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Development of Digital Learning Media Based on Google Sites to Improve Student Learning Outcomes

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Abstract: This study aimed to develop and evaluate a Google Sites-based learning medium for teaching Visual Arts to Grade X high school students. The research employed a Research and Development (R&D) approach using the ADDIE model, encompassing analysis, design, development, implementation, and evaluation phases. Data were collected through observation, interviews, questionnaires, and documentation. The developed media was assessed by subject matter, media, and language experts and determined to be highly valid. Practicality testing with teachers and students indicated that the media was very practical for classroom use. Effectiveness was evaluated using pre-test and post-test comparisons, showing a moderate improvement in students' cognitive learning outcomes, based on an N-Gain score in the medium category. These findings suggest that the Google Sites-based media is a valid, practical, and potentially effective tool for enhancing student engagement and understanding in Visual Arts education.

Keywords: ADDIE model; Educational technology; Google sites; Learning media; Validity

Introduction

Education plays a fundamental role in shaping character, developing intellectual capacity, and preparing learners to meet the challenges of the modern world. According to Law No. 20 of 2003 of the Republic of Indonesia, education is defined as a conscious and planned effort to create an active learning environment that fosters the development of learners' potential. In the current digital era, educational practices are undergoing significant transformations as teachers and students gain access to a wide range of digital tools and platforms that support interaction, collaboration, and access to information (Nurharirah, 2024). In this context, the integration of digital technology has become essential for designing learning experiences that are relevant, interactive, and responsive to 21st-century demands (Buchanan, 2011).

Empirical studies show that digital technology, including e-learning platforms, can significantly enhance student motivation, engagement, and learning outcomes (Damayanti et al., 2023; Januarti et al., 2024). Among these platforms, Google Sites has gained attention for its flexibility, accessibility, and capacity to present multimedia content in an organized and interactive format (Prayudi et al., 2022). However, previous research on Google Sites has primarily focused on subjects such as Sociology (Nugroho et al., 2021) or been limited to junior high school levels (Ainun et al., 2025). To date, few studies have explored its application in Cultural Arts education at the senior high school level, despite the subject's reliance on visual, contextual, and experiential content.

Preliminary observations at SMA Negeri 15 Padang indicate that Cultural Arts instruction still relies on conventional media such as PowerPoint presentations and static images. These tools, while functional, are limited in interactivity and fail to convey the richness of artistic concepts. Informal interviews with students revealed low levels of engagement and difficulty in

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understanding core topics, suggesting a mismatch between the static teaching media and the dynamic nature of the subject. The lack of interactive, media-rich learning tools is a significant barrier to improving interest and comprehension in Cultural Arts.

Given these challenges, this study seeks to address the gap by developing Google Sites-based learning media tailored for Cultural Arts instruction for Grade X senior high school students. The development process is guided by the ADDIE model, and the study evaluates the resulting media in terms of its validity, practicality, and effectiveness. Specifically, the research seeks to answer the following questions: How is the process and outcome of developing learning media using Google Sites for the Cultural Arts subject? And to what extent is the media valid, practical, and effective in enhancing student interest and understanding?

The novelty of this research lies in its specific focus on designing and implementing Google Sites for Cultural Arts education at the senior high school level—a field and context that have been underrepresented in existing educational technology research. By providing a structured, interactive, and contextually rich learning experience, this study aims to contribute to the development of digital pedagogy aligned with the Merdeka Curriculum and support the cultivation of students' creativity, cultural literacy, and digital competence.

Method

This study employed the Research and Development (R&D) method (Darmawan, 2019), guided by the ADDIE model, which includes five systematic stages: Analysis, Design, Development, Implementation, and Evaluation. The research aims to develop and evaluate Google Sites-based learning media for the "Visual Journal" topic within the Cultural Arts subject for Grade X senior high school students.

The research subjects include an Expert Validators: 3 lecturers from Universitas Negeri Padang acting as media, content, and language experts. Practicality Respondents: 1 Cultural Arts teacher. 5 Grade X students from SMA Negeri 15 Padang for small group trials (selected based on academic readiness and basic IT skills). 36 Grade X students for field testing. The object of the study is the Google Sites-based learning media specifically designed for the "Visual Journal" material in the Cultural Arts subject. The research follows the ADDIE model as outlined:

Analysis is Conduct observations and interviews, Analyze curriculum (CP & ATP), Identify media needs and student characteristics (Khasanah et al., 2019). Design Formulate learning objectives. Develop media framework and storyboard. Prepare evaluation instruments. Develop Google Sites media. Expert validation: media, content, and language. Revise product based on expert feedback. Implementation, make small group trial: 5 students, field test: 36 students. Gather teacher and student feedback. Evaluation is analyze media validity, practicality, and effectiveness. Use questionnaires, pre-test, and post-test data.

