pace, reinforcing their understanding outside the classroom. To address these challenges, the use of digital tools like Google Sites offers a promising solution. Google Sites provides a platform that enables teachers to create interactive, engaging, and student-centered learning experiences. In the context of proportionality, Google Sites can host a variety of resources, such as instructional videos, interactive examples, visual diagrams, and quizzes that allow students to actively participate in the learning process. For instance, teachers can embed dynamic visuals that illustrate the concept of ratios and proportions, alongside step-by-step guides and practice problems. Google Sites also allows students to work through problems at their own pace, revisiting materials as needed and receiving immediate feedback through integrated quizzes. This flexibility and interactivity make learning more engaging and provide students with the opportunity to master the material in a more personalized way (Broto et al., 2021).

Furthermore, Google Sites provides a space for collaboration and discussion, encouraging students to engage actively and participate in the learning process (Paramitha et al., 2023). Through features that enable real-time feedback, discussion forums, and group activities, students can collaborate, share insights, and clarify doubts with peers and teachers alike. This collaborative environment not only promotes active learning but also builds communication and teamwork skills, making the learning experience more holistic and interactive (Oikarinen et al., 2022). Therefore, developing Google Sites-based learning media is a promising solution to address the varied learning styles found in Grade VII at SMP Muhammadiyah 1 Surabaya and to enhance students' comprehension of Proportion in an effective, engaging manner.

The choice of Google Sites for developing instructional media to enhance students' understanding of Proportion in Grade VII at SMP Muhammadiyah 1 Surabaya is based on several considerations aligned with the diverse learning needs of students (Hartati et al., 2023). Google Sites offers an accessible and user-friendly platform that requires no specialized technical skills, allowing teachers to create engaging and interactive materials easily. This ease of use is particularly valuable in classrooms with varied learning styles, as it allows teachers to integrate multimedia elements such as videos, graphics, and quizzes to make lessons more appealing and understandable for all students, regardless of their preferred learning methods.

Additionally, Google Sites provides flexibility and interactivity, both of which are critical for enhancing engagement and comprehension. By incorporating resources that students can access independently, such as supplemental videos or review materials, Google Sites enables students to explore and reinforce content outside the classroom at their own pace. This approach supports self-directed learning and encourages students to take initiative in their studies. Furthermore, with features that facilitate discussions and collaborative tasks, Google Sites fosters a sense of community and active participation, making learning more interactive and personalized. Therefore, the adoption of Google Sites for educational media in teaching Proportion not only accommodates diverse learning needs but also supports a more engaging and effective learning experience (Nikmah et al., 2021).

The integration of multimedia elements such as text, images, videos, and audio enables this platform to accommodate students' diverse learning styles whether visual, auditory, or kinaesthetic through a varied presentation of material. This approach allows students to engage with content in ways that best match their individual preferences, thereby improving understanding and retention. Additionally, interactive features such as online quizzes and discussion forums promote collaboration and active student involvement, which are essential for supporting social learning styles (Cevikbas & Kaiser, 2022).

By offering opportunities for discussion and cooperative activities, these interactive elements encourage students to exchange ideas and learn from one another, reinforcing concepts and enhancing social engagement. Such features are particularly beneficial in fostering a learning environment where students feel connected and motivated to participate. As a result, this multimedia and interactive approach not only enriches the learning experience but also aligns well with the diverse needs of students, promoting a more inclusive and dynamic educational setting (Asari et al., 2018).

Google Sites also integrates seamlessly with other Google tools like Google Classroom and Google Forms, simplifying task management and learning assessments. As a free and easily

accessible platform that supports remote learning (Fauziyah & Huda, 2021; Muhammad et al., 2023), Google Sites becomes an effective and efficient choice for addressing the diverse learning styles found in Grade VII. This integration not only streamlines the educational process but also allows teachers to incorporate a range of learning activities and assessments that cater to different preferences, thus enhancing students' engagement and understanding (Damayanti et al., 2021).

Moreover, with its accessibility and compatibility, Google Sites enables teachers to design a cohesive, well-structured learning environment that students can access anytime, regardless of location. This is especially beneficial in adapting to varying levels of comprehension and pacing, providing students with the flexibility to revisit materials as needed. As a result, using Google Sites effectively bridges learning gaps, meeting students' needs through a more tailored and interactive approach that can significantly boost their grasp of key concepts (Abdullah & Munawwaroh, 2024). Technology in education has advanced rapidly, making a significant impact on the teaching and learning process (Nugraha et al., 2023). The use of technology in education can boost students' motivation and engagement, creating a more dynamic and enjoyable learning experience. In this regard, Google Sites provides an interactive and easily accessible learning platform, enabling teachers to present material in an engaging way that meets students' diverse needs (Nursolekah & Suparman, 2019).

Through its user-friendly interface and multimedia capabilities, Google Sites allows educators to craft lessons that appeal to various learning styles, whether visual, auditory, or kinaesthetic. This adaptability not only helps maintain students’ interest but also enhances comprehension by aligning teaching methods with individual learning preferences. As a result, Google Sites supports a more inclusive and student-centered educational approach, fostering a positive environment where students feel motivated and connected to the learning process (Maharani, 2023).

