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Usability Analysis of Digital Learning Media Based on Google Sites Using the SUS Scale

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ABSTRACT

Purpose of the study: This study aims to evaluate the usability of digital learning media developed using Google Sites through a systematic and standardized measurement approach. The main focus is to identify whether the media is easy to use, engaging, and acceptable from the users' perspective.

Methodology: This study employed the System Usability Scale (SUS) method, combined with a literature review of related studies. The SUS questionnaire was used as the main tool for data collection, while scoring and analysis were performed with standardized calculation procedures to evaluate usability outcomes.

Main Findings: The results showed that the digital learning media developed with Google Sites achieved an average SUS score of 79. This score falls into the "Good" category, equivalent to a grade scale of C, and is classified as "acceptable." Users demonstrated positive perceptions regarding its usability, indicating effectiveness while also highlighting the need for further development.

Novelty/Originality of this study: This study provides new insights into usability evaluation of Google Sites as a digital learning medium using the SUS method. It contributes by highlighting practical user perceptions and offering evidence-based recommendations for further improvement, thereby expanding knowledge about effective integration of accessible online platforms in education.

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1. INTRODUCTION

The Learning media is one element in the teaching and learning process. Learning media can be understood as an alternative tool used to convey learning information to students This media functions as a tool that helps teachers deliver lesson materials so that children become interested and enthusiastic about the material given[1]. Learning media plays a role in presenting information clearly, making it easier for students to understand complex material [2]. Learning media not only facilitates understanding, but also improves students' ability to retain information more effectively [3]. This is reinforced by the statement the use of learning media can encourage increased student participation and motivation, while reducing boredom in learning activities [4], The use of traditional learning media such as theme books in elementary schools is less effective in increasing student participation, activeness, and learning motivation The development of digital technology has driven significant changes in the world of education, particularly in the use of online learning media. Digital learning refers to all

forms of educational activities that utilize technology, such as online learning, the use of digital media, and the use of interactive tools [5] In today's digital era, teachers are required to develop creative, innovative, and enjoyable learning by integrating information and communication technology (ICT). Teachers as innovators are required to carry out the learning process in schools by keeping up with the dynamics and changes developing in society and the world of education [6].

The online platform supports collaboration among students by providing a space to exchange ideas and support each other in a virtual environment [7]. Technology now offers various conveniences through features that can be accessed via a variety of devices, such as smartphones, computers, laptops, and other digital media, making it easier to find solutions to various problems [8]. Technological advances require teachers to improve their competencies, one of which is through the use of digital technology as a medium in the learning process [9]. These changes are also felt at the elementary school level, where teachers are required to be able to deliver learning that is not only interesting but also adaptive to the times. Basic education today cannot be separated from the role of technology. In line with the demands of the 21st century, which emphasizes critical and creative thinking skills, the development of educational technology has become an important factor in supporting the achievement of learning objectives [10]. Elementary school children, who are growing up as the digital generation, have a high interest in visual and interactive media, so the use of technology has become one of the most effective approaches to increase their motivation and engagement in learning. One such approach is digital learning media. Digital learning media refers to the use of technology and software to present learning materials, thereby creating a more flexible learning environment [11]. The primary objective of digital learning media is to simplify and enrich the learning process while adapting to diverse learning styles and needs of students [12]. In the digital age, technology has become a key pillar in the transformation of education. Its presence not only expands access to information, but also enables the learning process to take place in a more flexible manner, adapting to the pace, needs, and learning styles of each student. Through the use of technology, teachers can provide a more interactive, collaborative, and contextual learning experience, thereby encouraging active student engagement and improving the quality of learning outcomes [13].

Digital learning media supports the optimization of 21st century education through increased flexibility, personalization, collaboration, and inclusivity [12]). This technology enables students to learn at their own pace, receive immediate feedback, and gain equitable access, thereby creating an adaptive and dynamic learning environment. In line with the research digital learning media allows for the delivery of content in an engaging and flexible manner, enabling students to tailor their learning process to their individual styles and paces. [14]. This medium also makes it easier for students to learn anytime and anywhere. Additionally, educational technology helps teachers design learning experiences that are more contextual and directly related to real-life situations.

