Proceeding – CAMIC

Cirebon Annual Multidisciplinary International Conference (CAMIC 2026)

Systematic Literature Review of Google Sites-Based Digital Teaching Materials for Function Composition in Vocational High Schools

1st Huda
Mathematics Education, Faculty of Science Education
Swadaya Gunung Jati University
Cirebon, Indonesia
huda.122070005@ugj.ac.id

2nd Surya Amami Pramuditya
Mathematics Education, Faculty of Science Education
Swadaya Gunung Jati University
Cirebon, Indonesia
amamisurya@ugj.ac.id

***Abstract*— The development of digital technology has encouraged the use of web-based learning media to improve students' understanding of mathematical concepts. One of the platforms used is Google Sites, which allows the integration of text, images, videos, and interactive exercises in a single learning medium. This article aims to review the literature related to the use of Google Sites in mathematics learning, specifically Function Composition material at the vocational high school level, and analyze its effectiveness on student learning outcomes through pre-tests and post-tests. The method used is a literature study with descriptive analysis of scientific articles, journals, and related publications published between 2019 and 2025. The results of the study show that Google Sites is effective in improving students' conceptual understanding, engagement, and learning motivation, although research focusing on Function Composition material in vocational high schools is still limited. These findings emphasize the importance of appropriate media design, teacher assistance, and systematic learning outcome evaluation. This article provides a basis for the development of digital teaching materials and further research to improve the quality of mathematics learning in vocational high schools.**

Keywords—***Google Sites; literature study; Function Composition***

I. INTRODUCTION

The development of digital technology has brought significant changes to the world of education, including mathematics learning [1], [2]. Students today are accustomed to using digital devices such as smartphones and the internet as part of their daily activities, requiring teachers to provide adaptive, interactive, and easily accessible learning resources [3]. However, in practice, mathematics learning in vocational high schools still faces various obstacles, especially related to the availability of teaching materials, both *offline* and *online*.

This situation has resulted in a low level of conceptual understanding, especially of abstract material such as function composition [4]. This material requires students to understand the concept of functions, the substitution process, and the correct sequence of function mapping. Without structured teaching materials and visual aids, students experience difficulties because they lack guided practice [5].

One solution that can be offered is the development of digital teaching materials based on Google Sites. Google Sites allows the integration of text, images, videos, and interactive exercises in a single platform that is easily accessible without requiring programming skills [6]. Therefore, the development of digital teaching materials based on Google Sites is considered relevant to overcome the limitations of teaching materials and support mathematics learning in vocational schools.

Although many studies have explored the use of Google Sites as a medium for mathematics learning in general, studies specifically targeting the subject of Function Composition for vocational high school students are still very limited. Most of the previous literature focuses on primary or secondary education in general, or on other mathematical topics. This indicates a need to review and analyze the specific use of Google Sites in teaching Function Composition in vocational high schools, thereby providing a more in-depth picture of the effectiveness of this learning medium in the context of mathematics learning at the vocational level.

The scope of this article is limited to the application of Google Sites as a medium for learning mathematics, specifically the subject of Function Composition for vocational high school students. The discussion focuses on how the implementation of

Google Sites affects student learning outcomes as measured by *pre-tests* and *post-tests*, thereby illustrating changes in student abilities before and after using this medium in the learning process. Previous studies have extensively researched the effectiveness of Google Sites in improving mastery of mathematical concepts and other subjects, as well as interactive research based on Google Sites that proves a significant increase in conceptual understanding based on an increase in pretest to posttest scores [7], [8]. However, studies that specifically examine the impact of using Google Sites on Function Composition material for vocational high school students through pretest and posttest data are still rare, so this article reviews the existing literature to identify findings, methodologies, and research gaps in this context.

This literature review article provides important benefits for the development of digital learning content, particularly in the context of using Google Sites for Function Composition material in vocational schools. By summarizing relevant research findings, this article can serve as a practical reference for educators and instructional material developers in designing effective, interactive, web-based learning media that can improve student learning outcomes in a measurable way through pre-tests and post-tests. Previous studies have shown that the use of Google Sites has been proven to improve student learning outcomes in general, based on literature studies conducted in various digital learning contexts [9]. In addition, this type of literature study helps identify best practices, methodological gaps, and research trends, so that future researchers can develop more in-depth studies focused on aspects that have not been widely explored, such as the validity of learning instruments and their impact on specific student competencies. These benefits are in line with the purpose of literature reviews to integrate existing knowledge and open up new research opportunities, so that this article not only provides theoretical insights but also practical contributions to technology-based education [10].

