Pedagonal : Jurnal Ilmiah Pendidikan
Vol. 07, No. 02, Oktober 2023, pp. 92~104
ISSN: 2550-0406, DOI: 10.55215/pedagonal.v7i2.8843

The Potency of Google Sites to Enhance Students' Performance in Research Skills

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Article Info

Article history:

Received Sep 10, 2023
Revised Oct 24, 2023
Accepted Oct 26, 2023

Keywords:

Research skills
Project-based learning
Learning technology
21st century skills
Google sites

ABSTRACT

This study aimed to determine high school students' perceptions of using Google Sites while improving research skills. How do students feel about using Google Sites for research learning regarding utility, ease of use, attitude, and intention to use? This article takes the initiative to explore the potential of the Google site to help students develop and retain research skills in planning, preparing, and writing research methods among senior high school students, especially related to finding information skills. The research used a descriptive qualitative approach, and the research subjects were 125 students of class XI and three Biology teachers who carried out research-based learning activities. In this study, a questionnaire survey was employed using a 5-point Likert scale, including perceived usefulness, perceived ease of use, attitude, and intention to use. The survey is in a Google form and shared via WhatsApp. According to the results of the study, Google Sites helped improve the abilities of students in research skills, especially in finding information from reliable sources. The collaboration between teachers and students in exploring this user-friendly platform fosters an environment of enthusiasm and confidence, paving the way for an enriched educational journey empowered by technology.

Introduction

In the 21st century, students need a wide range of skills to do well in a world that is getting more complicated and linked. Beyond academic skills and subject knowledge, noncognitive skills are now considered essential to a student's overall development (Stehle & Peters, 2019). (Indira et al., 2020; Teo et al., 2021) The 21st century is also marked by fast technological progress, much knowledge, and complex global problems. In this situation, it has become increasingly important for students to learn how to study. Developing students' research skills in education is meant to give them the tools they need to learn a wide range of skills, such as (a) understanding how scientific knowledge is gained in different fields (and what role specific ideas and methods play in this), and (b) evaluating the validity and usefulness of scientific claims, methods, and ideas (Opitz et al., 2017).

Research skills cultivate cognitive and noncognitive talents to prepare students for modern-day issues and equip them to navigate and critically assess information, solve problems, and make informed decisions (Stehle & Peters, 2019; Van et al., 2020). These competencies are required for academic success, career development, and involvement in a knowledge-based society. One widely recognized framework is The Willison Research Skills Framework, developed by Willison and O'Regan (2007), which outlines a set of research skills essential for undergraduate students. It consists of six interconnected facets that encompass various aspects of the research process, including (1) Defining the Research Question, (2) Finding information, (3) Critically Evaluating Information, (4) Managing Information, (5) Applying Ethical Practices, and (6) Communicating and Using information.

Previous studies indicate that students confront various problems when acquiring research abilities. One big challenge is information overload. For students, the amount of knowledge available might be daunting. Sifting through massive amounts of data, publications, and resources can be difficult and time-consuming to obtain valuable and reputable information (Patricio, 2022). The situation is worsening since many students may need more ability to browse and assess information sources (Churchill, 2020). They may need help to distinguish between reliable and untrustworthy sources, critically analyze material, and appropriately cite and reference their sources (Dumitru, 2020; Churchill, 2020). Teachers must provide rigorous direction and assistance for pupils in developing information literacy abilities and teaching critical evaluation procedures (Churchill, 2020). Unfortunately, with a crowded curriculum and varied academic demands, teachers may struggle to find enough time to teach and help students through the research process (Maddens et al., 2020).

