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Integrating *Google Sites* and project-based learning: Development of digital learning media

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ABSTRACT

This study aims to develop Google Sites–based learning media integrated with a project-based learning approach for fifth-grade science education and to evaluate its validity, practicality, and effectiveness. The research employed a research and development (R&D) method using the 4D model, consisting of the stages of define, design, develop, and disseminate. The participants were fifth-grade students from three elementary schools: UPT SDN 02 Silaut, UPT SDN 07 Silaut, and UPT SDN 04 Silaut in Pesisir Selatan Regency. Data were collected through validation sheets, practicality questionnaires, and effectiveness tests. The results indicate that the developed media achieved high validity, with material experts rating it at 94%, display experts at 90%, and language experts at 94%, all categorized as "very valid." Practicality assessments also showed positive responses from teachers (91.73%) and students (89.06%), indicating that the media is "very practical" for classroom use. Furthermore, effectiveness testing demonstrated a significant improvement in student learning outcomes, with the average score increasing from 48.05 in the pre-test to 91.23 in the post-test, resulting in an N-Gain score of 85.47% (high category). These findings suggest that Google Sites–based learning media integrated with project-based learning is a valid, practical, and effective tool for enhancing elementary science learning.

INTRODUCTION

Digital learning media continue to evolve alongside rapid technological advancements, including the utilization of platforms such as Google Sites to support interactive learning environments (Al Mulhim & Zaky, 2023). Previous studies have explored the development of Google Sites–based learning media across various educational contexts. For instance, Bahtiar (2023), Ramadia (2023), and Irmawati (2017) developed interactive media for several Social

Studies topics and reported that Google Sites–based learning media are valid, engaging, and effective in improving students' conceptual understanding (Blanka et al., 2022). These studies highlight the potential of web-based learning platforms to enhance accessibility and interactivity in elementary education.

Despite these contributions, most prior research has primarily focused on evaluating the general effectiveness and feasibility of Google Sites–based media. Limited attention has been given to integrating this platform with innovative pedagogical approaches, such as Project-Based Learning (PBL), particularly within the context of the Integrated Science and Social Studies (IPAS) curriculum for Grade V elementary school (Hussein, 2021). In fact, IPAS learning includes contextual topics such as Indonesia's geographical conditions, which require interactive, context-based learning experiences that promote active student engagement (Wu, 2024). Without appropriate learning media and pedagogical strategies, students may struggle to understand abstract concepts and connect them to real-life situations.

Empirical observations conducted in several elementary schools in Silaut District namely UPT SDN 02 Silaut, UPT SDN 04 Silaut, and UPT SDN 07 Silaut indicate that Grade V students' learning outcomes in IPAS subjects remain below the Minimum Competency Criteria (KKM). Classroom learning activities were also found to be relatively monotonous and had not optimally utilized available technological facilities such as Chromebooks (Novalia et al., 2025). These conditions suggest the need for innovative digital learning media that can increase students' motivation, engagement, and learning outcomes (Rehman et al., 2024).

Project Based Learning (PjBL) offers an instructional approach that encourages students to actively construct knowledge through authentic projects and collaborative problem-solving activities (Almulla, 2020). Integrating PjBL with Google Sites can provide a digital platform that facilitates project documentation, collaborative learning, and access to multimedia resources, thereby supporting more student-centred learning experiences (Sánchez-García & Reyes-de-Cózar, 2025). Such integration also aligns with the principles of the Merdeka Curriculum, which emphasizes meaningful learning, student autonomy, and the use of technology to support learning innovation (Shafaa & Daulay, 2024).

Based on these considerations, this study addresses the gap in previous research by developing Google Sites–based learning media integrated with a Project Based Learning approach specifically for Grade V IPAS subjects. The novelty of this study lies in the integration of a web-based learning platform with the PjBL model to support contextual and technology-enhanced learning in elementary education. Furthermore, the study provides empirical evidence regarding the validity, practicality, and effectiveness of the developed media in improving students' learning outcomes and engagement.