Advances in technology and information have brought about major changes in formal learning practices in schools. Digital learning media are increasingly becoming a necessity to achieve more effective and engaging educational goals for students. One platform that is widely used in digital learning is Google Sites, a simple website creation service that allows educators to present educational material through text, images, audio, and video in an integrated manner. The advantages of Google Sites as a learning medium include ease of use, accessibility without application installation, and the ability to present interactive content that supports various student learning styles [11].

Various studies have shown the effectiveness of using Google Sites in the context of learning. Adzkiya and Suryaman (2021) reported that the use of Google Sites in teaching English to fifth-grade elementary school students had a positive impact on students' interest and comfort in learning, because this medium was able to present material in an interesting and practical way. The results of the study indicate that Google Sites can facilitate the delivery of material in various forms of media, such as colored text, images, and videos, so that students are more interested in participating in learning.

Similar findings were also found in research on the use of Google Sites in other subjects. For example, the study *Interactive Learning Media Using Google Sites to Enhance Students' Understanding of Ratio Concepts in Grade VII* shows that Google Sites can significantly support students' understanding of mathematical concepts; students' responses to the material presented indicate that the majority of students found the material clear and easy to understand, although self-directed learning motivation still needs to be improved through richer interactive features [12].

In addition, other studies emphasize that the application of Google Sites in learning is often used as part of a web-based learning media design developed through instructional design models such as ADDIE. Research *on the Development of Google Sites as a Learning Medium to Improve Student Learning Achievement* shows that Google Sites designed with a systematic approach has the potential to produce valid, effective, and efficient learning media in the context of high school physics learning, with features and navigation that support student learning activities [13].

Other studies show that the Google Sites platform can enhance student creativity and engagement in the basic science learning process in elementary schools through the use of various attractive and interactive multimedia elements. This study shows that the use of Google Sites as a learning medium can stimulate students' creativity in tackling innovative learning tasks [14].

The problems with using Google Sites in learning are not only technical or content-related. Several studies report adoption barriers related to limited access to technology, lack of teacher training, and challenges in designing content that is truly effective for specific learning objectives. A study titled *Interactive Learning Media Using Google Sites to Enhance Students' Understanding of Ratio Concepts in Grade VII* notes that although this platform is effective in delivering material, students' motivation for independent learning still needs to be improved by adding more interesting features.

Based on these studies, two important points emerged as common themes: Google Sites as a web-based learning medium can support interactive learning, and good media design is crucial to its effectiveness in improving student learning outcomes. This is in line with the findings [15] which emphasize the importance of developing innovative learning media to facilitate the improvement of students' mathematical representation skills through content in the form of comics or other visual materials. In the context of mathematics, content presented contextually and visually can help students understand abstract concepts, as demonstrated in the development of mathematics teaching materials.

However, existing literature still tends to test Google Sites at the elementary and junior high school levels or in general subjects, while research focusing on specific mathematics material and vocational high school levels is still relatively scarce. This is acknowledged because the majority of previous studies used Google Sites to deliver linear or routine material, such as English, basic science, or ratio concepts in lower-level mathematics, but there is not much literature that specifically analyzes the use of Google Sites for learning more complex mathematical concepts such as *function composition*. This segment is important because the material requires a higher cognitive learning approach and often poses a challenge for vocational high school students in mastering advanced mathematical concepts.

In addition, many previous studies have used *research and development* designs or case studies in a particular class or school, while analysis of student learning outcomes through pretest and posttest data measured quantitatively, especially for Function Composition material in vocational schools, is still rarely found. In fact, the pretest-posttest method provides strong empirical evidence of the level of change in students' abilities as a result of using certain learning media, so that a literature review covering this aspect will provide a more comprehensive picture of the effectiveness of Google Sites media in vocational mathematics education.