As students become more reliant on online educational resources, educators have begun investigating innovative ways to enhance their instructional strategies. Referring to Cognitive load theory states that collaboration work or project work could indeed have a higher cognitive load that can inhibit students' performance. Working memory capacity and time constraints are important factors in cognitive load. Costley & Fanguy (2021) discuss the limited capacity of working memory and the three types of cognitive load imposed on it: extraneous, germane, and intrinsic. These references emphasize that collaboration work can increase the cognitive load by imposing extraneous and germane cognitive load, especially when there are multiple novel and interacting information elements to be processed simultaneously (Klepsch & Seufert., 2020; Costley & Fanguy, 2021). Digital platforms can help reduce the extraneous load by providing a more organized and structured learning environment (Skulmowski & Xu., 2021). Digital platforms can streamline learning by presenting information clearly and concisely, eliminating unnecessary distractions or cognitive overload. This reduction in extraneous load allows learners to focus more on the relevant content and tasks, enhancing their learning experience (Klepsch & Seufert., 2020; Skulmowski & Xu., 2021)

One proposed approach to manage the student's cognitive load in project learning is Utilizing technology's capabilities to enhance and support students' research process. According to Lestari (2020), explaining the purpose of using ICT can pique students' interest and motivate them to learn. Google Sites-delivered web-based instruction can facilitate learning on a deeper level by serving as an efficient revision tool. Google Sites is a user-friendly website creation tool that enables educators to design visually enticing and interactive web pages. Teachers can provide students with a comprehensive and engaging online resource for developing research skills. Google Sites provides educators with various features, including multimedia integration, collaboration tools, and customizable templates,

making it a versatile tool. Skulmowski & Xu (2021) discuss the role of digital learning environments in cognitive load. They highlight the importance of considering environmental factors and motivation to extraneous load. By optimizing the design of digital learning platforms, the extraneous load can be minimized, allowing learners to focus on relevant content and tasks.

In this study, we used Google Sites to support students' research skill development, including learning resources and direct links to Google Scholar for credible information. To reduce the extraneous load, we manage the sites with structured content organization and customization, enabling the integration of text, images, videos, interactive elements, and other multimedia resources, ensuring that the material is engaging and caters to different learning styles and difficulties. The platform also allowed students to independently present their research and engage in self-assessment, fostering better research abilities and self-awareness. Figure 1 shows some features provided by Google Sites.

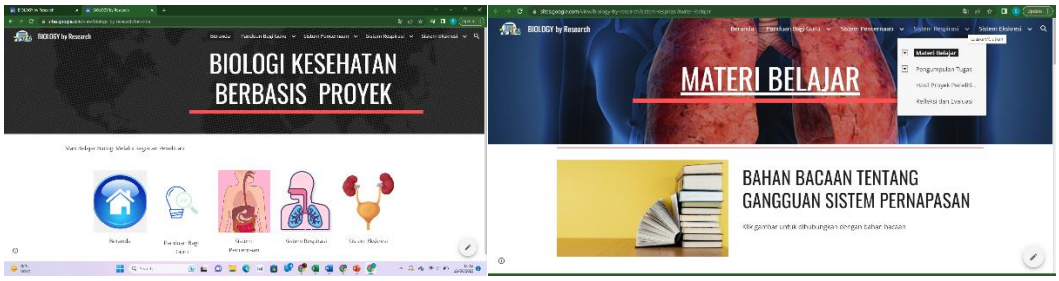

Figure 1. Features provided in Google Sites

Utilization of Google Sites in learning has been discussed in several publications, such as Improve Mastery of Concepts and Process Skills in Electrical Circuit Materials (Hidayat et al., 2023) and Google Sites involvement in project-based learning and creative thinking (Boonsong & Meesup, 2020). Agad et al. (2019) and Dewi (2020) discussed the function of Google Sites in enhancing academic performance. According to previous publications, studies have yet to address using Google Sites to promote research skills, particularly in information discovery. This study investigates the potential of the Google site to assist senior high school students in developing and retaining research skills in planning, composing, and writing research methods, particularly as they pertain to information-finding skills. As a limitation of the research, this article sought to determine how high school students perceive using Google Sites to improve their research skills.