METHOD

This study employed a Research and Development (R&D) approach to develop and evaluate a digital learning product (Anon, 1987). Research and development methods are used to produce educational products and to test their validity, practicality, and effectiveness in real learning contexts (Sugiyono, 2019). The development procedure in this study follows the 4D model, which consists of four stages: define, design, develop, and disseminate. The define stage involves identifying learning problems, analyzing curriculum requirements, and determining the characteristics of learners and learning materials. At this stage, the need for digital learning media in Grade V Integrated Science and Social Studies (IPAS) subjects was analyzed, particularly regarding the topic of Indonesia's geographical conditions (Alam et al., 2022). The design stage focuses on preparing the initial design of the learning media. This includes determining the structure of the Google Sites platform, designing learning content, preparing project-based learning activities, and developing assessment instruments. The media were designed to support the implementation of the Project-Based Learning (PjBL) model and to facilitate interactive and student-centred learning.

The develop stage involves producing the Google Sites–based learning media and conducting expert validation and limited trials. The product was evaluated by experts in material, media display, and language to assess its validity. After receiving feedback, revisions were made to improve the product's quality before it was implemented in classroom trials (Detzen & Verbeeten, 2025). Practicality testing was then conducted through teacher and student questionnaires to evaluate the usability and feasibility of the developed media. The disseminate stage refers to the broader introduction and distribution of the developed product after it has been validated and tested. In this study, dissemination was conducted by introducing the finalized learning media to teachers within the Silaut District school cluster and providing access to the Google Sites platform for instructional use.

The field testing of the developed product was conducted with Grade V students from three elementary schools UPT SDN 02 Silaut, UPT SDN 04 Silaut, and UPT SDN 07 Silaut which belong to Cluster 2 of public elementary schools in Silaut District. The research instruments included validation sheets, questionnaires, and learning outcome tests. Students' learning outcomes were measured using multiple-choice test items on Indonesia's geographical location (Saragi et al., 2021). Data analysis was conducted to evaluate the validity, practicality, and effectiveness of the developed learning media. Validity and practicality data were analyzed using percentage and achievement level techniques, while the effectiveness of the learning media was analyzed using pretest and posttest scores (Maimun & Jannah, 2023). The improvement in students' learning outcomes was measured using N-Gain analysis, and statistical significance was tested using a t-test (Wijaya et al., 2021).

RESULT AND DISCUSSION

RESULTS

Findings

The results of this study indicate that the Google Sites–based learning media integrated with a Project Based Learning (PjBL) model for the Grade V Integrated Science and Social Studies (IPAS) subject has undergone a comprehensive validation process involving experts in material, media design, and language. The purpose of this validation was to evaluate the quality and feasibility of the developed learning media in terms of content accuracy, presentation, and linguistic clarity before its implementation in classroom learning. The results of the expert validation are summarized in Tables 1–3, which show high levels of validity across the assessed aspects (Sulistyorini et al., 2025). The material experts evaluated the alignment of the learning content with curriculum standards, the accuracy of scientific concepts, the depth and relevance of the material, and its suitability for the cognitive level of elementary school students (Mustafidatul et al., 2025).

The evaluation results indicate that the material aspect achieved a validity score of 94%, categorized as "very valid." This suggests that the learning content presented in the Google Sites media is consistent with the curriculum and appropriately supports students' conceptual understanding. Furthermore, media design experts assessed the visual layout, navigation structure, and the integration of multimedia elements within the Google Sites platform. The evaluation results show a validity score of 90%, categorized as "very valid." The experts noted that the media effectively integrates various supporting elements, such as images, videos, and structured learning pages, which enhance the interactivity and attractiveness of the learning environment (Astari et al., 2026). In addition, the organization of content within the Google Sites platform was found to support the implementation of project-based learning activities by clearly presenting project stages, learning resources, and student outputs in a systematic manner (Cahayati et al., 2025).