Designing learning media, teachers need to adapt the media developed to the needs and conditions of the students [14]. Given that we are currently in an era of rapid technological development and students have become familiar with this technology, teachers, as facilitators and providers of learning media, need to utilize various forms of available technology to support the teaching and learning process. One platform widely used by educators due to its ease of access and integration with various Google services is Google Sites. The use of Google Sites is flexible and simple, and does not require expensive computer network and internet infrastructure [14].Google Sites, as a web-based learning platform, provides a variety of features that support independent and interactive learning. With a simple and user-friendly interface design, students have the opportunity to easily access materials, deepen their understanding through exploration, and build collaboration with their peers. The use of Google Sites in the context of learning provides opportunities to enrich the learning experience of students, especially on challenging or difficult-to-understand topics, so that the learning process can take place more optimally [15]. Google Sites is one of the most appropriate media to use in developing teaching materials, because it is dynamic and provides space for teachers to improve their competence in utilizing modern technology. Through this platform, teachers can manipulate objects, present simple visualizations of abstract concepts, and broaden their knowledge regarding the use of technology in learning. This is in line with Piaget's view that knowledge is constructed by individuals through interaction with their experiences and the objects they encounter [16].

Google Sites offers ease of use that is relevant in the world of education through its support for project collaboration, multimodal content creation, and ease of sharing work outside the classroom. The simple interface helps students develop shared responsibility, obtain repeated feedback during the writing process, and reflect on their learning experiences [17]. Seamless integration with various other Google services further enriches the learning process. With the accessibility and flexibility it offers, Google Sites is a valuable resource for both teachers and students in building knowledge collectively.

Google Sites allows teachers to compile teaching materials, embed various multimedia content, and present material systematically on a single integrated page. Teachers can adapt the site to suit different subjects and teaching methods, making it suitable for use in a variety of learning contexts. The use of Google Sites has been proven to develop students' critical and creative thinking skills, which are important aspects of mastering 21st-century skills [18]. The results of the study indicate that teaching materials designed using Google Sites are valid and practical, and have received positive responses from both teachers and students[19]. Meanwhile, for

elementary school teachers, this platform provides opportunities to present teaching materials in a more interesting way, organize project-based assignments, display student work, and easily create digital portfolios. This is reinforced by the statement of Rachmawati, who state that Google Sites helps teachers structure learning materials and supports student engagement and collaboration. Additionally, Google Sites can be used to improve communication between teachers, students, and parents [18]. Google Sites is an easy-to-use platform that allows users to build and manage websites without the need for special programming skills. This service also provides integration with Google applications, supports real-time collaboration, and offers free online storage[20].