Method

As a research method, the descriptive-qualitative approach was adopted. It focuses on presenting a complete, extensive, in-depth description and explanation of an event or situation. Through qualitative data collection and analysis approaches, it captures the richness and complexity of the participants' experiences, viewpoints, and behaviors. The research instrument was a questionnaire survey to assess its perceived usefulness (5 items), perceived ease of use (8 items), attitude (5 items), and intention to use (5 items). The questionnaire is a 5-Likert scale range: Not Acceptable (NA), Barely Acceptable (BA), Acceptable (A), Moderately Acceptable (MA), and Very Acceptable (VA). Another instrument used is a set of interview questions for instructors. The survey is in the form of a Google Form and is distributed over WhatsApp. The questionnaires were delivered to 125 class XI students and three Biology teachers from three high schools participating in research-based learning activities. Data interpretation begins with descriptive analysis,

which summarizes and describes the data. Calculate frequencies, percentages, or averages for each question to understand the distribution of responses.

The recruitment strategy for the students included in the study was meticulously planned to provide a fair and unbiased representation. The researchers started the recruitment process by inviting biology teachers to participate in the study. Researchers described the research aims and techniques during an information session while providing professional development on engaging students with Google Sites. Participation was voluntary, and teachers were told their decision would not affect their professional status. The session encouraged teachers to engage in open discourse and collaborative learning. This integrated strategy is intended to provide teachers with creative teaching tactics while contributing to the research objectives. Finally, three biology teachers from three distinct schools agreed to participate in the study. Their dedication was recognized as an essential factor in the research's success. Furthermore, the cooperation of these teachers supported the participation of 132 pupils in the project; however, seven were excluded in this study due to incomplete questionnaire responses.

The demographic involved in the research consists of 125 students from three different schools. Out of the total sample, there are 28 students from school X, 67 from school Y, and 30 from school Z. School Y contributes the most prominent data sample with 67 samples. It is worth noting that School Y consists of two classes, indicating that the participants were drawn from two distinct groups within the school. All the data samples provided reflect a diverse and well-represented group of participants, enabling the study to draw more robust conclusions.

Results and Discussion

This study aims to investigate user perceptions of Google Sites as learning technologies to promote research skills. To avoid over generalizations, it focuses on the factors affecting student acceptance in a specific course delivery context. We investigated the attitudes of students toward the use of the technology in an “Biology Project Research” course conducted at three high school in Bandung Barat District, Indonesia from March to May 2023. During the course, students were required to work collaboratively in groups to complete a research project for three selected topics: nutrition, respiratory system, and urinary system. During the delivery of the subject by the teachers, different tools in Google Sites were used to facilitate collaborations and help students to improve their research skills especially in finding information.

Students' responses to learning with Google Sites was evaluated by distributing a questionnaire after the three topics had been done. The questionnaire assesses their perceptions of four key aspects: attitude, usefulness, ease of use, and intention to use. The questionnaire provided valuable insights into the students' experiences and perspectives regarding incorporating Google Sites in their learning projects. Figure 2 shows the response of the students to the questionnaire in each aspect. From the questionnaire responses, it became evident that students held a predominantly positive perception of the involvement of Google Sites in their learning projects. Across all four aspects, many students expressed favorable views, demonstrating the platform's effectiveness in supporting their research and learning endeavors. In the usefulness aspect, the data indicated that 40% of students found Google Sites to be "Moderately Acceptable" in terms of usefulness. Another 25% found it "Acceptable," reflecting 65% of students who perceived the platform as a valuable and

beneficial resource. These findings highlight how much Google Sites enhanced students' understanding and exploration of their research topics.

During the interviews, students highlighted several factors that contributed to their positive responses regarding the usefulness of Google Sites. From the data response and interview with students in Figure 3, it showed that the positive response of students to the usefulness aspects of Google Sites is influenced by its user-friendly interface (100%), teaches other digital skills (89,6%), assists in completing research assignments according to standards (88.8%), and shows relevant research examples (93,6%).

