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# Validity and Practicality of Physics Learning Media on Measurement Topic Using Google Sites

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**ABSTRACT**

*This research addresses the need for engaging and accessible physics learning media by developing and evaluating a Google Sites-based resource for the topic of Measurement, designed for tenth-grade students. This study employed a Research and Development (R&D) methodology, utilizing the ADDIE model, but was limited to the analysis, design, and development phases, which included comprehensive feasibility testing. The feasibility assessment involved two key stages: a validity test conducted by a panel of six experts (three UNP Physics lecturers and three senior Physics teachers from SMAN 5 Padang) , and a practicality test with end-users (three Physics teachers and 40 tenth-grade students at SMAN 5 Padang). Data were collected using validated questionnaires. The validity data were analyzed using Aiken's V statistic, while practicality data were analyzed using descriptive percentage analysis. The findings indicated a high level of validity, with an average Aiken's V score of 0.90. The practicality assessment also yielded positive results, with teachers awarding an average score of 93.6% (Very Practical), and students providing an average score of 84.21% (Very Practical). These results confirm that the developed Google Sites-based learning media is both valid and highly practical for implementation in the physics learning process.*

**Keywords:** Physics Learning Media, Google Sites, Validity, Practicality.



## I. INTRODUCTION

The contemporary educational landscape, profoundly shaped by the advancements of the Industrial Revolution 4.0, demands relentless innovation, particularly within the domain of science education in Indonesia. Education in physics learning faces ongoing challenges in fostering student engagement and conceptual understanding, especially when traditional teaching methods fail to connect abstract concepts with real-world applications [1]. The moo logical proficiency and problem-solving aptitudes of students in science learning emphasize the require for an inventive and relevant approach that's relevant to standard of living. Physics education, specifically, is confronted with persistent pedagogical challenges in fostering robust student engagement and ensuring a deep, conceptual understanding of the subject matter. This challenge is compounded by traditional teaching approaches that often do not engage students or stimulate critical thinking. As a result, students are more likely to memorize formulas without understanding the basic principles behind them, which ultimately limits their ability to solve problems and connect theory to real applications. In line with this, the implementation of the Independent Curriculum provides educators with greater autonomy to design varied and contextual learning, with a focus on deepening concepts and strengthening student competencies. In this context, the role of teachers as facilitators is crucial in developing creativity and innovation, particularly in selecting the proper learning media to bolster the accomplishment of learning destinations and progress understudy learning results[2]. Learning media not only functions as a means of conveying messages, but also as an instrument to stimulate students' interests, thoughts, and attention, so that the teaching and learning process becomes more interesting, practical and interactive.

In response to these challenges, technology integration in education has emerged as a powerful strategy. Digital learning environments have shown the potential to transform the learning process by improving content delivery, fostering interactive and engaging learning experiences, and ultimately improving students' academic

outcomes[3]. Among the various digital tools available, web-based learning environments offer distinct advantages, including unmatched flexibility of time and location, broad accessibility, and the capacity to facilitate learner-centered and personalized learning paths.[4]. The use of relevant and interesting learning media, especially those based on technology, is becoming increasingly important to facilitate the understanding of Physics concepts which are often abstract and complex[5]. Physics learning is ideally presented in a concrete way to increase appeal, accelerate understanding, and motivate students. [6]. Be that as it may, initial observations conducted at SMA Negeri 5 Padang demonstrated that the utilization of technology-based learning media was not ideal. This finding appears that as it was a small number of instructors have utilized technology-based media [7]. This condition has the potential to cause Physics learning to be less than optimal, as reflected in the mid-semester 1 assessment data at SMA Negeri 5 Padang, where only 27.15% of students achieved learning completion. In fact, the high frequency of digital technology use by students (77.8% use it every day) and the breadth of internet access they have (86.1% have access) are actually important modalities that have not been optimally integrated in supporting the learning process.

To overcome the gap between ideal conditions and reality in the field, it is necessary to develop innovative, practical, and interesting technology-based learning media for students. One stage that has the potential to be created is Google Sites. Google Sites, in particular, stands out as a very profitable platform for educators [8] . As a free, intuitive, and versatile web development tool, Google Sites empowers teachers to create sophisticated, interactive learning media without requiring special programming skills [9]. *Google Sites* is a web application that allows users to combine various types of information such as text, images, video, audio, and interactive simulations in one structured and easily accessible container.[1] The advantages of Google Sites include ease of use for educators and students, free of charge, cross-device accessibility, and its ability to integrate with other Google services such as YouTube and PhET Colorado.[10]. Google Sites based learning media has consistently shown validity and positive learning outcomes [10, 11].