A number of other mathematics education studies show the importance of developing learning media that is appropriate to the characteristics of the learning material itself. For example, study [16] shows that the effective use of digital media can improve junior high school students' understanding of mathematical concepts based on concept understanding analysis; while [17] found that web-based learning can improve students' mathematical power in general. Although these two studies did not explicitly use Google Sites, they provide a basis for the argument that digital learning media designed for a mathematics context has a positive impact on learning outcomes. This reinforces the argument that special consideration should be given to how Google Sites can be optimized for complex mathematics material such as Function Composition in vocational high schools.

In addition to conceptual and cognitive aspects, the literature also shows that the appropriate use of digital learning media can increase student motivation and interest in certain subjects. [18] found that learning media, methods, and parental support influence junior high school students' interest in learning. These findings indicate that the use of digital learning media not only serves as *a means of delivering content*, but also as a tool for developing students' motivation and emotional engagement in the learning process.

Finally, the literature review also found that robust instructional design models such as ADDIE are often used to ensure that the learning media developed are valid, effective, and efficient. This approach guides the design of web-based learning media to suit learning objectives and learner characteristics, and can be evaluated systematically. This shows that in the context of Google Sites research for mathematics learning in vocational schools, the media design validation approach is very important to consider in literature analysis so that the conclusions drawn are more meaningful and can be used as a basis for further research.

II. METHOD

This study uses a literature review method to analyze the application of Google Sites in mathematics learning, specifically in Function Composition material at the vocational high school level. This approach was chosen because it aims to identify findings, best practices, and research gaps from previous studies related to Google Sites-based digital learning media. Research data was obtained from scientific articles, national and international journals, proceedings, and related publications discussing Google Sites, digital learning media, and mathematics learning. The literature focused on the use of Google Sites as a learning medium, its impact on student learning outcomes as measured by pre-tests and post-tests, and the application of mathematics material, particularly Function Composition in vocational high schools.

The articles analyzed were selected based on specific criteria, namely published between 2019 and 2025, having full access or a clear abstract for analysis, focusing on digital learning, interactive learning media, or the use of Google Sites, and having a quantitative, qualitative, or media development research (*R&D*) design. The literature analysis process was carried out in several stages, beginning with the collection of articles using official databases such as Google Scholar and DOI, followed by the selection of articles according to inclusion and exclusion criteria. Next, data extraction was carried out, covering research methods, learning media used, teaching materials, pretest and posttest results, and key findings from each study. The data obtained was then synthesized descriptively by comparing research results, compiling patterns of findings, and identifying research gaps.

With this procedure, the study can describe trends in the use of Google Sites in mathematics learning, the effectiveness of media in improving students' conceptual understanding and learning outcomes, and the challenges found in previous studies. This literature study approach allows researchers to draw conclusions about the effectiveness of Google Sites as a learning medium for Function Composition material in vocational schools while providing a basis for more in-depth further research.

III. RESULTS AND DISCUSSION

A literature review shows that the use of Google Sites as a learning medium has a positive effect on the mathematics

Identify applicable funding agency here. If none, delete this text box.

learning process, although research specifically targeting Function Composition material in vocational schools is still limited. Analysis of various previous studies shows that Google Sites is capable of presenting learning material in an interactive and engaging manner through the integration of text, images, videos, and exercises in a single platform. For example, Adzkiya and Suryaman (2021) reported that the use of Google Sites in teaching English to fifth-grade elementary school students increased students' interest and comfort in learning, making them more active and involved in learning activities. These findings indicate that web-based media can facilitate learning in a more enjoyable way, which can implicitly support the understanding of mathematical concepts when applied to more complex material.

Research by Aulia and Pramuditya (2025) shows that the use of Google Sites in teaching the concept of ratios in seventh grade junior high school significantly improves students' understanding of the concept. Students who learned with Google Sites showed an increase in scores from the pretest to the posttest, indicating that this medium not only presents information but also helps students process and apply the concepts they have learned . These results are in line with the research by Halim and Hadi (n.d.), which emphasizes that systematically designed digital media can improve students' understanding of mathematical concepts and facilitate more independent and focused learning.

In addition to improving conceptual understanding, Google Sites has also been shown to support student motivation and engagement. Laili, Darmawan, and El Yunusi (2024) found that the use of digital learning media, learning methods, and parental support significantly influenced students' interest in learning. In the context of vocational schools, this is important because subjects such as Function Composition require active student involvement in understanding the process of mapping and function substitution. Interactive digital media can be an effective tool for guiding students through problem-solving steps and providing immediate feedback.