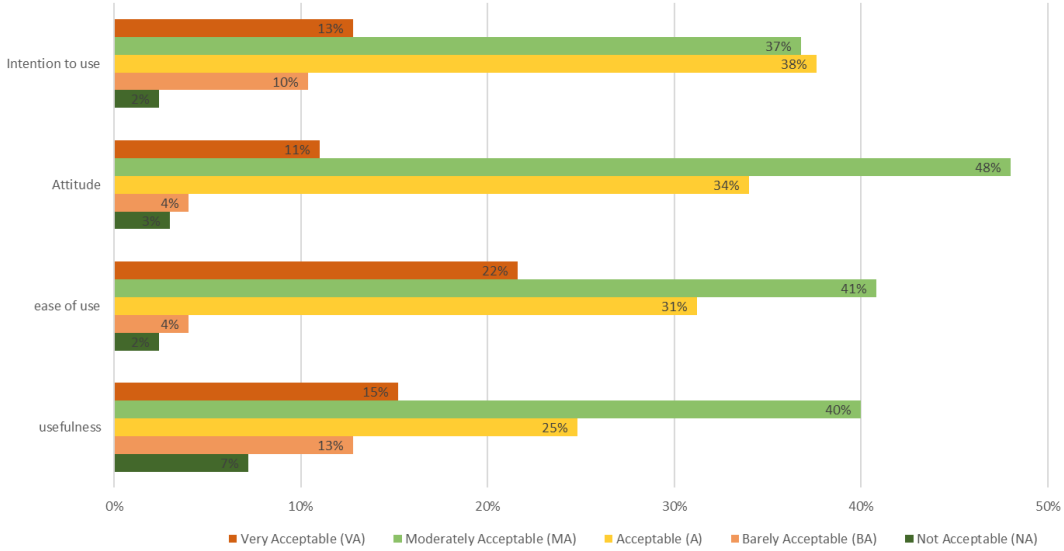

Figure 2. Student's Perception About Google Sites

One prominent factor that increased the usefulness was the platform's user-friendly interface, which facilitated easy navigation and material organization, allowing them to locate and access relevant resources quickly, further enhancing their research and learning experiences. The platform offers a comprehensive range of learning resources with multiple representations, allowing students to choose materials that suit their preferences, leading to a more engaging and personalized learning experience. This comprehensive collection of materials allowed students to explore and engage with their research topics from various angles, facilitating a deeper understanding of the subject matter.

The platform caters to different learning styles and preferences by providing multiple representations of learning materials. Students have unique ways of understanding and retaining information, and various resources ensure they can choose the one that resonates best with them. This personalized approach leads to better comprehension and retention of the subject matter. Flexibility in accessing and interacting with learning resources can accommodate different learning styles and preferences, making the learning experience more effective and enjoyable (Guinsisana.,2022). This active engagement also encourages students to take ownership of their learning process, fostering a more effective and fulfilling educational experience (Noah & Gbemisola., 2020; Dhingra., 2020).