The language experts evaluated the clarity, readability, and appropriateness of the language used in the learning media. The results show a validity score of 94%, also categorized as "very valid." The experts concluded that the language used in the media is clear, communicative, and suitable for the comprehension level of Grade V students. Overall, the validation results presented in Tables 1–3 demonstrate that the developed Google Sites–based learning media meets the required standards in terms of content, media design, and language aspects, indicating that the product is highly valid and feasible for implementation in elementary school learning. Although the overall evaluation results indicate a very high level of validity, experts suggested several minor revisions to further clarify certain explanations and enhance the visual presentation of some learning components.

Table 1. Validation results by material experts

Aspect	Indicator	V1	V2
Content Knowlegde	Alignment of the material with the Learning Outcomes (CP)	4	4
	Relevance of the topic to the material	4	4
	Presentation of the material that engages students in carrying out learning activities	3	4
	Contains learning steps and materials that help students learn independently	4	3
Content Knowledge	Explanations are easy to understand	4	4
	Material explanations are concise, clear, and straightforward	4	4
Attractiveness	Able to motivate students to discuss with their peers	3	3
	Suitability of the media with students' conditions	4	3
Flexibility	The media is relevant to the material that students must learn	4	4
Quality of social interaction	Active involvement of students in the learning process	3	4
	The media is easily accepted by students	4	4
Impact on students	Provides an impact on students in the form of improved learning outcomes	4	4
Impact on teachers	Facilitates teachers in the learning process	4	4
	Supports the smooth implementation of learning	3	4
Total		**52 (93%)**	**53 (95%)**

Based on the table above, it can be seen that the average validation score from the material expert reached 94%, which falls into the "very valid" category. This indicates that the developed product is considered highly feasible for field implementation, although there are still several aspects that need improvement. The material expert's comments suggest adding more engaging and relevant images related to the field of Silat, as well as improving the provision of basic questions at the beginning of the lesson. These suggestions and inputs from the material expert will be used as the basis for revising the content in the Google Sites–based learning media developed using the project-based learning model. Furthermore, the results of the validation conducted by the media/design expert regarding the Google Sites–based learning media for the IPAS subject, assessed through a display validation questionnaire, will be presented next.

Table 2. Validation Results for Media Aspects

Aspect	Indicator	V1	V2
Readability	Accuracy of layout selection	3	3
	The shape and size of the font are designed to be appealing to students.	3	4
	The appearance and design of the learning media present the material in an engaging manner.	4	3
	Background color in relation to the text and images.	4	4
	The addition of images and illustrations in the learning media is attractive but not excessive.	3	3
	Accuracy in media selection.	4	3
	Appropriateness of font choice.	4	4
	Appropriateness of text size.	4	4
	Suitability of images with the learning material.	4	3
	Clarity of image colors.	3	4
Display	The text/material displayed in the learning media is clear and easy to understand.	4	3
	Accuracy of text color that is easy to read.	4	4
Total		**44 (90%)**	**42 (88%)**

Based on the table above, it is known that the average validation score from the media expert reached 90%, which falls into the "very valid" category. This indicates that the developed product is considered highly feasible for field use. The results of the display or media validity for the Google Sites based learning media using the project-based learning model show a very high score, making it highly suitable for implementation in the Grade V IPAS subject in elementary school. By considering the descriptive explanation of the validation results from expert validators regarding the development of Google Sites–based learning media with a project-based approach for the IPAS subject in elementary school, these results can be summarized in the following validity assessment recap table.

Table 3. Recapitulation of Validity Results by Experts

No	Aspect	Validity	Category
1	Material	94%	Very Valid
2	Media	90%	Very Valid
3	Language	94%	Very Valid

Regarding the feasibility category, the validity results for developing learning media using Google Sites with a project-based learning model for the IPAS subject in elementary school fall into the highly feasible category across material, visual/media, and language aspects. This research discussion presents the process of testing the validity, practicality, and effectiveness of the Google Sites–based learning media developed using a project-based learning model.