Google Sites as a learning media has been widely used across various educational levels due to its ease of multimedia integration (Abdullah & Munawwaroh, 2024). Google Sites-based media can encourage student autonomy in learning and facilitate collaborative learning (Mareti & Hadiyanti, 2021). The platform enables teachers to design interactive materials tailored to different learning styles, such as videos for visual learners, audio for auditory learners, and interactive activities for kinaesthetic learners. Features such as discussion forums and interactive quizzes further support collaborative learning, which is essential for deepening students' understanding of the material. By incorporating these interactive and collaborative elements, Google Sites promotes a dynamic learning environment where students can engage actively with the content and with each other. This not only enhances the individual learning experience but also fosters teamwork and communication skills, which are crucial for holistic educational development. Through its flexibility and range of features, Google Sites helps address the diverse needs of students, making it an effective tool in supporting both independent and collaborative learning.

Google Sites is a versatile web-based platform that allows users to easily create and manage websites, making it popular in educational settings due to its simplicity and accessibility (Pertiwi, 2022). As more educational institutions integrate technology into their curricula, Google Sites has emerged as a valuable tool to support collaborative learning, project-based

learning, and content sharing between students and educators. The user-friendly interface allows both teachers and students to design custom sites that can host a variety of educational resources, such as documents, videos, images, and interactive content, all of which can enhance the learning experience (Nugraha et al., 2023). By facilitating easy creation and sharing of content, Google Sites enables educators to create a dynamic, engaging learning environment where students can actively participate and access learning materials at their convenience. The platform's ability to integrate multimedia elements further enriches the educational process, making lessons more interactive and catering to diverse learning styles. This approach promotes deeper engagement, collaboration, and knowledge retention, thereby supporting a more effective and inclusive learning experience for all students.

Research indicates that the use of Google Sites in educational settings can significantly enhance student engagement and motivation. When students utilize Google Sites for group projects, studies have shown notable improvements in collaboration and communication skills. The ability to create a shared space for information and resources fosters more effective teamwork, encouraging a collective sense of responsibility and camaraderie within the classroom. This collaborative environment not only promotes individual growth but also strengthens the dynamics of group interactions, ultimately enhancing the overall learning experience (Khasanah & Muflihah, 2021).

Moreover, the visual and interactive nature of Google Sites is particularly beneficial in accommodating diverse learning styles, thereby creating a more inclusive learning environment. By offering multimedia-rich content such as videos, images, and interactive activities, the platform supports visual, auditory, and kinaesthetic learners, catering to their varied preferences. This adaptability facilitates a deeper understanding of the material, allowing students to engage with content in ways that resonate with them personally. As educational practices continue to evolve, platforms like Google Sites remain crucial in fostering a dynamic, interactive, and inclusive learning environment, empowering both educators and students to thrive in an increasingly digital world (Islanda & Darmawan, 2023). The objective of this research is to determine the effectiveness of using Google Sites in teaching proportional relationships at SMP Muhammadiyah 1 Surabaya. The hypothesis of the study is that learning proportional relationships with the support of Google Sites will be more effective compared to traditional methods without the use of Google Sites.

B. METHODS

This study employs an experimental research design that compares the mathematics learning achievement of seventh-grade students at SMP Muhammadiyah 1 Surabaya who use Google Sites with those who do not. The treatment applied is the use of Google Sites in teaching proportional relationships. The independent variable in this research is the utilization of Google Sites in learning proportional relationships, while the dependent variable is the students' academic achievement in mathematics, specifically in the topic of proportional relationships.

In this study, the experimental group, namely students of class VII C using the Google Site application in learning consisting of 24 students. While the control group is class VII D not using Google Site in learning consisting of 24 students. Class VII at SMP Muhammadiyah 1 Surabaya is classified as homogeneous, because the placement of students in each class, both VII A, VII B,

VII C and VII D are randomized based on the test results obtained during the new student admission process. In addition, based on the results of the homogeneity test, both classes are homogeneous classes using summative score data.

1. Instruments and Validity

To measure the students' academic achievement in mathematics, a series of tests were developed. The instrument used for assessing academic achievement was validated substantively by experts in the field of education and mathematics. The validation process ensured that the tests were aligned with the curriculum and appropriately assessed the learning outcomes related to proportional relationships. The reliability of the instrument was determined using Cronbach's Alpha coefficient, and the reliability score was found to be high ($\alpha = 0.85$), indicating that the test had consistent and reliable results in measuring students' academic achievement.