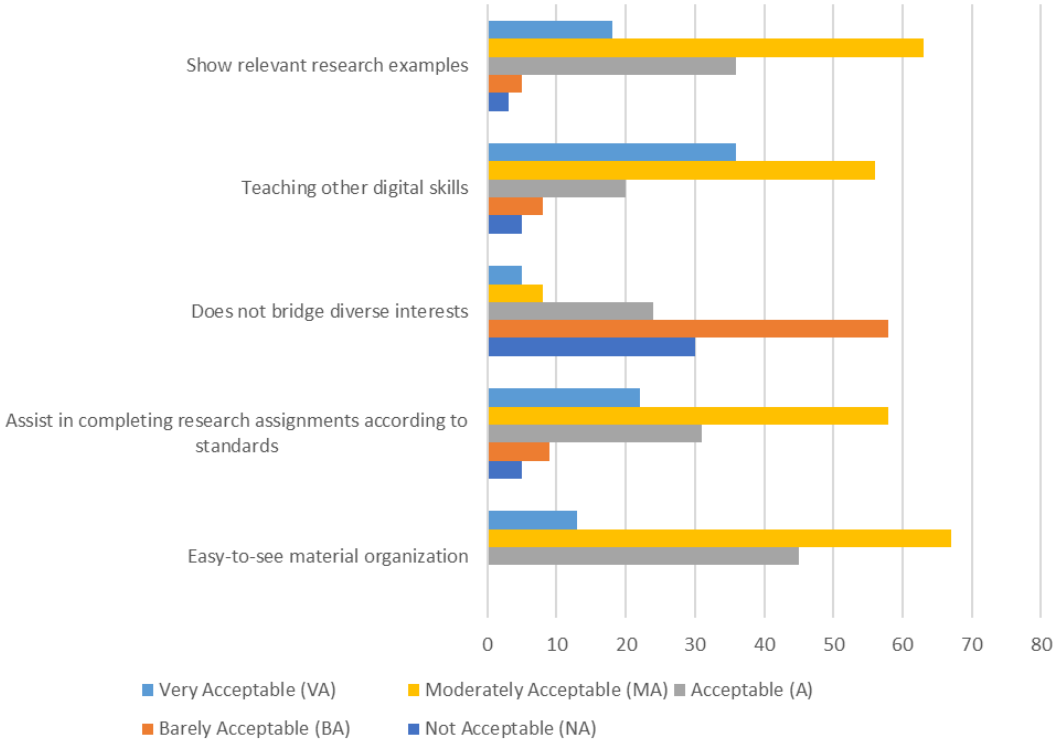

Figure 3. Students Response to Google Sites Usefulness

Furthermore, students acknowledged that using Google Sites allowed them to develop digital skills beyond the scope of their research projects. Through the platform, they acquired essential skills such as content creation while making their PowerPoint presentation in Google Slides, collaboration while using Google Slides and Google Docs, and information management in the world wide web, which is increasingly relevant in today's digitally driven world. This broader acquisition of digital competencies further enhanced their overall learning experience. In his study, Hamutoglu et al. (2019) investigated the attitudes toward e-learning that show a significant predictor of digital literacy skills.

Additionally, students recognized the platform's role in assisting them in meeting research assignment standards. Especially with the assessment rubric that is always available and easy to find on Google Sites, help students work according to the expected standards. One student remarked during the interviews, "Having the rubric in Google Sites made it so much easier to ensure I covered all the requirements. It was like having a checklist to follow!" This direct reference to the platform's rubric availability demonstrates its role in supporting students to work according to the expected standards, leading to a higher level of confidence in the quality of their assignments and the effective communication of their ideas. By adhering to established standards, students felt more confident in their assignments' quality and were better equipped to communicate their ideas effectively. Lastly, students appreciated the availability of relevant research examples on Google Sites.

The platform served as a valuable repository of real-world research projects, enabling students to explore and learn from various examples. One student shared, "My group found a research paper on Google Sites that used the same type of instruments we were learning about in class. It was so helpful to see how those instruments were applied in a real study." This example highlights how Google Sites nurtures the growth of students as researchers by fostering a deeper understanding of research methodologies and expanding their knowledge beyond classroom lectures. Rubrics helped students understand critical issues in solving

assignments, evaluate their performance, and receive immediate feedback on their strengths and weaknesses. The use of rubrics provides a clear map for achieving learning goals (Sitorus., 2020), resulting in higher quality work and improved scores in assignments (Chowdhury., 2018; Panda et al., 2021)

Regarding ease of use as shown in figure 4, 41% of students rated Google Sites as "Moderately Acceptable," while 22% found it "Very Acceptable." 63% of students acknowledged the platform's user-friendly nature, indicating that Google Sites facilitated most participants' seamless and convenient learning experience. The positive finding of 63% of students acknowledging Google Sites as user-friendly is linked to the positive response observed in the usefulness aspects. The platform's ease of use allows students to navigate and interact with it effortlessly, enabling them to access diverse and comprehensive learning resources easily. The component of ease of use can be seen in Figure 2. One of the prominent ease-of-use aspects that students embrace about Google Sites is its compatibility with QR codes. Integrating QR codes into the platform allows educators to streamline access to specific sites or pages related to their learning projects. By scanning the QR code, students can instantly navigate the relevant content without manually typing lengthy URLs. This seamless interaction saves time and fosters a smoother and more engaging learning experience, enabling students to focus on the content rather than grappling with technical hurdles.