In Indonesia, the implementation of digital learning media is in line with the implementation of the Merdeka Curriculum, which emphasizes the importance of utilizing technology in the learning process [21] Furthermore, Widiastari & Puspita argue that the use of digital learning media is a crucial aspect of the curriculum that must be implemented, with the aim of providing a more engaging, interactive, and efficient learning experience for students. In the context of the Merdeka Curriculum, which emphasizes differentiated learning and character building, the use of Google Sites is a relevant strategy to support meaningful, enjoyable, and developmentally appropriate teaching and learning processes for elementary school students. Although the use of digital technology in learning is increasingly encouraged by national education policies and the availability of various online learning platforms, in reality there is still a significant gap in its implementation by teachers, especially at the elementary school level. Many teachers still face obstacles in optimally integrating digital media into the learning process. One of the main causes is the limited digital competence of teachers, both in terms of technical aspects of device use and in designing technology-based learning. Additionally, not all educational institutions have adequate supporting infrastructure, such as stable internet connections, availability of ICT devices, and continuous technical support. Furthermore, some teachers still view technology merely as a tool, not as an integral part of a learning strategy designed to improve the quality of the learning process and outcomes for students. This results in the use of digital learning media often being sporadic, unplanned, and irrelevant to the needs and characteristics of students. However, in the context of the Merdeka Curriculum, which emphasizes differentiated, collaborative, and project-based learning, the mastery and creative use of digital media are of utmost importance. This gap highlights the urgent need to strengthen teachers' capacity to design and manage digital learning systematically, including through practical training and guidance on using user-friendly digital platforms such as Google Sites. Additionally, while Google Sites is technically easy to access, the effectiveness of learning media is not solely determined by the content but also by the usability of the media from the perspective of both teachers and students. Google Sites is an interactive web platform with relatively low barriers to use, making it ideal for use in primary education, particularly in teaching science and social studies. With a simple interface, flexibility in embedding various learning resources (text, images, videos, interactive quizzes, and external links), and ease of access for both teachers and students, Google Sites enables a more natural integration of technology into the teaching and learning process [22]. The use of Google Sites opens up opportunities for rich, interactive, media-based learning. This platform contributes to increased student motivation and engagement, supports flexibility and collaboration in learning, and strengthens the development of critical and reflective thinking skills [23].

The System Usability Scale (SUS) is a widely used global instrument for evaluating the usability of digital products, including information systems, software, and learning media. The use of SUS enables quick, reliable, and quantitatively comparable evaluations across various platforms, even with a small sample size [24]. The System Usability Scale (SUS) is a widely used tool for evaluating the usability of a product or system, particularly those with interactive features. This tool consists of 10 statements that describe users' subjective assessments of the ease of use of the system.

The System Usability Scale (SUS) is a simple yet effective approach to identifying the level of comfort and ease of use of a system, where assessments are obtained through questionnaires filled out directly by users. With recognized validity and reliability, SUS is able to provide representative evaluation results even with only a small number of respondents. These advantages make this method one of the most widely used approaches for measuring usability quickly, effectively, and efficiently [25]. The advantages of SUS lie in its simplicity, cost-effectiveness, and ability to provide a quick overview of the level of satisfaction and effectiveness of the system according to users [26] . In line with the opinion the SUS has a structure consisting of 10 statements that are assessed using a 5-point Likert scale. This assessment produces a score between 0 and 100 that represents users' perceptions of a system's usability [27].

Previous studies have shown that the use of digital learning media positively contributes to student engagement and learning outcomes. Some previous studies have discussed the development of web-based learning media and its effectiveness in improving learning outcomes. Although Google Sites has various advantages, its use in the classroom also requires teachers to enhance their technological competencies to utilize it optimally [28]. However, there is still a gap in studies that specifically evaluate the usability aspect of Google Sites-based digital learning media. Understanding usability is crucial to ensure that the media is not only informative but also easy to use, engaging, and does not overload the user's cognitive abilities. Therefore, this study aims to determine the usability of learning media developed using a systematic and standardized approach such as the System Usability Scale (SUS). John Brooke designed the SUS as a simple measurement tool used to assess the extent to which a

product, including a website, is easy to use by its users [29]. Through usability testing, it is hoped that an overview of the user experience can be obtained, including their perceptions and the obstacles they encounter when using the website [30].

Despite the growing body of research on digital learning media, previous studies have not systematically evaluated the usability of Google Sites using a standardized instrument such as SUS. This study contributes new insights by providing empirical evidence on the usability of Google Sites-based learning media and highlighting its practical implications for classroom use. Furthermore, the findings underline the urgency of developing elementary school teachers' capacity in utilizing digital platforms effectively, ensuring that technology integration in education is both sustainable and impactful.

2. RESEARCH METHOD

2.1 Research Design

This study employed a descriptive quantitative research design using the System Usability Scale (SUS) method. The SUS was chosen because it enables a rapid, reliable, and standardized usability assessment, which is applicable to various products such as websites, mobile applications, and digital learning media. The focus of this research was to evaluate the usability of Google Sites-based digital learning media developed for the IPAS subject, specifically the topic "Oh, the Environment is Damaged" in fifth grade elementary school.