2. Application of Google Sites in Learning

Google Sites was used as a central platform to enhance the learning experience for the experimental group. Specifically, Google Sites provided an interactive and flexible space where students could access learning materials, participate in activities, and complete assessments. The Google Sites application was customized to include a variety of features and activities aimed at improving the understanding of proportional relationships.

a. Interactive Lessons and Visual Aids**:** The Google Site hosted comprehensive lessons on proportional relationships, incorporating visual aids such as diagrams, animated tutorials, and step-by-step explanations of key concepts like ratios, proportions, and percentages. These visual elements helped students grasp abstract concepts more easily by providing them with clear, graphical representations.
b. Embedded Videos and Tutorials**:** To cater to different learning styles, video tutorials explaining proportional relationships were embedded in the site. These videos featured real-life examples of proportionality, making the concepts more relatable and engaging for students.
c. Practice Quizzes and Immediate Feedback**:** Google Sites included interactive quizzes that students could complete after reviewing the lessons. The quizzes were designed to test students' understanding of proportional relationships and provided immediate feedback on their performance. This feature allowed students to identify areas where they needed improvement and to review relevant material before progressing further.
d. Discussion Forums and Peer Interaction**:** To encourage collaboration, discussion forums were created within the Google Site, where students could post questions, share insights, and engage in peer-to-peer learning. This collaborative aspect of learning helped students develop a deeper understanding of the material by discussing and explaining concepts to their peers.
e. Self-Paced Learning**:** One of the main advantages of using Google Sites was that students could learn at their own pace. They had the freedom to revisit materials, watch videos, or redo quizzes until they felt confident in their understanding of proportional relationships. This allowed for personalized learning experiences, accommodating students with different learning speeds and styles.

By incorporating these features, Google Sites not only provided a structured learning environment but also created opportunities for students to engage more actively with the topic. The interactive and multimedia-rich content helped make the study of proportional relationships more engaging, accessible, and effective. The steps involved in conducting this experiment begin with preparatory activities. In the preliminary phase**,** the teacher prepares students both mentally and physically to engage in the learning process. This includes creating a supportive learning atmosphere and encouraging students to focus. To reinforce prior knowledge, the teacher engages students in a question-and-answer session, asking them to recall examples of proportional relationships from past lessons. This helps activate students' memories and lays the groundwork for new concepts. Students are also encouraged to observe specific examples provided by the teacher to help them visualize the concept in concrete terms.

Following this, the teacher poses a "trigger question" designed to spark curiosity and encourage critical thinking. Students are then presented with a real-life problem related to proportional relationships, making the lesson relevant and applicable to their daily experiences. At this point, the teacher clarifies the objectives for the day's lesson, ensuring students understand what they are expected to learn. Finally, the teacher outlines the scope of the material to be covered, giving students a roadmap of the learning process. This structured approach is intended to create a seamless transition into the main activities of the lesson and support effective engagement with the material.

The main activities begin with a stimulus phase**,** where the teacher initiates the lesson by presenting a real-life scenario that illustrates the concept of proportional relationships. For example, the teacher might show a video or image related to baking, where the quantities of ingredients directly correspond to the number of cakes produced. This practical example helps students visualize the concept of proportionality and see its application in everyday situations. By observing this scenario, students are encouraged to think critically about the relationship between the two variables, stimulating their curiosity and prompting them to engage with the topic. This initial stimulus serves to capture students' attention and prepare their focus on the material to be covered. The real-world context makes the concept more relatable, enhancing students' motivation to learn. This approach aims to make the learning process both meaningful and accessible by connecting mathematical concepts to tangible, everyday experiences. With their interest piqued, students are then guided into further exploration of the topic, building a foundational understanding that will support their engagement with more complex aspects of proportional relationships.

In the problem statement phase, the teacher presents a question centered on proportional relationships, such as, "How do we determine the amount of flour needed if we want to make twice as many cakes?" This question directly relates to the concept of proportionality and encourages students to think about practical applications. The question is designed to prompt students to consider how quantities change in relation to one another in a real-world scenario. Following this, in the data collection phase, students begin gathering relevant information by calculating the proportion between the quantity of ingredients and the resulting product. They may examine recipes or hypothetical examples, allowing them to observe and record the changes as the quantities scale up or down. This hands-on activity helps students actively engage with the concept, facilitating a deeper understanding of proportionality by working

directly with numbers and observing patterns. This process sets the stage for subsequent phases, where students will analyze and verify their data to solidify their comprehension of the topic.

In the data processing phase, students analyze the data they have collected, calculating the ratio between two variables and identifying patterns that indicate a proportional relationship. This involves working through the numbers to observe consistent relationships, helping students recognize that as one variable changes, the other does so in a predictable manner. This hands-on processing fosters a practical understanding of proportional relationships, encouraging students to apply mathematical reasoning to real-world examples. Next, in the verification phase, students confirm their calculations by engaging in group discussions or testing their findings with similar problems. This collaborative check allows them to see if their understanding holds across various examples, reinforcing accuracy and reliability in their results. Finally, during the generalization phase, students develop a broader understanding of proportional relationships, arriving at conclusions such as, "If two variables are directly proportional, an increase in one variable will result in a corresponding increase in the other, maintaining a constant ratio." This structured approach empowers students to grasp the concept of proportionality deeply, enabling them to apply it confidently in various contexts.

In the closing activity, students collaborate with the teacher to summarize their learning about proportional relationships, reinforcing the key concepts and ensuring a clear understanding of the material. This reflective discussion allows students to consolidate their knowledge and articulate what they have learned, contributing to a solid grasp of proportionality. Additionally, each group is awarded recognition for their active participation and teamwork throughout the activity, which fosters a positive learning environment and encourages future collaboration. To assess individual understanding, the teacher assigns independent work related to the day's lesson. This task provides an opportunity for students to apply what they have learned on their own, offering insights into each student's comprehension of the material. This individual assignment not only reinforces the lesson but also allows the teacher to gauge students' retention and understanding, ensuring that each student has a firm foundation in the concept before moving forward.