Although the potential of Google Sites has been widely explored, research that specifically develops and evaluates the feasibility of Physics learning media using Google Sites for Measurement material in class X with the Independent Curriculum at SMA Negeri 5 Padang is still limited. Therefore, This research endeavors to build Physics learning content accessible via Google Sites, centered on Measurement material for class X semester 1 students, as well as to analyze the level of validity and practicality of the developed learning media. It is hoped that this media can be an alternative solution to improve the quality of the Physics learning process, as well as support the activeness and independence of student learning.

## II. METHOD

This study uses the Research and Development (R&D) method. The adapted development model is the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation)[13], however, this study is limited to three initial stages, namely Analysis, Design, and Development, which include validity testing by experts and practicality testing by limited users. The product developed is a Physics learning media based on Google Sites for Measurement material for class X semester 1 students. The ADDIE model is illustrated in Figure 1.

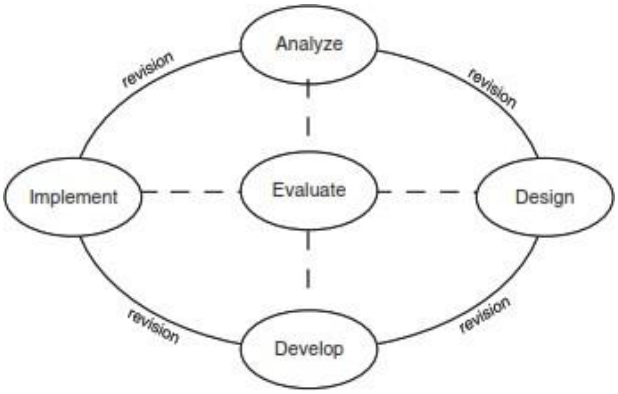


**Fig. 1.** Illustration of the ADDIE Process

Based on Figure 1, this research procedure follows the stages of the ADDIE model which have been adapted. [14] : 1. Analysis Stage: At this stage, a needs analysis was conducted through observation and interviews with Physics teachers and questionnaires were distributed to grade X students at SMA Negeri 5 Padang to identify problems and needs for learning media. Furthermore, a curriculum analysis was conducted to map the Learning Outcomes (CP) of the Grade X Measurement material into Learning Objective Flows (ATP) and Learning Objectives (TP). Analysis of student characteristics was also conducted to ensure that the media developed was in accordance with their needs. 2. Design Stage: This stage includes designing Google Sites learning media content that integrates text, images, videos, and interactive simulations according to the analysis results. In addition, a research instrument was designed in the form of a validation questionnaire for experts and a practicality questionnaire for teachers and students. These instruments were first validated by experts to ensure their feasibility before being used. 3. Development Stage: At this stage, Google Sites-based Physics learning media was realized according to the design. The initial product was then validated by six experts (three Physics lecturers from Padang State University and three Physics teachers from Padang State Senior High School 5). The validators provided quantitative ratings and qualitative feedback. This feedback was systematically analyzed, and the media was revised accordingly. This cyclical process of expert review and data-driven revision is the foundation of high-quality R&D and reflects the principles of user-centered design [15]. This combination of academic and practitioner experts ensures a balanced and robust validation process. [16]. Based on input and suggestions from the validator, the product was revised to meet the valid criteria. After being declared valid, the media was tested for its limited practicality on three Physics teachers and 40 grade X students of SMA Negeri 5 Padang.

The research subjects consisted of two groups. First, six expert validators, consisting of three Physics lecturers from Padang State University and three Physics teachers from SMA Negeri 5 Padang, who were tasked with assessing the validity of the learning media. Second, the subjects for the practicality test were three Physics teachers and 40 grade X students of SMA Negeri 5 Padang who provided responses to the use of the media.