Discussion

Validity of Google Sites–Based Learning Media

The validity of the Google Sites–based learning media integrated with the Project-Based Learning (PjBL) model for Grade V IPAS learning was examined through a comprehensive expert validation process. This validation involved five experts consisting of two media or visual design experts, one language expert, one subject matter expert from the university, and one practitioner teacher from the elementary school level (Risnaini et al., 2020). The inclusion of multiple validators from different areas of expertise was intended to ensure that the developed learning media met the standards of pedagogical quality, content accuracy, linguistic clarity, and visual effectiveness (Musfiroh et al., 2025). Such a multi-perspective validation process is essential in educational product development because learning media must not only convey accurate subject matter but also present it through appropriate language and attractive visual design to facilitate students' understanding and engagement (Safitri et al., 2022).

The media or visual experts focused their evaluation on aspects related to interface design, layout organization, navigation structure, visual attractiveness, readability, and the integration of multimedia elements within the Google Sites platform. These elements are crucial in web-based learning environments because the effectiveness of digital learning media is highly influenced by usability and visual communication. A well-designed interface can enhance learners' motivation and reduce cognitive load, allowing students to focus more on the learning content rather than on navigating the system. The validation results show that the media or visual aspect obtained a score of 90%, which falls within the "very valid" category. This indicates that the design of the learning media has successfully met the expected standards of digital learning media development, including clarity of navigation, consistency of visual elements, and suitability of design for elementary school learners (Hidayat et al., 2024).

Meanwhile, the material expert evaluated the accuracy, depth, and relevance of the IPAS learning content presented in the media. This validation included examining the alignment of the learning materials with the elementary school curriculum, the appropriateness of the learning objectives, the correctness of scientific concepts, and the suitability of the evaluation questions provided in the media. The material validation result reached an average score of 94%, which is categorized as "very valid." This high score indicates that the content embedded in the Google Sites–based media accurately represents the learning competencies expected in Grade V IPAS subjects. Furthermore, integrating the Project-Based Learning model into the media supports the development of higher-order thinking skills by encouraging students to explore problems, conduct investigations, and produce outcomes relevant to real-life contexts.

The language expert's validation focused on the clarity, readability, and appropriateness of the language used in the learning media. Language plays a critical role in instructional materials because it directly affects students' comprehension of the presented information. For elementary school learners, language must be simple, communicative, and aligned with their cognitive development level. The validation results indicate that the language aspect achieved a score of 94%, placing it in the "very valid" category. This finding suggests that the language used in the media effectively supports learning by presenting information clearly, understandably, and pedagogically appropriately.

Overall, the results of the validation process demonstrate that the developed Google Sites–based learning media achieved a very high level of validity across all assessed aspects, including content, media design, and language. The consistently high scores obtained from each validator indicate that the learning media has fulfilled the essential criteria required for educational media development. These criteria include content accuracy, instructional relevance, visual effectiveness, and linguistic clarity. As a result, the product can be considered suitable for implementation in the elementary school learning process, particularly for Grade V IPAS learning.

These findings are consistent with previous studies that emphasize the effectiveness of web-based learning platforms in enhancing the feasibility and quality of digital learning media. For instance, (Rosena et al., 2022) reported that the development of web-based learning media using Google Sites demonstrated excellent feasibility based on expert validation results (Rosena et

al., 2022). Their study highlighted that Google Sites provides flexible features that allow educators to organize learning materials, multimedia content, and interactive elements in a structured manner, thereby supporting more engaging and accessible learning experiences. Similarly, (Rahmah et al., 2025) argued that learning media can be categorized as valid when the development process incorporates systematic revisions based on expert suggestions (Rahmah et al., 2025). Such iterative improvements ensure that the final product meets pedagogical standards and addresses potential weaknesses identified during the validation stage.