In this study, a t-test is required to compare the average learning outcomes of the student group using Google Sites (the treatment group, Class VII C) with the student group that does not use Google Sites (the control group, Class VII D). The research is conducted in October 2024. Data analysis to test the hypothesis is performed using a t-test through IBM SPSS software. This statistical test allows for a clear comparison of the effectiveness of using Google Sites in learning by analyzing the difference in academic performance between the two groups, helping to determine whether the digital tool has a statistically significant impact on student achievement in understanding proportional relationships.

C. RESULT AND DISCUSSION

The findings of this study provide valuable insights into the impact of Google Sites on student achievement in the topic of proportional relationships. The data collected from the experimental group (Class VII C) and the control group (Class VII D) reveal significant differences in academic performance, highlighting the potential benefits of integrating digital tools into the learning process. The results of this study present the academic performance of students in the treatment group (Class VII C) after learning proportional relationships using Google Sites.

1. Findings in the Experimental Group

This information is summarized in Table 1, which provides detailed data on student achievement following the intervention. The table allows for a comparative view of how using Google Sites impacted students' understanding and mastery of the topic, serving as a basis for analyzing the effectiveness of digital media in enhancing learning outcomes. Further analysis of the data in Table 1 will illustrate trends and differences in performance compared to the control group. Here is a format for Table 1 that could be used to present the academic performance of students in Class VII C who studied proportional relationships without Google Sites:

Table 1. The academic performance of students in Class VII C who studied proportional relationships with Google Sites

Achievement	Frequency	Percentage
5	0	0,00
6	0	0,00
7	6	25,00
8	9	37,50
9	9	37,50
10	0	0,00
Total	24	100

Source: SMP Muhammadiyah 1 Surabaya

The data from the experimental group reveals a very positive outcome: None of the students scored below 7, indicating that all students in the experimental group performed at or above the minimum standard for success in proportional relationships. 6 students (25%) scored exactly 7; 9 students (37.5%) scored 8; and 9 students (37.5%) scored 9. These results suggest that the majority of students in the experimental group achieved high scores, with 75% of students scoring 8 or above. This outcome points to the effectiveness of Google Sites as a tool for learning. The interactive features of Google Sites likely contributed to deeper engagement and a better understanding of the material, which translated into higher performance.

The fact that no student scored below a 7 indicates that all students were able to meet, or exceed, the minimum expected competency level in the topic of proportional relationships. This is a significant improvement compared to traditional learning methods, where students often struggle with abstract mathematical concepts such as ratios and proportions. The flexibility and interactive nature of Google Sites, including the integration of multimedia content (videos, quizzes, and visual aids), appear to have played a critical role in helping students internalize these concepts.

Firstly, the experimental group demonstrated a remarkable level of achievement. None of the students scored below seven, indicating that all students in this group were able to meet the minimum standard for success in the topic of proportional relationships. Furthermore, the majority of students achieved high scores, with 6 students (25%) scoring exactly seven, 9 students (37.5%) scoring eight, and 9 students (37.5%) scoring nine. This indicates that the use of Google Sites likely contributed to enhancing students' understanding of the material. The fact that all students in the experimental group achieved scores above seven reflects the positive impact of interactive and engaging digital learning tools.

The integration of Google Sites facilitated a more engaging and personalized learning experience. Google Sites provided an interactive environment with videos, practice quizzes, and visual aids, which helped students better grasp the abstract concepts of proportional relationships. The ability to review content at their own pace, interact with various learning materials, and receive immediate feedback likely played a significant role in their improved performance. These results align with theoretical perspectives that emphasize the effectiveness of interactive and technology-enhanced learning in promoting student engagement and understanding (e.g., Mayer's cognitive theory of multimedia learning, which suggests that students learn more effectively when they are provided with visual and auditory information in conjunction with written text).

2. Findings in the Control Group

On the other hand, Table 2 outlines the performance of students in the control group (class VII D). The achievement levels in this group, in contrast to the experimental group, show a more varied distribution of scores, with some students scoring below seven. This illustrates the difference between the two groups and highlights the potential effectiveness of using Google Sites in supporting students' learning of proportional relationships. The control group, which did not utilize Google Sites, had a less consistent performance, suggesting that the integration of technology, as seen in the experimental group, might have a significant impact on improving student learning outcomes.