However, this literature review also found several challenges in the implementation of Google Sites. Several studies reported obstacles related to limited access to technology, teachers' lack of experience in creating interactive content, and material designs that were not yet optimal for specific learning objectives. For example, the study by Aulia and Pramuditya (2025) emphasizes that even though students are able to understand the material, their motivation for independent learning still needs to be improved through more interesting features and more varied interactive exercises. This shows that the effectiveness of Google Sites is highly dependent on the quality of media design and implementation strategies.

Further analysis shows that most previous studies used quasi-experimental or R&D research designs at the primary to secondary education levels, but few focused on advanced mathematics material such as Function Composition in vocational schools. In fact, this material requires higher abstract thinking and logic skills, so the use of Google Sites as a learning medium in vocational schools requires specific material design, clear learning steps, and pretest and posttest-based evaluation. The study by Dewi and Sulistiowati (2025), which examined the development of mathematical comic media, shows that the presentation of contextual and interactive visual content can improve students' mathematical representation skills. This finding is relevant because it confirms that web-based media such as Google Sites can be adapted to present Function Composition material visually and interactively, making it easier for students to understand abstract concepts.

Based on a synthesis of the literature, several main themes can be identified. First, Google Sites is effective as a digital learning medium that supports the delivery of interactive material, increases student engagement, and facilitates independent learning. Second, student learning outcomes generally improve from pretest to posttest when the media is well designed and integrated with interactive exercises. Third, although effective, this medium requires teacher assistance and proper design in order to optimize student learning outcomes, especially for complex material such as Function Composition. Fourth, there is still a gap in research related to the use of Google Sites for vocational mathematics material in vocational schools, particularly quantitative analysis of changes in student learning outcomes through pre-tests and post-tests.

Overall, these findings confirm that Google Sites has great potential for use in teaching Function Composition in vocational schools. However, its effectiveness is highly dependent on the design of appropriate media, the integration of material that is suited to the characteristics of students' , and systematic evaluation of learning outcomes. Further research is needed to develop optimal implementation strategies, test the validity and reliability of the media, and evaluate its impact on students' mathematical competencies specifically. Thus, this literature study provides a basis for further research to design Google Sites media that is more effective and suitable for mathematics learning needs at the vocational level.

IV. CONCLUSIONS

Based on the results of the literature study, it can be concluded that Google Sites is an effective and interactive digital learning medium to support mathematics learning, especially Function Composition material at the vocational high school level. This medium allows the integration of text, images, videos, and interactive exercises in one platform, thereby improving students' conceptual understanding and engagement. Literature analysis shows that the use of Google Sites generally contributes to improved student learning outcomes, which can be measured by comparing pretest and posttest scores, although its effectiveness is highly dependent on the quality of media design, teaching methods, and teacher guidance.

In addition, the literature review also identified a research gap regarding the application of Google Sites in advanced mathematics material in vocational schools. Most previous studies have focused on primary or secondary education in general, so there is still little research that specifically evaluates the effect of Google Sites on the understanding of Function Composition material through pretest and posttest data. This indicates the need for more in-depth follow-up research, including media validation, instrument reliability, and analysis of the impact on students' mathematical competence specifically.

Thus, this article not only provides an overview of the effectiveness of Google Sites as a learning medium, but also provides a basis for the development of digital teaching materials and further research to improve the quality of mathematics learning in vocational schools.

REFERENCES

[1] F. Dwi Lestari Pendidikan Matematika and U. Sultan Ageng Tirtayasa, "STUDI LITERATUR: PENGARUH MEDIA DIGITAL PEMBELAJARAN TERHADAP HASIL BELAJAR MATEMATIKA," *SCIENCE : Jurnal Inovasi Pendidikan Matematika dan IPA*, vol. 5, no. 2, 2025, [Online]. Available: https://jurnalp4i.com/index.php/science

[2] N. Romadhon Ardyan, "Aksioma: Jurnal Matematika The Role of Digital Technology in Mathematics Learning and its Impact on Learning Concepts," 2024, doi: 10.62872/d83tws09.

[3] R. Puji Utami, "PEMANFAATAN MEDIA PEMBELAJARAN BERBASIS GOOGLE SITES DALAM PEMBELAJARAN IPA DI SEKOLAH DASAR," 2023.