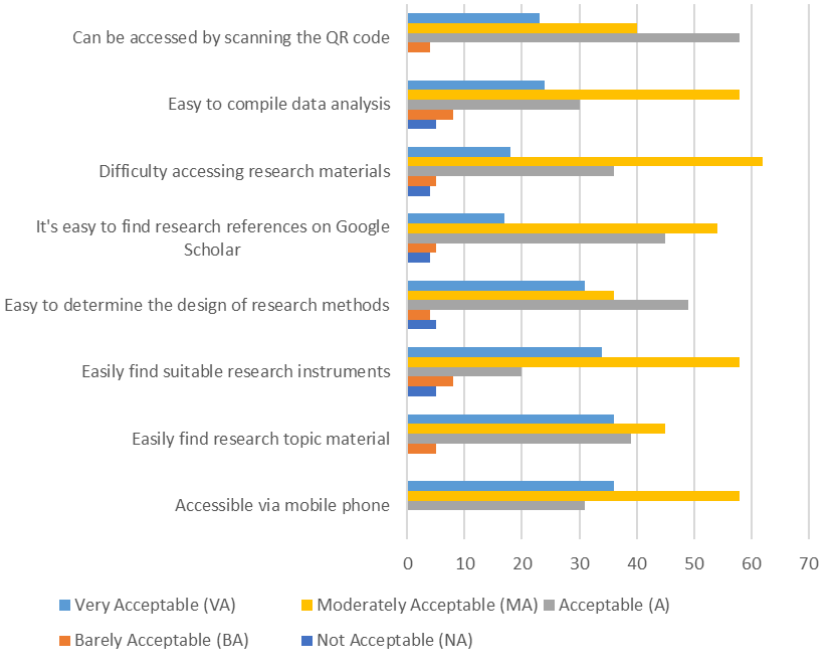

Figure 4. Students Response to Google Sites' Ease of Use

In pursuing academic excellence, students rely heavily on credible and relevant journal references to bolster their research endeavors. Google Sites facilitates this process by allowing students to embed direct links to Google Scholar within the platform. The response found that by integrating this feature, 91% of students gain more accessible access to authoritative and peer-reviewed scholarly articles directly related to their project topics. Putting the link simplifies the research process and empowers students to enrich their understanding and refine their academic work through well-informed referencing. In today's mobile-centric world, students increasingly rely on their handheld devices for quick and

efficient access to information. Google Sites caters to this preference by offering seamless access from smartphones and tablets. Almost 100% of students agreed that through a single link, students can access the entire repository of project materials, resources, and relevant content, conveniently accommodating their on-the-go learning needs. This mobile accessibility enhances student engagement and promotes a flexible and personalized learning experience, enabling students to delve into their coursework at their own pace and convenience.

Students' attitude towards Google Sites as shown in figure 5 was predominantly positive, with 48% perceiving it as "Moderately Acceptable" and 11% considering it "Very Acceptable." This combined total of 59% reflected a favorable attitude towards the platform, implying that students embraced Google Sites as a valuable tool in their research endeavors. Attitude components can be detailed in Figure 3, along with the intention to use aspects. One significant factor that likely contributed to the positive attitude towards Google Sites was the high frequency of its usage among students. 82 % of students answered that they had visited the sites frequently. The platform's prevalence in their research projects allowed students to become more familiar with its features and capabilities, leading to a greater comfort level in using it effectively. Frequency of use affected the platform's easiness to navigate and understand; it enhanced efficiency and reduced frustration, resulting in a more positive overall experience. Due to the response, it found that 83% of students feel that project learning gives a more fun experience to them.