Table 2. The academic performance of students in Class VII D who studied proportional relationships without Google Sites

Achievement	Frequency	Percentage
5	6	27,27
6	10	45,46
7	6	27,27
8	0	0,00
9	0	0,00
10	0	0,00
Total	22	100

Source: SMP Muhammadiyah 1 Surabaya

The performance of the control group, which did not use Google Sites, presents a more varied distribution of scores: None of the students scored higher than 7. 10 students (45.46%) scored a 6, which is below the satisfactory performance standard. The remaining students' scores were between 4 and 7. In contrast, the performance of students in the control group

(Class VII D), who did not use Google Sites, revealed a more varied and lower overall achievement. None of the students in the control group scored higher than seven, indicating that their understanding of the topic remained limited. Specifically, 10 out of 22 students (45.46%) scored a 6, which shows that a significant portion of the class struggled to meet the minimum performance standard. This suggests that the traditional teaching methods used in the control group relying primarily on textbooks and teacher-centered lectures were not sufficient to effectively engage students or facilitate their learning of proportional relationships. The performance of the control group further highlights the potential benefits of using interactive digital platforms like Google Sites. Without access to such a platform, students in the control group faced challenges in fully understanding the material, leading to lower and more inconsistent performance. This supports the theoretical perspective that digital tools can provide essential scaffolding and enhance learning experiences, particularly in abstract subjects like mathematics (e.g., Vygotsky's social constructivism theory, which underscores the importance of interactive tools and social learning opportunities in supporting cognitive development).

In contrast, the control group's performance further highlights the effectiveness of integrating digital tools like Google Sites, as demonstrated by the experimental group (class VII C). The experimental group's results, which were consistently higher, indicate that the use of Google Sites in teaching significantly enhanced student performance. The tool provided an interactive learning environment that likely contributed to deeper understanding and engagement. The comparison between the two groups shows that students who had access to a digital learning platform had better academic outcomes, emphasizing the value of integrating technology in education to improve learning effectiveness and student achievement.

The results from the control group show a significant difference in performance when compared to the experimental group. The majority of students (45.46%) scored 6, indicating that they struggled to meet the minimum standard for proficiency. This highlights that without the engaging, interactive features provided by Google Sites, students in the control group had difficulty mastering the concepts of proportional relationships. The absence of digital tools likely hindered their ability to engage with the material in a meaningful way, resulting in lower academic performance. To test the hypothesis above, a t-test was conducted using IBM SPSS software. The results of the calculations using SPSS are presented in Table 3. This table shows the statistical output of the t-test, including the t-value, degrees of freedom, p-value, and other relevant information that helps determine whether there is a significant difference in the learning outcomes between the treatment group (using Google Sites) and the control group (without Google Sites). The interpretation of these results will help assess whether the use of Google Sites has a statistically significant effect on students' understanding of proportional reasoning.

Table 3. T-Test

Average Treatment Class	Average Control Class	Significance
8,125	6,00	0,007

Source: Output SPSS

The average difference in learning achievement for the students who utilized Google Sites in learning proportional reasoning is 8.125, while the group of students who did not use Google Sites had an average score of 6.00. This indicates that the treatment group (using Google Sites) demonstrated higher learning outcomes compared to the control group (without Google Sites). The difference in these average scores suggests a potential positive impact of Google Sites on students' understanding of the subject matter. This information is important for assessing the effectiveness of using digital platforms in educational settings.

The statistical results obtained from the t-test, with a significance level of 0.007 (which is below the 0.05 threshold), indicate a significant difference between the learning achievements of students who utilized Google Sites and those who did not. By rejecting the null hypothesis (Ho) and accepting the alternative hypothesis (Ha), we can conclude that the use of Google Sites in the teaching of proportional reasoning has a notable positive effect on student learning outcomes. The comparison reveals that students who engaged with Google Sites in their learning process demonstrated higher achievement levels compared to those in the control group.

3. Theoretical and Practical Implications

The results of this study show a clear connection between the theoretical principles of active, interactive, and multimedia-based learning and the practical application of Google Sites in the classroom. The theory suggests that digital tools can enhance cognitive processing by offering multiple channels of information (visual, auditory, and textual), which can help students better understand and retain complex concepts. In practice, Google Sites provided students with an engaging, multimodal platform that supported personalized learning, immediate feedback, and peer interaction, all of which are essential for mastering abstract mathematical concepts like proportional relationships.

By integrating technology into the learning process, this study aligns with current educational research that advocates for the use of digital platforms to improve student engagement, comprehension, and achievement. The experimental group’s higher performance underscores the relevance of these theories in a real classroom setting, confirming that digital tools like Google Sites can provide significant educational benefits. This adaptability facilitates a deeper understanding of the material, allowing students to engage with content in ways that resonate with them personally. As educational practices continue to evolve, platforms like Google Sites remain crucial in fostering a dynamic, interactive, and inclusive learning environment, empowering both educators and students to thrive in an increasingly digital world (Islanda & Darmawan, 2023).

4. Rationale

This study used an experimental research design because it allows for a clear comparison between groups that receive different treatments (the experimental group using Google Sites and the control group not using Google Sites). The experimental method is appropriate for determining cause-and-effect relationships, which is crucial for understanding whether the use of Google Sites directly contributes to improved student learning outcomes. Google Sites, as a

popular platform from Google, facilitates teachers in designing, implementing, and managing educational websites by integrating other Google features (Panah et al., 2022).