2.2 Research Subjects

The research subjects were elementary school teachers who used the Google Sites-based digital learning media. A total of 130 teachers participated in the study. The object of this study was the Google Sites-based digital learning media used in classroom learning activities.

Table 1. Respondent Demographics

Item	Demographic Category	Total	Percentage
Gender	Male	25	30.7%
	Female	105	69.3%
Age	21–40 years	86	66.15%
	41–60 years	44	33.85%
Years of Experience	1–20 years	112	86.15%
	21–40 years	18	13.85%

The demographic data indicate that the majority of respondents were female teachers (69.3%), aged between 21–40 years (66.15%), and had 1–20 years of teaching experience (86.15%).

2.3 Research Instruments

The primary research instrument was a questionnaire based on the SUS framework. The questionnaire consisted of two sections: Demographic questions to collect respondents' background information (gender, age, years of teaching experience) and SUS items, consisting of 10 statements assessed using a 5-point Likert scale, designed to evaluate user perceptions regarding the usability of the digital learning media.

2.4 Research Procedures

The research procedures included the following steps: Development of Google Sites-based digital learning media for the IPAS subject, distribution of the SUS questionnaire to participating teachers who had used the developed media, collection of completed questionnaires containing demographic and usability data and organization of data for analysis, including coding of responses and calculation of SUS scores.

2.5 Research Analysis

The data analysis followed a descriptive quantitative approach. SUS scores were calculated according to standard scoring guidelines, yielding values ranging from 0 to 100. The average score was then compared against the SUS benchmark categories to determine the usability level. Additional descriptive statistics were applied to analyze respondent demographics and their perceptions of the learning media.

3. RESULTS AND DISCUSSION

Data analysis was conducted based on 130 valid responses obtained from the SUS questionnaire. The analysis process involved three main stages: data cleaning, data categorization, and SUS score calculation. After

ensuring that the data were consistent and valid, demographic information was tabulated to provide a respondent profile.

3.1 Respondent demographics

Table 1 shows the demographic characteristics of the respondents. The majority were female teachers (69.3%), aged 21–40 years (66.15%), and had 1–20 years of teaching experience (86.15%).

Table 1. Respondent Demographics

Demographic Variable	Category	n	%
Gender	Male	25	30.7
	Female	105	69.3
Age	21–40 years	86	66.15
	41–60 years	44	33.85
Teaching Experience	1–20 years	112	86.15
	21–40 years	18	13.85

3.2 SUS score calculation

The SUS questionnaire consisted of 10 items, each scored using a 5-point Likert scale. Following the standard scoring procedure, odd-numbered items were scored as *response – 1* and even-numbered items as *5 – response*. The total score per respondent was multiplied by 2.5 to obtain a usability score ranging from 0 to 100.

The total accumulated SUS score from 130 respondents was 10,288, yielding an average SUS score of 79.13 (rounded to 79). The formula can be written as follows:

Average SUS score = (Total score of all respondents) : 130 = 10288 : 130 = 79.13 rounded to 79.

This average score provides a general overview of the usability of the system based on the perceptions of all respondents, which is then matched with the SUS Score indicator below.

3.3 Usability Interpretation

Based on the interpretation framework (acceptability range, grade scale, and adjective rating), the usability results are summarized in Table 2.

Table 2. SUS Score Interpretation

Indicator	SUS Score = 79	Category
Acceptability Range	70–100	Acceptable
Grade Scale	C	Fair/Good (needs improvement)
Adjective Rating	Good – Excellent	Positive perception

3.4 Visualization of Results

Figure 1 presents the usability interpretation based on the SUS score.