In a broader perspective, the high validity of this study also underscores the potential of integrating digital platforms with innovative instructional models, such as Project-Based Learning. The combination of Google Sites as a web-based learning platform and the PjBL approach creates opportunities for more student-centred learning experiences. Through project-based activities, students are encouraged to actively construct knowledge, collaborate with peers, and apply scientific concepts to real-world situations. When supported by well-designed digital media, these activities can enhance learning engagement, deepen conceptual understanding, and promote meaningful learning outcomes.

Therefore, based on the comprehensive validation results and the support of previous research findings, it can be concluded that the Google Sites–based learning media developed in this study is highly valid and appropriate for use in elementary school learning. Its integration with the Project-Based Learning model provides an innovative instructional tool that can support interactive, contextual, and student-centered learning processes, particularly in Grade V IPAS subjects. Furthermore, the strong validity evidence suggests that the media has significant potential to improve the quality of digital learning implementation in elementary education.

Implementation of Google Sites–Based Learning Media

The practicality of the Google Sites–based learning media integrated with the Project-Based Learning (PjBL) model was evaluated through questionnaire responses obtained from both teachers and students who participated in the learning process. The practicality assessment aimed to determine the extent to which the developed learning media could be easily used, understood, and implemented in real classroom situations (Ningsi & Hartono, 2025). In educational product development, practicality is an important indicator because even a highly valid learning media may not be effective if it is difficult for teachers to implement or for students to access and operate. Therefore, measuring the practicality of the media provides insight into how well the product supports the learning process in actual educational settings.

The teacher questionnaire consisted of 8 items designed to measure two main aspects: usefulness and applicability. The usefulness aspect evaluated how far the media supports teaching activities, facilitates the explanation of learning materials, and helps teachers manage the learning process more effectively. Meanwhile, the applicability aspect examined whether the media could be easily integrated into classroom instruction, whether the features available in Google Sites support the implementation of project-based learning activities, and whether the media aligns with the learning objectives in Grade V IPAS and Mathematics subjects. Based on the questionnaire results, the teacher provided an average score of 92%, which falls into the "highly practical" category. This high score indicates that the teacher perceived the developed learning media as beneficial and easy to apply during classroom instruction. The teacher's positive response also suggests that the Google Sites platform provides a flexible and supportive environment for delivering instructional materials, organizing project activities, and guiding students through the stages of project-based learning.

In addition to teacher responses, the practicality evaluation also involved students as primary users of the learning media. The student questionnaire consisted of eight items focusing mainly on the practicality and ease of use of the Google Sites–based learning media (Gessa et al., 2025). These items assessed several aspects, including the clarity of navigation, the ease of accessing learning materials, the attractiveness of the visual presentation, and the extent to which the

media helped students understand the learning content. The results show that the average score obtained from students was 89.1%, which is also categorized as "highly practical." This result indicates that students generally found the media easy to use, accessible, and supportive of their learning activities. For elementary school students, particularly those in Grade V, user-friendly digital interfaces are essential because they allow students to focus more on learning tasks rather than on technical difficulties when interacting with the learning platform.

The high practicality scores obtained from both teachers and students demonstrate that the Google Sites–based learning media can be effectively implemented in classroom practice. The combination of clear content organization, simple navigation, and visually engaging design contributes to a positive user experience (Guo et al., 2025). Moreover, the integration of the Project-Based Learning model within the media structure enables students to follow project stages systematically, from problem identification and information exploration to project completion and reflection (Priyadarshini, 2024). Such a structure helps teachers guide students through meaningful learning experiences while maintaining a manageable instructional process. Another important aspect revealed in this practicality evaluation is the ability of the media to support both IPAS and Mathematics learning for Grade V elementary school students. The integration of diverse subject content into a single digital platform enables students to access learning materials more efficiently and encourages interdisciplinary understanding (Fitzgerald & Evans, 2024). Furthermore, the use of multimedia elements such as images, links, and structured project instructions makes the learning process more interactive and contextual. When students encounter visual representations that relate to their daily experiences, their cognitive engagement with the material tends to increase, thereby improving comprehension and retention.