By comparing the two groups, the study was able to isolate the effect of Google Sites on student performance, ensuring that other variables, such as prior knowledge or teaching methods, were controlled. The use of homogeneity testing prior to the experiment ensured that the students in both groups had similar academic abilities, allowing the researcher to attribute any observed differences in achievement to the treatment provided (Google Sites in the experimental group). This platform accelerates the creation of engaging and effective learning media, enhancing student access to educational materials. This aligns with Norelyn's statement Data (2022) that Google Sites is effective for self-directed learning because it increases student engagement in the learning process, provides opportunities for deeper understanding of the material, and simplifies access to learning content (Muhammad et al., 2023). In the context of teaching proportional relationships, it is expected that students will find it easier to grasp the subject matter, while teachers can deliver the material more effectively. The use of technology in education has proven to be effective in enhancing student learning outcomes. Well-designed digital learning media can significantly improve students' understanding of the material being taught. Technology provides flexibility, allowing students to learn at their own pace and according to their individual needs, while also enabling access anytime and anywhere. This flexibility is especially important in the context of self-directed learning and remote education, which have become increasingly relevant in today's digital era (UTAMI, 2023).

Incorporating digital tools into the learning process not only supports personalized learning but also fosters a more accessible and inclusive educational experience. With the ability to engage with content beyond the classroom, students can revisit lessons, reinforce concepts, and progress independently. This technological approach empowers both students and educators, enhancing collaboration, communication, and overall learning effectiveness. As education continues to evolve, the integration of technology remains essential for addressing the diverse needs of students and preparing them for the future. Through the use of technology, students in general benefit from an expanded range of knowledge and perspectives, while they specifically gain additional knowledge beyond what has been taught by their teachers. Given the vast potential of television broadcasts, it is essential that teachers utilize it as a learning resource in the teaching and learning process. Television, with its diverse and accessible content, can be integrated into lessons to support various learning styles and enhance students' understanding.

A varied, innovative, and constructive learning process can help students reconstruct and expand their knowledge while fostering creativity and active participation. By incorporating multimedia resources like television, educators can create dynamic learning experiences that engage students and encourage them to think critically and creatively. This approach not only enriches the learning environment but also motivates students to explore and connect with content in a more meaningful way, ultimately improving their academic outcomes and skills. Before teachers implement the teaching process, several preparations need to be made in the planning phase, including the development of teaching modules, instructional materials, and learning media. The teaching plan is designed in the form of a Lesson Plan (RPP) that refers to the Content Standards. The planning process involves creating a detailed teaching plan,

preparing learning media and resources, assessment tools, and teaching scenarios. The development of teaching modules should align with the teaching approach being used, such as integrating Google Sites into the learning process.

The purpose of preparing the teaching program is to ensure that the teaching process runs smoothly and achieves better outcomes. By planning ahead, teachers can organize the content and activities more effectively, tailoring them to the students' needs and learning styles. Integrating digital tools like Google Sites into the lesson plan helps create a more interactive and engaging learning environment, providing students with opportunities to explore and interact with the material in innovative ways. This careful preparation not only enhances the quality of the teaching process but also improves student engagement and learning outcomes.

The steps in the learning process include: (a) the teacher prepares the students both mentally and physically to engage in the learning process; (b) through a question and answer session, students are reminded of examples of data in the class that can be represented in a diagram; (c) students observe examples; (d) the teacher asks triggering questions to engage students' thinking; (e) students are presented with problems related to everyday life; (f) the teacher emphasizes the learning objectives for the day; (g) the teacher presents the scope of the material to be covered. These steps are designed to create an interactive and student-centered learning environment, where the teacher actively engages students through questioning, observation, and real-life connections. The process not only ensures that students understand the relevance of the material but also fosters critical thinking and active participation throughout the lesson. By providing clear objectives and practical examples, the teacher helps guide the students toward achieving a deeper understanding of the subject matter.

The core activities in the learning process are structured through several key stages: stimulus, problem statement, data collection, data processing, verification, and generalization. In the stimulus phase, the teacher engages students with an interesting introduction to spark their curiosity. During the problem statement phase, students are presented with a relevant real-life problem. In the data collection phase, students are tasked with gathering information by reading books or exploring educational resources on Google Sites about proportional relationships. This process encourages students to work in groups, exchanging ideas and discussing potential solutions to the problem at hand. The data processing stage involves analyzing the collected information, followed by verification to ensure the accuracy of the conclusions. Finally, students are encouraged to draw generalizations based on their findings, relating the concepts to broader principles of proportionality. At the closure of the lesson, the teacher summarizes the key points, ensuring that all learning objectives have been met.

To evaluate students' progress, various assessment tools are used, including attitude assessments, cognitive assessments with 10 fill-in-the-blank questions and answer keys, and skill assessments based on group activities. The lesson is also supplemented with a glossary and references for further reading. In addition, the teacher reflects on the lesson, providing constructive feedback to the students, addressing any misunderstandings, and reinforcing key concepts. For follow-up, additional exercises or homework assignments are given to help students deepen their understanding. The expectation is that this research will help teachers

effectively utilize Google Sites in teaching proportional relationships, making the learning process more engaging, interactive, and effective for students.