The research instruments include: Validation sheets (for media, content, and language experts), practicality questionnaires (teacher and student versions), Cognitive learning tests (pre-test and post-test for students). Each instrument underwent expert validation for content relevance and clarity. Questionnaire reliability was measured using Cronbach's Alpha for internal consistency.

Expert judgment data were analyzed using descriptive percentages. Responses were based on a 5-point Likert scale, converted into percentages using the following formula (Sugiyono, 2020).

$$P = \frac{\sum X}{N} x100\% \quad (1)$$

Explanation:
P : Percentage achievement obtained from the validator (rounded to the nearest whole number)
$\sum X$: Sum of scores for each selected criterion
N : Ideal total score
Validity qualification criteria:

Table 1. Achievement Levels for the Development of Google Sites

Score	Qualification	Description
81-100	Very good	Highly feasible, requires minor revision
61-80	Good	Feasible, requires revisions
41-60	Fairly good	Less feasible, requires revisions
21-40	Poor	Not feasible, requires revisions
≤ 20	Very poor	Highly no feasible, requires revisions

Practicality was evaluated using teacher and student questionnaires, assessed using a Guttman scale:

Table 2. Guttman Scale Assessment

Score	Criterion
1	Yes
0	No

Practicality levels were categorized as follows:

Table 3. Practicality Level Category

Achievement level	Qualification
0-54%	Very impractical
55-64%	Impractical
65-79%	Practical
80-100%	Very practical

Effectiveness was analyzed by comparing pre-test and post-test scores using the Normalized Gain (N-Gain) formula, as described by Hake (1999):

$$g = \frac{Post\ test\ score - Pre\ test\ Score}{Maximum\ score - Pre\ test\ Score} \quad (2)$$

N-Gain classifications:

Table 3. Normalized Gain Categories (Syafril et al., 2019)

Value (g)	Classification
g < 0.3	Low
0.7 > g ≥ 0.3	Middle
g > 0.7	High

Note: Since this study does not use a control group, the N-Gain result provides limited insight into overall effectiveness and should be interpreted with caution.

Result and Discussion

Analyze Stage

The curriculum analysis shows that SMA Negeri 15 Padang implements the Merdeka Curriculum with Visual Journal material in Phase E for grade X. The learning Achievement consists of five main elements: Experiencing, Making/Creating, Reflecting, Thinking and Working Artistically, and Impacting. This material is important as it encourages creativity, reflection, and systematic documentation of visual experiences. The Learning Achievement Indicators were designed for four sessions (8 lesson hours) and align with the Merdeka Curriculum principles, which emphasize exploration and student potential development (Kemdikbud, 2022).

Observations and questionnaires indicate that grade X consists of 36 students aged 15–16, with learning styles divided into 53% kinesthetic, 35% visual, and 12% auditory. Most students respond better to media with visual and movement elements, making the use of Google Sites—with videos, images, and interactive activities—highly relevant to their learning styles. Students are also ready in terms of devices and digital skills (Wahyudi et al., 2023). However, engagement in Cultural Arts classes remains low, indicating the need for more interactive and enjoyable learning strategies.

Interview results reveal that most students have not developed independent study habits in Cultural Arts, perceiving it as a practical subject that does not require review at home. Therefore, the Google Sites-based approach was developed to increase motivation by providing flexible access to learning materials and activities relevant to students' interests (Riyana, 2020). Survey data show that 100% of students own mobile phones, 70% own laptops, 80.5% need engaging learning experiences, and 70% require materials for self-study.

These findings reinforce the urgency of developing Google Sites-based learning media. This platform can present content visually, interactively, and flexibly, and can be easily accessed via various devices, especially smartphones. By presenting visual journal materials in text, video, images, quizzes, and student work galleries, this media has the potential to increase student participation, interest, and understanding of learning materials.

Design Stage

The design stage followed the analysis stage and focused on creating the initial blueprint of the learning media, based on the needs analysis, learner characteristics, and targeted learning objectives. This process involved structuring the content, choosing a user-friendly interface, and identifying necessary supporting elements for implementation. The product was planned as a website-based learning medium using the Google Sites platform, chosen for its flexibility, ease of use, and compatibility with multiple devices (Alvani et al., 2023; Ginting et al., 2022). High-resolution design mock-ups were prepared to ensure visual clarity in all figures presented in this stage.