The data collection instruments used in this study include: 1. Media Validation Questionnaire: Used to collect data on the level of media feasibility from experts. This questionnaire assesses aspects of content feasibility, language, presentation/didactics, appearance/graphics, and media techniques. This instrument has been validated by experts with an average result of 95% (Very Valid category). 2. Teacher Practicality Questionnaire: Used to collect data on the level of media practicality from the perspective of Physics teachers. This questionnaire assesses aspects of media content, presentation in the media, structure and navigation, ease of use, and media benefits. This instrument has been validated by experts with an average result of 97% (Very Valid category). 3. Student Practicality Questionnaire: Used to collect data on the level of media practicality from the perspective of grade X students. This questionnaire assesses aspects of ease of learning, material integrity, presentation structure and navigation, learning motivation, and mastery of the material. This instrument has been validated by experts with an average result of 97% (Very Valid category).

The data analysis techniques used are as follows: 1) Validity Data Analysis: Data from the validation questionnaire assessment results from experts were analyzed using descriptive statistics with the Aiken's V formula as follows:

$$V = \frac{\sum s}{n(c-1)} \qquad (1)$$

$$s = r - l_o$$

Information:
V = Aiken's V coefficient
$s$ = The score given by each rater minus the lowest possible score
$r$ = The score given by the rater
$l_o$ = The lowest possible score on the Likert scale (in this study, $lo$=1)
c = The highest possible score on the Likert scale (in this study, c=4)
$n$ = Number of raters (in this study, n=6 experts)

**Table 1.** Interpretation of Aiken's V Index for Validity Levels

| Interval | Category |
|---|---|
| 0,78-1,00 | Valid |
| 0-0,77 | Invalid |

(Source: Ref [17])

2) Practicality Data Analysis: Data obtained from the practicality questionnaires completed by teachers and students underwent analysis using descriptive percentages, calculated with the formula presented below:

$$P = \frac{f}{N} x100\% \qquad (2)$$

Information:
$P$ = Percentage of practicality
$f$ = Total score obtained from the practicality questionnaire
$N$ = Maximum possible score on the practicality questionnaire

**Table 2.** Students and Teachers Response Result Criteria

| Interval | Category |
|---|---|
| 81%-100% | Very Practical |
| 61%-80% | Practical |
| 41%-60% | Quite Practical |
| 21%-40% | Less Practical |
| 0%-20% | Not Practical |

(Source: Ref [18])

## III. RESULTS AND DISCUSSION

### A. Result

The outcome of this research is a Physics learning media, built on Google Sites, tailored for the Class X Semester 1 Measurement curriculum. This media was developed by systematically progressing through the Analysis, Design, and Development stages of the ADDIE model. This media is designed to present material content interactively through text, images, learning videos, simulations, and quizzes, with a structure that includes a cover page, navigation menu, instructions for use, learning achievements and objectives, five material meeting units, evaluation, references, and a glossary.

The validity of the learning media was assessed by six experts, consisting of three Physics lecturers from Padang State University and three Physics teachers from Padang State Senior High School 5. The validation outcomes of the Google Sites Physics learning media are presented in Figure 1.

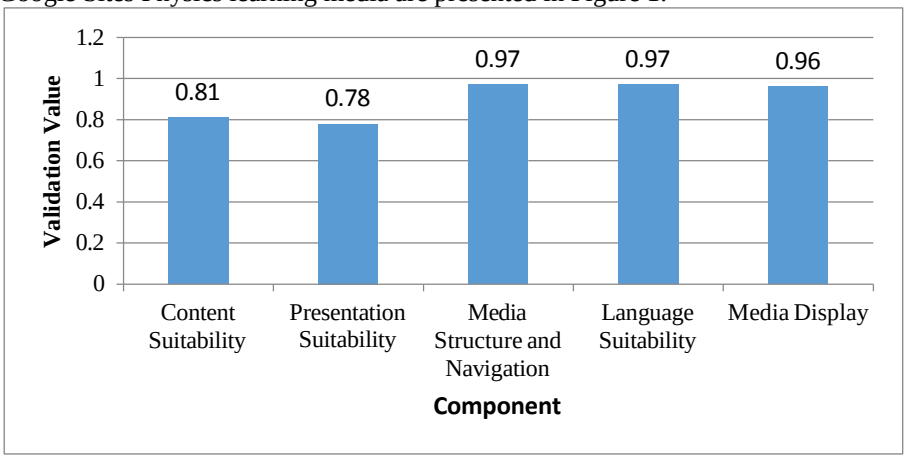


**Fig. 2.** The results of the validation of the Google Sites physics learning media

The validity assessment covers five main aspects: content suitability, presentation suitability, media structure and navigation, language suitability, and media display. The results of the validity data analysis showed an overall average score of 0.90, which is categorized as Valid based on Aiken's V criteria. The details of the average scores per component are as follows: content suitability (0.81), presentation suatibility (0.78), media structure and navigation (0.97), language suatibility (0.97), and media display (0.96). All of these components are also categorized as Valid.1 Based on input and suggestions from the validators, a number of revisions were made to the initial product, including improvements to sample questions, adding back navigation, adjusting font size, improving grammar and spelling, and updating supporting content such as image/video captions and bibliographies.