(Insert bar chart or gauge showing SUS score = 79 in Acceptable, Grade = C, Adjective Rating = Good–Excellent)

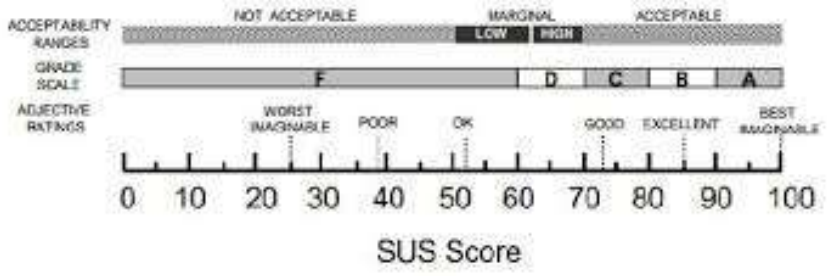

Figure 1. SUS score indicator

3.5 Summary of Results

The analysis confirmed that Google Sites–based digital learning media for IPAS lessons in Grade 5 achieved an average SUS score of 79, which: 1) Falls into the Acceptable range of usability, 2) Corresponds to a C grade, indicating moderate quality and opportunities for further development, 3) Is rated as Good to Excellent on the adjective scale, reflecting positive user perceptions.

These results directly answer the research problem: Google Sites–based learning media is usable and well accepted by teachers, but improvements are needed in interface design, navigation, and visual appeal to elevate its usability quality to higher categories (B or A). The formula can be written as follows:

Average SUS score = (Total score of all respondents) : 130 = 10288 : 130 = 79.13 rounded to 79.

This average score provides a general overview of the usability of the system based on the perceptions of all respondents, which is then matched with the SUS Score indicator below.

Based on the average SUS score calculated from the usability questionnaire for Google Sites-based digital learning media that has been distributed, the media developed is within the Acceptability Range. A score of 79 falls into the Acceptable category, which means that the system or product is well accepted by users. However, when viewed from the Grade Scale, this score is still in the C range. This indicates that the usability quality still needs to be developed further to achieve a B or A grade. Meanwhile, when viewed from the Adjective Rating, a score of 79 is categorized as Good to Excellent. This shows that users have a positive perception of the system's ease of use.

Based on the average System Usability Scale (SUS) score obtained from the usability questionnaire for Google Sites-based digital learning media, it can be concluded that the media developed is in the acceptable range. A SUS score of 79 indicates that this media is well accepted by users, reflecting success in terms of basic functionality and ease of use.

However, when viewed from the SUS Grade Scale, a score of 79 is still in the C category, which means that the usability quality of the media still has room for improvement. To achieve a higher level of usability (category B or A), further development is needed, especially in terms of interface design, navigation efficiency, and visual appeal.

4. CONCLUSION

Based on the research results, it can be concluded that the Google Sites–based digital learning media developed for the IPAS subject in Grade V, specifically on Topic B *"Oh, the Environment is Damaged"*, has demonstrated a good level of usability. The evaluation using the System Usability Scale (SUS) method with 130 respondents produced an average score of 79, placing it in the Acceptable category. This score corresponds to a Grade C and falls within the Good–Excellent range in the adjective rating. These results indicate that the media is well-received by users and has potential to strengthen digital-based learning in elementary schools.

Nevertheless, the findings also highlight that improvements are still needed to elevate its usability to higher levels (Grade B or A), particularly in interface design, navigation efficiency, and visual appeal. Furthermore, effective utilization of this media requires enhancing teachers' technological competencies to ensure its optimal integration in classroom learning.

With these recommendations, digital media developers can not only refine the usability of Google Sites–based learning media but also contribute to advancing elementary education by creating learning environments that are accessible, engaging, and future-ready. Thus, this Google Sites-based digital learning media is suitable for use as a learning aid in elementary schools and has great potential to enhance students' learning experiences and teachers' teaching effectiveness, particularly in integrating technology into the learning process. While Google Sites has many advantages, some educators may have difficulty adapting to the new technology, potentially hindering its optimal use in the classroom.

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