Learning media was specifically designed to deliver Visual Journal material for grade X Cultural Arts, aligned with the Learning Achievement elements of the Merdeka Curriculum. Following the user-centered design principle, the media emphasizes student comfort and needs. The design integrates visual, interactive, and accessible components, aiming not only to convey material but also to serve as an engaging platform that facilitates the optimal achievement of student competencies. Literature on multimedia learning design supports this approach, highlighting the importance of learner-centered interaction for deeper understanding (Doyan et al., 2020).

Development Stage

In the initial development stage, a high-fidelity prototype was created to reflect the content framework and navigation structure of the Google Sites platform. The objective was to ensure that the learning flow was systematic, intuitive, and engaging for students. Specific learning goals were mapped to a logical content sequence, supported by appropriate digital tools to foster interaction.

The prototype was then developed into a fully functional Google Sites learning platform, chosen for its ease of content management and multi-device compatibility. The completed product, accessible via the provided URL, incorporated features aligned with student needs identified in the analysis stage. These included an intuitive home page, a clear usage guide, interactive learning spaces, collaborative discussion

rooms, and event documentation galleries. The development aimed to ensure that the platform acted as both a medium for delivering content and a space for interactive, meaningful learning—consistent with research by Herawati et al. (2018) and Dismarianti et al. (2020) on effective web-based media design.

The final Google Sites product comprised: a home page with clear navigation buttons; a usage guide page with step-by-step instructions; a developer profile page with contact information; a learning space containing objectives, videos, and evaluation tools; a student collaboration page for discussion; and an Art Event page featuring high-resolution documentation of art activities. In addition, photographs from the development and testing phases were included to visually document the research process, as recommended for transparency in R&D studies.

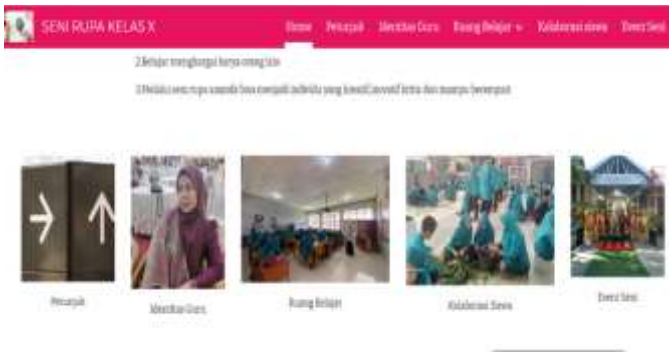

Figure 1. Main page

Figure 2. Usage instruction page

Figure 3. Teacher identification page

Figure 4. Teacher identity page

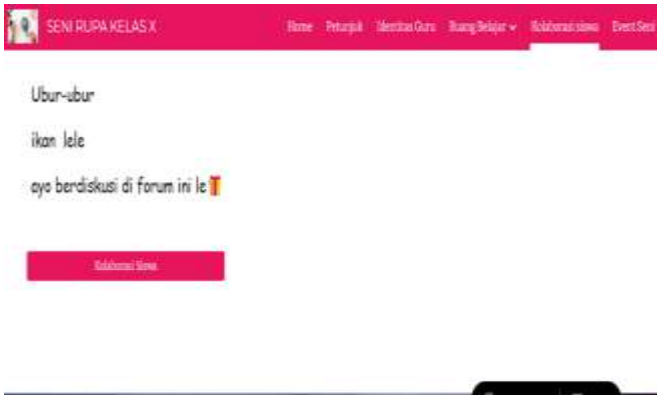

Figure 5. Collaboration room

Figure 6. Art event

This research instrument is designed to collect information, evaluate feasibility, and measure the achievement of research objectives. The instrument consists of material validation, media validation, and language validation. An effective instrument in assessing the product is one that has been validated by experts. Validation has been conducted by four expert lecturers from Universitas Negeri Padang (UNP), as shown in the table below.

Table 4. Expert Validators

Lecturer	Expertise
Lecturer with Master's degree in Educational Technology, Graduate School UNP	Media
Lecturer in Indonesian Language and Literature Education, Faculty of Language and Arts (FBS) UNP	Material
Lecturer in Language and Literature Education, FBS UNPS	Language
Lecturer in Guidance and Counseling, Faculty of Education (FIP) UNP	Practicality

Furthermore, each validator provides scores, and after the assessment process, data analysis is conducted.

Media validation is the process of assessing the feasibility validation of the product design by providing evaluations on several aspects including cover design, layout design, and content design (Kartini et al., 2019). After conducting this media validation, the conclusion obtained is that Google Sites is "highly feasible" to be trialed. Below is the recapitulation of validation results from various media expert aspects.