After revision based on validation results, the learning media was tested for its practicality on direct users, namely Physics teachers and class X students of SMA Negeri 5 Padang. The practicality test by three Physics teachers assessed five aspects: media content, media presentation, structure and navigation, ease of use, and media usefulness. A recapitulation of the average assessment results for each practicality component from the teacher's perspective can be seen in Figure 3.

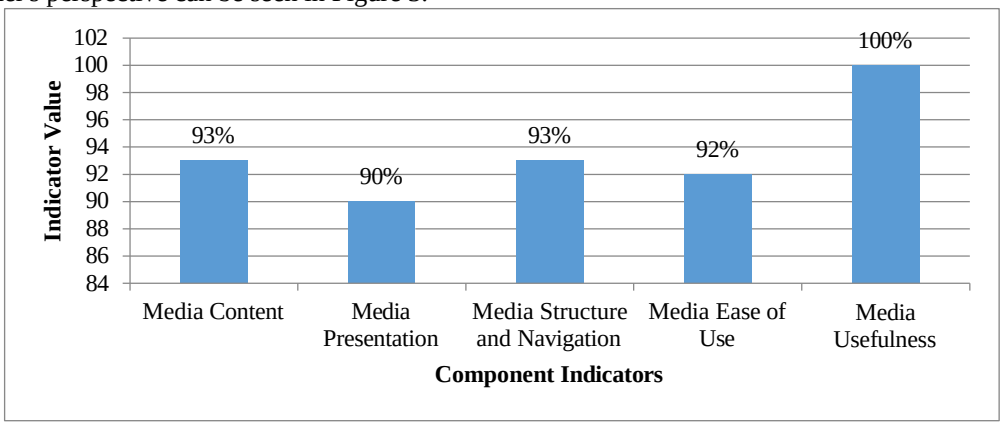


**Fig. 3.** Average Assessment Results of Teacher Practicality

The analysis results showed an average overall practicality score of 93.6%, which is categorized as Very Practical. The average scores for each component were: media content (93%), media presentation (90%), structure and navigation (93%), ease of use (92%), and media usefulness (100%), all of which showed a high level of practicality.

The practicality test by 40 grade X students assessed five aspects: ease of learning, integrity of material, presentation of structure and navigation, motivation in learning, and mastery of the material. The average value for each practicality component from the student perspective can be seen in Figure 4.

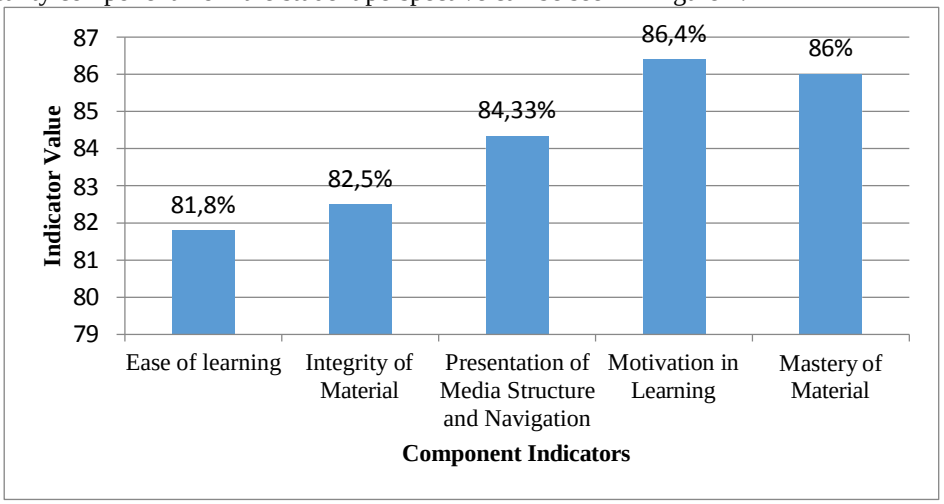


**Fig. 4.** Average Practicality Ratings from Students

The results of the analysis showed an average overall practicality score of 84.21%, which is categorized as Very Practical. The average scores for each component were: ease of learning (81.8%), integrity of material (82.5%), presentation, structure, and navigation (84.33%), motivation in learning (86.4%), and mastery of the material (86%). All components were assessed as Very Practical by students.