The results of this study are supported by previous research emphasizing the effectiveness and practicality of web-based learning media. (Hidayati et al., 2024) found that Google Sites–based learning media can be implemented effectively with minimal technical obstacles, allowing teachers and students to use the platform continuously as part of the learning process (Hidayati et al., 2024). The flexibility of the Google Sites platform enables teachers to organize learning materials systematically while maintaining accessibility for students both inside and outside the classroom. This ease of access is particularly beneficial in modern learning environments where digital learning resources are increasingly integrated into everyday educational activities. Similarly, research conducted by (Mustafidatul et al., 2025) highlights that Google Sites–based learning media can enhance students' understanding of learning materials through the use of relevant and attractive visual elements (Mustafidatul et al., 2025). Visual representations that are connected to students' real-life experiences help bridge the gap between abstract concepts and concrete understanding. For elementary school learners, this approach is especially important because their cognitive development is still closely linked to concrete and contextual learning experiences. As a result, the use of meaningful images and interactive digital content contributes to more effective knowledge construction.

Overall, the findings of the practicality evaluation indicate that the developed Google Sites–based learning media demonstrates a high level of usability and accessibility for both teachers and students. The positive responses from users suggest that the media not only supports instructional activities but also enhances students' engagement and understanding of the learning materials. Consequently, the integration of Google Sites with the Project-Based Learning model can be considered a practical and effective approach for supporting interactive, student-centered learning in Grade V elementary school, particularly in IPAS and Mathematics subjects.

Effectiveness of Google Sites–Based Learning Media

The effectiveness of the Google Sites–based learning media integrated with a Project-Based Learning (PjBL) approach for Grade V elementary school was evaluated after the product had passed the stages of expert validation and practicality testing involving teachers and students. In research and development studies, effectiveness represents a crucial indicator that measures whether the developed learning media can significantly improve students' learning outcomes

and learning experiences (Sipahutar & Harahap, 2025). While validity ensures that the product meets academic and design standards, and practicality reflects its ease of use in real classroom situations, effectiveness demonstrates the actual impact of the media on student learning performance. Therefore, assessing effectiveness provides empirical evidence regarding the instructional value of the developed media in supporting the learning process.

The effectiveness of the media in this study was determined by analysing students' learning outcomes through pretest and posttest assessments. The pretest was conducted before implementing the Google Sites–based learning media to measure students' initial understanding of the learning material. This stage served as a baseline to identify students' prior knowledge and the level of mastery before the intervention. The results of the pretest showed that the average student score was 48.05, indicating that students' initial understanding of the learning content was relatively low and that many students had not yet mastered the key concepts being studied. Such findings are common in elementary-level learning when students have not yet been exposed to structured digital learning media or interactive learning approaches that encourage active engagement with the material (Aryfien et al., 2025). After the learning process was conducted using the Google Sites–based learning media integrated with the Project-Based Learning model, students were given a posttest to measure their level of understanding after the instructional intervention (Marini et al., 2025). The posttest results showed a substantial improvement, with the average student score increasing to 91.23. This significant increase demonstrates that the use of the developed learning media contributed positively to students' comprehension of the material. The structured presentation of learning materials through Google Sites, combined with project-based activities that encourage exploration, collaboration, and problem-solving, enabled students to engage more deeply with the learning content (Baziukė et al., 2025). As a result, students were able to achieve higher levels of conceptual understanding compared in their initial learning condition.