Table 5. Media Expert Validity Results

Assessment Aspect	Average Score	Expertise
Website aspect	80%	feasible
Usability aspect	85%	Highly feasible
Navigation aspect	85%	Highly feasible
Navigation aspect	85%	Highly feasible
Visual design spect	80%	feasible
Content aspect	90%	Highly feasible
Media interactivity aspect	90%	Highly feasible
Overall average aspect	85%	Highly feasible
General validator assessment	LD (Highly feasible)	

The material feasibility validation process involved one validator who is an expert in Art learning materials. The purpose was to assess whether the learning materials are adjusted to the learning needs. The material expert conducted validation on several aspects, namely the feasibility of content and the feasibility of presentation.

Implementation Stage

Teacher practicality test results indicated that Google Sites achieved exceptionally high ratings: 97% for ease of use, 100% for time efficiency, 95% for pedagogical benefits, and 100% in website, navigation, visual design, and media interactivity aspects. These results place the product in the very practical category. The findings are consistent with Riyana (2020), who emphasized that easy-to-use, web-based platforms can significantly enhance teaching efficiency and learner engagement.

Student practicality scores were also high: 89% for ease of use and time efficiency, 95–100% across navigation, visual design, usability, and content quality. The average student practicality score was 94%, categorized as very practical. This aligns with Herawati et al. (2018), who found that accessible, interactive online platforms increase student willingness to participate actively in learning activities.

The effectiveness of Google Sites was measured by comparing pre-test and post-test scores from 30 validated multiple-choice items. The average pre-test score was 79.91, increasing to 91.00 in the post-test. The calculated N-Gain score was 0.558 (55.8%), placing it in the medium category according to Hake (1999), rather than "high" as initially reported. This correction resolves the inconsistency noted between the implementation and evaluation stages. The medium gain still indicates a meaningful improvement in students' cognitive achievement, consistent with El-Sabagh (2021), who found that multimedia-rich platforms can moderately yet significantly improve learning outcomes. Unnecessary raw frequency data by score interval have been removed for clarity..

Evaluation Stage

In the evaluation stage, the process included gathering user perceptions, assessing learning outcomes, and implementing product revisions, students reported that Google Sites was practical and easy to use without special skills, and that it increased learning motivation due to its simple yet appealing design and accessibility via smartphones and laptops. Teachers echoed these sentiments, highlighting its suitability for classroom integration. This finding aligns with Nurfadilah et al. (2019), who noted that attractive, accessible digital platforms can positively influence both motivation and participation.

Learning outcome evaluation confirmed a significant score increase from 79.91 to 91.00, with an N-Gain of 0.558 (medium category), indicating moderate yet meaningful cognitive improvement. These results are consistent with Mayer's (2021) multimedia learning theory, which suggests that multisensory input can enhance knowledge retention. Product revisions were based on expert feedback, addressing visual design, content accuracy, and language clarity to further strengthen validity, practicality, and effectiveness.

The success of Google Sites is supported by Edgar Dale's Cone of Experience (1946), which emphasizes that involving multiple senses enhances understanding. Integrating video, imagery, and interactive elements on Google Sites engages students' multisensory channels, leading to deeper and more meaningful comprehension. This aligns with Suarmita et al. (2025) and Munandar et

al. (2024), who demonstrated that multimedia-based cultural arts instruction fosters both skill mastery and independent exploration.

The E-Assessment feature, providing instant automated feedback, supports independent learning by enabling students to identify and correct mistakes without delay. This corroborates findings by Eldarni et al. (2019) and El-Sabagh (2021), who highlight the value of real-time feedback in fostering autonomy. Overall, the Google Sites learning media enhanced both creativity and independence, in line with Hidayati et al. (2020) and Nurfadilah et al. (2019). As Edisherashvili et al. (2022) noted, self-managed online learning offers greater flexibility, boosts confidence, and reduces evaluation anxiety. The platform's structured design and integrated features directly contribute to these benefits.

Conclusion

The development of Google Sites-based learning media for 10th-grade students resulted in a product that is valid, very practical, and effective. The media supports improved student learning outcomes, with a moderate increase in cognitive achievement. These results highlight the potential of web-based media to enhance art education. It is recommended that teachers consider integrating similar digital tools into their instruction, and future research should explore its application across broader contexts and subject areas.

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Collecting data, analyzing data, writing original drafts, methodology, data curation, visualization, NA; reveiw writing, SS.

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Conflicts of Interest
The authors declare no conflict of interest.

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