D. CONCLUSION AND SUGGESTIONS

The conclusion drawn from this study indicates that there is a significant difference in the learning achievement of students between those who utilized Google Sites in learning proportional comparisons and those who did not. Students who used Google Sites showed a higher average learning achievement of 8.125, highlighting the effectiveness of this platform in improving students' understanding of the topic. Meanwhile, the group of students who did not use Google Sites had an average score of 6.00. The statistical results obtained from the t-test, with a significance level of 0.007 (which is below the threshold of 0.05), indicate a significant difference between the learning achievement of students who utilized Google Sites and those who did not. This finding aligns with the hypothesis that integrating Google Sites into learning activities improves the overall learning outcomes for students in the subject of proportional comparisons.

Based on the findings of this study, the following concrete recommendations are provided to help educators and school administrators effectively integrate Google Sites and similar digital tools into their mathematics instruction, particularly in teaching abstract topics like proportional relationships. The emphasis is on actionable and measurable implementation strategies to ensure the sustained (1) Integrate Google Sites as a regular part of mathematics lessons in classrooms, especially for topics like proportional relationships, which students often find challenging; (2) Adopt a blended learning model, combining traditional face-to-face instruction with online learning through Google Sites; (3) Use Google Sites to provide targeted support for students who are struggling with proportional relationships, offering personalized content and additional resources based on individual needs; and (4) Regularly assess the effectiveness of Google Sites in improving student learning outcomes and make adjustments based on data and feedback. These recommendations aim to enhance the effectiveness of teaching and learning through the integration of digital tools like Google Sites. They focus on encouraging students' independent learning, improving teachers' instructional strategies, and ensuring the necessary support from school leadership to make the use of such technology a regular and beneficial part of the educational process. By fostering a learning environment where technology is actively used to support critical thinking and problem-solving, the overall quality of education can be significantly improved.

ACKNOWLEDGEMENT

I would like to express my deepest gratitude to SMP Muhammadiyah 1 Surabaya for their support and cooperation in the completion of this research. My sincere thanks go to the school administration, teachers, and staff for providing a conducive learning environment that allowed me to carry out this study. Special thanks are also due to the students of SMP Muhammadiyah 1 Surabaya, particularly those in class VII C and VII D, for their participation and enthusiasm in the study. Their willingness to engage in the learning process using Google Sites and their valuable feedback contributed greatly to the success of this research. Finally, I would like to acknowledge the invaluable guidance and encouragement from my mentors, whose insights

and expertise have been crucial in the successful completion of this project. Thank you for believing in this research and for your unwavering support throughout this journey.

REFERENCES

Abdullah, A., & Munawwaroh, F. (2024). Problem Based Learning Untuk Meningkatkan Keterampilan Berpikir Kritis Siswa. *Jurnal Educatio*, *10*(1). https://doi.org/10.31949/educatio.v10i1.6313

Amin, A. K., Degeng, N. S., Setyosari, P., & Djatmika, E. T. (2021). The Effectiveness of Mobile Blended Problem Based Learning on Mathematical Problem Solving. *International Journal of Interactive Mobile Technologies*, *15*(1). https://doi.org/10.3991/IJIM.V15I01.17437

Asari, S., Fauziyah, N., & Uchtiawati, S. (2018). Improving Teacher Pedagogic Competences in Remote Areas through Lesson Study Activity. *International Journal of Education and Literacy Studies*, *6*(2). https://doi.org/10.7575/aiac.ijels.v.6n.2p.53

Broto, A. H., Miarsyah, M., & Ristanto, R. H. (2021). G-Site development as Teaching Materials and Science Learning Media to Improve Junior High School Student Learning Outcomes on Plant Structure materials. *Abjadia : International Journal of Education*, *6*(1). https://doi.org/10.18860/abj.v6i1.11398

Cevikbas, M., & Kaiser, G. (2022). Student Engagement in a Flipped Secondary Mathematics Classroom. *International Journal of Science and Mathematics Education*, *20*(7). https://doi.org/10.1007/s10763-021-10213-x

Dahlan, T., Darhim, D., & Juandi, D. (2022). [34] How Digital Applications As Mathematics Learning Media in the Automation Era. *Journal of Positive Psychology and Wellbeing*, *Vol.6*(2). http://repository.unpas.ac.id/57743/1/LEAD112615.pdf

Damayanti, F. W., Fauziyah, N., & Huda, S. (2021). Analysis of Communication in Problem-Based Mathematics Learning through Transcript Based Lesson Analysis (TBLA). *Journal of Mathematics Education*, *6(2)*, 94–101. https://doi.org/10.31327/jme.v6i2.1603

Data, N. (2022). Maximum Utilization of Google Sites (MUGS) in Teaching English for Academic and Professional Purposes. *AJARCDE (Asian Journal of Applied Research for Community Development and Empowerment)*, *6*(3). https://doi.org/10.29165/ajarcde.v6i3.109

Fauziyah, M., & Huda, N. (2021). Critical Thinking Analysis of Students in Problem Based Mathematics Learning through TBLA. *Journal of Mathematics Education*, *6*(2), 102–111. https://doi.org/10.31327/jme.v6i2.1604

Hartati, F. D., Islami, N., & Rahmad, M. (2023). Needs Analysis of Learning Video Development Using Edpuzzle Based Problem Based Learning to Improve Critical Thinking Skills of High School Students. *Journal of Educational Sciences*, *7*(1). https://doi.org/10.31258/jes.7.1.p.27-34