[4] A. Geno and B. Triandini, "Pembelajaran Pemahaman Konsep Fungsi Komposisi," 2024.

[5] N. Elleshe Kurniawaty, S. Utaminingsih, P. Studi Magister Pendidikan Dasar Fakultas Keguruan Dan Ilmu Pendidikan Unviersitas Muria Kudus, and P. Matematika Fakultas Keguruan Dan Ilmu Pendidikan Unviersitas Muria Kudus, "Efektifitas penerapan LKS dengan pendekatan open ended untuk pembelajaran penguasaan konsep matematika."

[6] D. S. Adzkiya and M. Suryaman, "Penggunaan Media Pembelajaran Google Site dalam Pembelajaran Bahasa Inggris Kelas V SD," *Educate : Jurnal Teknologi Pendidikan*, vol. 6, no. 2, p. 20, Jul. 2021, doi: 10.32832/educate.v6i2.4891.

[7] R. Munawirah and S. Sahala Sitompul, "THE EFFECTIVENESS OF GOOGLE SITES ON THE CONCEPT MASTERY OF HIGH SCHOOL STUDENTS."

[8] H. Johdi and S. Ayub, "Indonesian Journal of STEM Education The Effectiveness of Interactive Google Sites-Based Learning Media on Students' Conceptual Understanding".

[9] H. Sapulete *et al.*, "Efektivitas Penggunaan Media Google Site dalam Meningkatkan Hasil Belajar Peserta Didik," vol. 5.

[10] D. Strategi, P. Shelty, D. M. Sumual, S. S. Y. Liow, and K. Jhony, "IMPLEMENTASI PEMBELAJARAN BERBASIS TIK DALAM PENDIDIKAN: STUDI LITERATUR TENTANG MANFAAT."

[11] D. S. Adzkiya and M. Suryaman, "Penggunaan Media Pembelajaran Google Site dalam Pembelajaran Bahasa Inggris Kelas V SD," *Educate : Jurnal Teknologi Pendidikan*, vol. 6, no. 2, p. 20, Jul. 2021, doi: 10.32832/educate.v6i2.4891.

[12] G. P. Aulia and S. A. Pramuditya, "Interaktif Pembelajaran Media Menggunakan Google Situs untuk Meningkatkan Pemahaman Siswa tentang Konsep Perbandingan di Kelas VII," 2025. [Online]. Available: www.DeepL.com/pro

[13] E. Islanda and D. Darmawan, "Hal 51-62 Pengembangan Google Sites Sebagai Media Pembelajaran untuk Meningkatkan Prestasi Belajar Siswa The Development of Google Sites as an Instructional Media to Enhance Students' Learning Achievement," 2023.

[14] S. Dwi Agustina, A. Shidiq, and N. Kholik, "Using Google Sites as Science Learning Media to Increase Elementary School Student Creativity," 2023.

[15] R. A. Dewi and D. L. Sulistiowati, "Pengembangan Media Pembelajaran Komik Matematika Berbasis Cerita Petualangan untuk Memfasilitasi Kemampuan Representasi Matematis Siswa," *Jurnal Ilmiah Matematika (JIMAT)*, vol. 6, no. 1, pp. 220–233, Jun. 2025, doi: 10.63976/jimat.v6i1.871.

[16] A. Halim and S. Hadi, "Analisis Efektivitas Penggunaan Media Digital dalam Meningkatkan Pemahaman Konsep Matematika Peserta Didik Kelas VII SMP Negeri 275 Jakarta".

[17] B. Setiawan and N. Sopia, "Development of Web-Based Mathematics Learning to Improve the Mathematical Power," Online, 2022. [Online]. Available: http://ejournal.umm.ac.id/index.php/MEJ

[18] N. Laili, D. Darmawan, and M. Y. M. El Yunusi, "PENGARUH MEDIA PEMBELAJARAN, METODE PEMBELAJARAN, DAN DUKUNGAN ORANG TUA TERHADAP MINAT BELAJAR SISWA SMP BUANA WARU SIDOARJO," *Khazanah Pendidikan*, vol. 18, no. 2, p. 260, Sep. 2024, doi: 10.30595/jkp.v18i2.21824.