## B. Discussion

This study's results suggest that the Physics learning media, developed on Google Sites for the Measurement material for class X has met the eligibility criteria, both in terms of validity and practicality. The overall validity value of 0.90 (Valid) from the experts indicates that this media is considered feasible in terms of content, presentation, structure, language, and appearance after going through a revision process. The involvement of balanced experts, including academics and class practitioners, ensures that the product is not only theoretically

appropriate and aligned with the curriculum, but also based on the reality of classroom teaching. [13,14]. The high validity values in the aspects of structure and navigation (0.97), language (0.97), and appearance (0.96) indicate that the interface design and information delivery of this media are considered very good by experts. Furthermore, the results of the Very Practical practicality test, both from the perspective of teachers (93.6%) and students (84.21%), indicate that this media is easy to use, interesting, and useful in real learning contexts. This success can be traced to several key factors. First, the choice of the Google Sites platform itself makes a significant contribution to usability. Its intuitive interface and accessibility mean that neither teachers nor students need special software or extensive technical training to use the media effectively.[15, 16], Second, a user-centered and iterative development process ensures that the final product is tailored to the needs and preferences of its users [15]. Third, the media design is directly aligned with the learner characteristics identified during the analysis phase. The prominent inclusion of videos, images, and interactive simulations caters to learners' visual and digital learning preferences, thereby bridging the "practicality gap" between out-of-school digital habits and in-school learning experiences.

These findings are consistent with the growing body of literature highlighting the effectiveness and practicality of web-based learning media, especially those developed using Google Sites, in science and physics education [23]. These results confirm that when carefully designed, such media can increase learner engagement, support self-directed learning, and make abstract concepts more understandable [24]. The main implication of this study is to provide an empirically validated, low-cost, and easily replicable model for educators. This empowers teachers to shift from being mere consumers of educational technology to active creators of high-quality, customized digital learning resources. Teachers rated the media as very useful (100%) and strongly supported the ease of use (92%) and presentation of the material (90%). Positive responses were also given by students, especially in terms of learning motivation (86.4%) and support for mastery of the material (86%). This is in line with the goal of developing learning media, namely to produce media that is valid in terms of content and application and can be well received by users.

The results of this study support previous findings regarding the effectiveness and feasibility of web-based learning media. Various studies have shown that online platform-based Physics learning media such as Google Sites have high validity and practicality [25]. In addition, website-based learning media have also been proven to be considered very practical by students as end users [26]. This alignment strengthens the argument that platforms such as Google Sites have great potential as interactive and easily accessible Physics learning tools.

The development of this media is expected to contribute as an alternative innovative learning resource for teachers and students, especially in facilitating understanding of Physics concepts and supporting independent learning. However, this study has limitations, namely the scope of testing which only reaches the validity and practicality stages without directly testing its effectiveness on student learning outcomes, and the implementation of the study is limited to one school.

Overall, the Google Sites-based Physics learning media developed has been proven to be valid and very practical, so it is worthy of being used as one of the supporting media in the Physics learning process in class X.

## IV. CONCLUSION

The analysis of the research findings and preceding discussion leads to the following conclusions: First, a Physics learning media product based on Google Sites has been successfully developed for Measurement material for class X semester 1. This media is designed by implementing the ADDIE development model and integrating various content including textual materials, learning videos, visual illustrations, and interactive simulations to support a varied and interesting learning process.

Secondly, the developed Google Sites-based Physics learning media has been deemed suitable for implementation in the educational process. This eligibility is based on the results of the validity test by experts which showed an overall average score of 0.90 with the Valid category. In addition, from the practicality aspect, this media is considered Very Practical based on user responses, with an average score of 93.6% from Physics teachers and 84.21% from students. Thus, this learning media can be an alternative source of innovative and applicable learning to support Physics learning.

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