To further analyze the level of improvement in student learning outcomes, the data were also examined using the Normalized Gain (N-Gain) formula, which measures the effectiveness of an instructional intervention by comparing the improvement between pretest and posttest scores relative to the maximum possible improvement. The analysis resulted in an N-Gain score of 0.8547 or 85.47%, which falls into the "high" category of learning effectiveness. This high N-Gain value indicates that the learning media was very effective in improving students' understanding of the subject matter. In educational research, an N-Gain value above 0.7 is generally considered to represent a highly effective learning intervention. Therefore, the results of this study provide strong evidence that the integration of Google Sites–based learning media with the Project-Based Learning approach can significantly enhance student learning outcomes (Cahayati et al., 2025).

Several factors may explain the high level of effectiveness observed in this study. First, the Google Sites platform enables teachers to organize learning materials in a structured, accessible, and visually engaging format. Students can easily navigate the learning pages, access supporting resources, and follow step-by-step instructions for completing learning tasks and projects. This accessibility reduces learning barriers and allows students to revisit the learning materials whenever needed, thereby reinforcing their understanding of the concepts being studied. Second, integrating the Project-Based Learning model encourages active student participation in the learning process. Through project-based activities, students are not merely passive recipients of information but instead become active learners who explore problems, collaborate with peers, and apply their knowledge to real-world situations. This active learning environment fosters deeper cognitive engagement, thereby improving learning outcomes.

The use of digital learning media such as Google Sites supports a more interactive and student-centered learning environment (Cahayati et al., 2025). Multimedia elements, structured learning paths, and contextual learning tasks can stimulate students' curiosity and motivation (Monib et al., 2025). When students are actively engaged in meaningful learning activities, their ability to understand and retain information increases significantly. This pedagogical approach aligns with contemporary educational principles that emphasize experiential learning, inquiry-based

learning, and collaborative learning as effective strategies for developing students' cognitive and problem-solving skills (Morris, 2025).

The findings of this study are also consistent with previous research that highlights the effectiveness of digital learning media in improving student achievement. (Adrian & Saputra, 2025), for example, reported that learning media developed through digital platforms demonstrated effective results based on the analysis of students' learning outcomes using the N-Gain test (Adrian & Saputra, 2025). Their research showed that the developed media significantly improved students' understanding of the learning materials and supported more effective classroom instruction (Efi Tasfiyatul Millah et al., 2025). These findings reinforce the argument that technology-integrated learning media can enhance the quality of teaching and learning when designed according to sound pedagogical principles (Fredy et al., 2026).

Based on the overall results of the effectiveness analysis, it can be concluded that the Google Sites–based learning media integrated with the Project-Based Learning model is highly effective in improving students' learning outcomes in Grade V IPAS learning. The significant increase in posttest scores and the high N-Gain value demonstrate that the developed media successfully supports students in understanding the learning material more deeply and meaningfully. In addition, the combination of digital learning platforms and active learning models provides a promising approach for enhancing learning engagement and academic performance in elementary education. Consequently, the implementation of Google Sites–based learning media has strong potential to foster innovative and effective learning practices in primary school classrooms.

CONCLUSION

The validity test of the Google Sites–based learning media for Grade V elementary school students showed highly satisfactory results. The material experts gave a score of 94%, the design/display experts gave 90%, and the language expert also gave 94%. Thus, this instructional material is categorized as very valid and can be used as a learning media for the Grade V IPAS subject. Furthermore, the practicality evaluation results indicate that the Google Sites–based learning media is classified as "highly practical", with an average score of 89.06% from students and 91.73% from teachers. This shows that the learning media is easy to implement in the Grade V IPAS learning process. Finally, the effectiveness test results of the Google Sites–based learning media demonstrate that the instructional material is effective, achieving a score of 85.47%. A significant improvement in student learning outcomes is clearly visible, where the average Pre-test score was 48.05, while the average Post-test score increased to 91.23. Additionally, an N-Gain score of 0.8547 and an N-Gain percentage of 85.47% indicate that the Google Sites–based learning media for Grade V elementary school is highly effective in supporting the teaching and learning process.

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