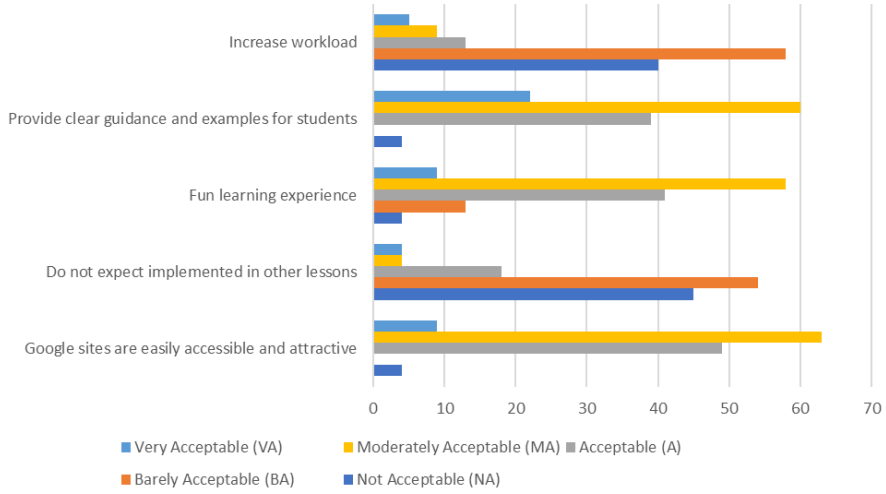

Figure 5. Student's Response to Google Sites of Attitude Aspect Component.

Figure 6 shows the student's response of regarding the intention to use Google Sites in future projects, 37% of students rated it "Moderately Acceptable," while 13% found it "Very Acceptable." These findings suggested that many students were willing to continue utilizing the platform in their upcoming research and learning tasks. One indicative of a positive ripple effect is that students would recommend Google Sites to their friends. Positive word-of-mouth recommendations can further influence the attitudes of other students and foster a culture of appreciation for the platform. Plan to return to the GS page when there is research activity and a desire to create Google sites. Moreover, the survey indicated that students intend to return to Google Sites when future research activities arise (82%). The platform's reliability and efficiency in supporting their current projects foster a sense of trust, making it a go-to resource for their upcoming research assignments. The finding also shows that students would recommend Google Sites to their friends (96%) suggests a positive ripple

effect. Word-of-mouth recommendations can influence other students' attitudes, promoting a culture of appreciation and familiarity with the platform.

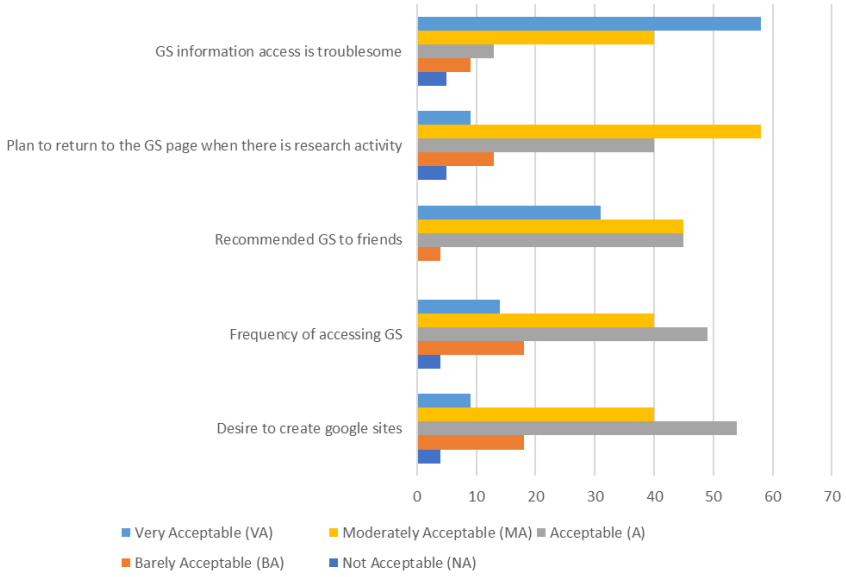

Figure 6. Student's Response to the intention to use Google Sites in future projects.