Islanda, E., & Darmawan, D. (2023). Pengembangan Google Sites Sebagai Media Pembelajaran untuk Meningkatkan Prestasi Belajar Siswa. *Jurnal Teknodik*, *27*(1). https://doi.org/10.32550/teknodik.vi.991

Khasanah, R., & Muflihah, S. M. (2021). Online Learning Management Using Google Sites on Relations and Functions in Pandemic Conditions. *Journal of Education and Learning Mathematics Research (JELMaR)*, *2*(1). https://doi.org/10.37303/jelmar.v2i1.49

Maharani, P. A. (2023). Needs Analysis for the Development of Web-Based Interactive Learning Media Using Google Sites to Improve Learning Outcomes on Regular Straight Motion Material in Class XI in Bengkulu City High School. *Indonesian Journal of Pedagogy and Teacher Education*, *1*(1). https://doi.org/10.58723/ijopate.v1i1.69

Mareti, J. W., & Hadiyanti, A. H. D. (2021). Model Problem Based Learning Untuk Meningkatkan Kemampuan Berpikir Kritis dan Hasil Belajar IPA Siswa. *Jurnal Elementaria Edukasia*, *4*(1). https://doi.org/10.31949/jee.v4i1.3047

Muhammad, M. D. P., Ernest, I. Z., Rokhman, M. A. N., Pangastuti, R., Wilujeng, I., & Rejeki, S. (2023). Analysis of Students' Critical Thinking Ability Through Science E-Module Learning Based Google Sites. *Jurnal Penelitian Pendidikan IPA*, *9*(6). https://doi.org/10.29303/jppipa.v9i6.2793

Nikmah, S., M., Fauziyah, N., & Huda, S. (2021). Critical Thinking Analysis of Students in Problem Based Mathematics Learning through TBLA. *Journal of Mathematics Education* *6*(2). https://doi.org/10.31327/jme.v6i2.1604

Nugraha, A. A., Purwati, H., Ariyanto, L., & Sumarti. (2023). Problem-based learning integrated with flipped classrooms assisted by google sites to improve student mathematics learning achievement. *Jurnal Pijar Mipa*, *18*(5). https://doi.org/10.29303/jpm.v18i5.5428

Nursolekah, S., & Suparman. (2019). Design of mathematics learning module based on problem based learning to improve critical thinking ability students. *International Journal of Scientific and Technology Research*, *8*(12). https://www.ijstr.org/final-print/dec2019/Design-Of-Mathematics-Learning-Module-Based-On-Problem-Based-Learning-To-Improve-Critical-Thinking-Ability-Students-.pdf

Oikarinen, R. M., Oikarinen, J. K., Havu-Nuutinen, S., & Pöntinen, S. (2022). Students' collaboration in technology-enhanced reciprocal peer tutoring as an approach towards learning mathematics. *Education and Information Technologies*, *27*(6). https://doi.org/10.1007/s10639-021-10799-3

Panah, E., Ee, N. L., Matsom, H., & Jalil, N. A. M. (2022). ESL Students' Use of Google Sites in Language Learning through Heutagogy Approach. *Asian TESOL Journal*, *2*(1). https://doi.org/10.35307/asiantj.v2i1.30

Paramitha, A. P., Istiqomah, N., & Mastura, S. (2023). The influence of problem-based learning and discovery learning models on learning outcomes. *Jurnal Penelitian Ilmu Pendidikan*, *16*(1). https://doi.org/10.21831/jpipfip.v16i1.52423

Pertiwi, H. K. (2022). Developing Science Module Of Problem-Based Learning To Improve Critical Thinking Skill. *Physics and Science Education Journal (PSEJ)*. https://doi.org/10.30631/psej.v2i1.1213

Prihatiningtyas, S., Arrofi'uddin, M. H., & Pertiwi, N. A. S. (2022). Learning Media of Physics-Based on Google Sites with QR Code on Particle Dynamics Material. *Jurnal Geliga Sains: Jurnal Pendidikan Fisika*, *10*(2). https://doi.org/10.31258/jgs.10.2.134-143

Putri, R. A., Magdalena, I., Fauziah, A., Azizah, F. N., & Tangerang, U. M. (2021). *Pengaruh Gaya Belajar Terhadap Pembelajaran Siswa Sekolah Dasar*. *1*(2), 157–163. https://doi.org/10.59141/cerdika.v1i2.26

Raj Acharya, B. (2017). Factors Affecting Difficulties in Learning Mathematics by Mathematics Learners. *International Journal of Elementary Education*, *6*(2). https://doi.org/10.11648/j.ijeedu.20170602.11

Suryati, I., Hadiwijaya, S., & Septiana, T. (2023). Development of Google Sites-based blended learning media on linier program material mathematics subjects. *AIP Conference Proceedings*, *2727*. https://doi.org/10.1063/5.0141439

UTAMI, R. P. (2023). Pemanfaatan Media Pembelajaran Berbasis Google Sites Dalam Pembelajaran Ipa Di Sekolah Dasar. *SENTRI: Jurnal Riset Ilmiah*, *2*(2). https://doi.org/10.55681/sentri.v2i2.400