Integrating digital platforms such as Google Sites as learning media in this study shows a positive attitude from students. Interactive and visually engaging content, such as videos, simulations, and interactive quizzes more appealing to students and can help them better understand complex concepts with less mental effort. The content is tailored to individual student needs and learning styles with content that matches their current level of knowledge and skills that may reduce students' cognitive load. The platforms also allow Self-Paced Learning as a good opportunity for students to learn at their own pace. This flexibility can be beneficial as students can take the time to understand difficult topics without feeling rushed or overwhelmed. Digital platforms with a well-structured learning environment can present information clearly and eliminate distractions, mitigating extraneous load (Bahari, 2023; Klepsch & Seufert., 2020; Skulmowski & Xu, 2021).

We also found that many students used Google Sites often as their learning reference. They were familiar with it because their teachers encouraged them to use it in various projects. The more they used it, the more they liked it and became more confident using the platform. The role of teachers in promoting Google Sites within students' learning experiences is pivotal to its widespread adoption and positive reception. Teachers play a vital role in creating and fostering these relationships and providing meaningful learning opportunities through digital platforms. A very interesting claim is that teachers with higher digital competence can effectively utilize digital platforms to create engaging and interactive learning experiences for students (Li et al., 2021; Pertiwi et al., 2022). Our findings indicate that many students were already using Google Sites extensively, and this familiarity can be attributed to the active encouragement from their teachers. As teachers incorporated Google Sites into various projects, students had the opportunity to explore the platform's functionalities and benefits firsthand. Teachers can offer timely feedback to students, our observation during the lesson shows that teacher endorsement of Google Sites sends a strong signal of credibility and trustworthiness to students. Educators actively promote and use the platform, reinforcing its relevance in the educational context. This endorsement fosters a positive learning environment where students feel encouraged to explore and experiment

with Google Sites, knowing their teachers support its use. The finding is supported by the statement of Churchill (2020) that teachers must provide rigorous direction and assistance for pupils in developing information literacy. Moreover, from the observation and interview with teachers, we found that many activities that teachers can offer to promote the integration of Google Sites in showcasing the diverse possibilities that Google Sites offers. They can demonstrate various features, such as multimedia integration, collaborative tools, and customization options, inspiring students to explore new ways of presenting their knowledge and research outcomes. Teachers should reconcile the motivation of students, which requires more refined strategies (Zheng & Zheng, 2017). As students witness their teachers' expertise in leveraging the platform's potential, it encourages them to aim for higher levels of proficiency and creativity.

Conclusion

The research findings indicate a predominantly positive attitude among students toward Google Sites, with 59% perceiving it as "Moderately Acceptable" and "Very Acceptable." The high frequency of usage (82%) among students demonstrates the platform's prevalence and integration into their research projects and learning activities. The ease of use of Google Sites positively impacts students' overall learning experience, reducing frustration and allowing them to focus on their research. Teachers play a crucial role in promoting Google Sites, encouraging its use, integrating it into the curriculum, and guiding students in utilizing it effectively. The platform's role in assisting students in meeting research assignment standards is highlighted, with assessment rubrics facilitating adherence to established criteria. Moreover, Google Sites is a valuable repository of relevant research examples, fostering students' growth as researchers. Overall, the research underscores the positive impact of Google Sites on students' learning experiences and emphasizes the importance of teacher support in promoting its use to enhance students' academic journey. Integrating digital platforms like Google Sites in this study led to a positive student attitude, interactive content, and self-paced learning improved understanding as well reduced cognitive load.

Acknowledgment

Author would like to extend our heartfelt gratitude to LPDP (Lembaga Pengelola Dana Pendidikan) Indonesia for their generous sponsorship and financial support throughout the course of our research. Their unwavering commitment to fostering educational development has been instrumental in making this study possible.

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