



# Development of Deep Learning-Oriented Google Sites Interactive Learning Media to Support SDG 4: Quality Education in High School English Learning

Rosnilawati<sup>1</sup>, Alwen Bentri<sup>1</sup>, Zellhendri Zen<sup>1</sup>, Mutiara Felicita Amsal<sup>1</sup>, Rayendra<sup>1\*</sup>

<sup>1</sup> Educational Technology, Universitas Negeri Padang, Padang, Indonesia.

Received: April 24, 2026

Revised: May 22, 2026

Accepted: June 25, 2026

Published: June 30, 2026

Corresponding Author:

Rayendra

[rayendra@fip.unp.ac.id](mailto:rayendra@fip.unp.ac.id)

DOI: [10.29303/jppipa.v12i6.15080](https://doi.org/10.29303/jppipa.v12i6.15080)

 Open Access

© 2026 The Authors. This article is distributed under a (CC-BY License)



**Abstract:** English learning at the high school level still faces various challenges, such as time constraints, low interaction, and the dominance of one-way learning that does not support 21st century skill development. This research aims to develop Google Sites-based interactive learning media that is oriented towards deep learning to improve understanding of concepts and student engagement. This research uses the Research and Development (R&D) method with the ADDIE model which includes the stages of analysis, design, development, implementation, and evaluation. The subjects of the study were 36 students of class X Phase E at SMAN 7 Padang. The research instruments include expert validation sheets, practicality questionnaires, and learning outcome tests. The data were analyzed descriptively, quantitatively, and qualitatively and used the N-gain test to measure effectiveness. The results showed that the media developed had a validity level of 95% (very feasible category), a practicality level of 95% (teachers) and 90% (students) (very practical category), and high effectiveness with an increase in average score from 58.7 (pretest) to 89.72 (posttest) and an N-gain value of 0.80 (high category). These findings show that Google Sites-based interactive learning media oriented to deep learning has proven to be valid, practical, and effective in improving students' understanding of concepts in English learning.

**Keywords:** 21st century skills; Deep learning; English learning; Google sites; Interactive learning media; Learning outcomes; Senior High School

## Introduction

The development of 21st century education demands the integration of technology in learning to improve critical thinking, creativity, collaboration, and communication skills. One of the efforts that can be made is through the development of digital-based interactive learning media that is able to create a more meaningful and contextual learning experience (Ali et al., 2024; Delvita et al., 2025). In this context, the use of digital platforms such as Google Sites is a potential alternative because of its ease of access, flexibility, and ability to integrate various learning content in an integrated manner (Astarina et al., 2024; Maryani et al., 2022; Mayangsari et al., 2025).

Several studies show that Google Sites is effectively used as an interactive learning medium because it supports the presentation of materials in a systematic, real-time, and collaborative manner. The platform allows the integration of features such as navigation menus, learning objectives, interactive activities, and evaluations that can improve student engagement and learning outcomes (Mayangsari et al., 2025; Noviarni et al., 2023; Tamrin et al., 2024). In addition, the use of Google Sites in problem-based learning has also been shown to significantly improve students' 21st century skills (Tamrin et al., 2024).

On the other hand, the deep learning approach is one of the important strategies in improving the quality of learning (Fadhlorahman et al., 2026; Lusiani et al.,

### How to Cite:

Rosnilawati, Bentri, A., Zen, Z., Amsal, M. F., & Rayendra. (2026). Development of Deep Learning-Oriented Google Sites Interactive Learning Media to Support SDG 4: Quality Education in High School English Learning. *Jurnal Penelitian Pendidikan IPA*, 12(6), 1-5. <https://doi.org/10.29303/jppipa.v12i6.15080>

2026). This approach emphasizes conceptual understanding, critical thinking skills, and the application of knowledge in real contexts. The integration of deep learning approaches in interactive learning media has been proven to increase student engagement and learning outcomes (Syaadah et al., 2025; C. Wu et al., 2022). In fact, in the context of digital-based English learning, the application of deep learning-based technology is able to increase learning motivation through personalization of learning experiences and more adaptive interactions (L. Chen, 2024).

In English learning, the use of interactive media is also very important to overcome learning problems that tend to be monotonous and do not actively involve students. The development of media such as e-modules and web-based platforms that integrate multimedia (video, audio, and interactive activities) has been shown to increase students' interest, participation, and language skills (Islami et al., 2021; C. Wu et al., 2022). In addition, gamification approaches and interactive activities in English learning also contribute to increasing students' motivation and learning outcomes (Afandi & Khobir, 2025; C. Chen, 2025). The results of the preliminary study at SMAN 7 Padang show that student involvement in English learning is still low. Students tend to be passive, have difficulty understanding analytical material such as analytical exposition texts, and are not optimal in developing high-level thinking skills. On the other hand, teachers face obstacles in learning management due to administrative burdens, time constraints, and the lack of optimal use of interactive and integrated learning technology.

In the development of learning media, the Research and Development (R&D) approach with the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model is widely used because it provides a systematic framework in producing valid, practical, and effective products (Irwan et al., 2021; Roemintoyo et al., 2022). This model allows the development of learning media that suits the needs of learners as well as dynamic learning contexts. Although studies have shown the effectiveness of using Google Sites, deep learning approaches, and interactive learning media separately, there are still research gaps that integrate these three aspects specifically in English learning at the high school level. Therefore, it is necessary to develop interactive learning media based on Google Sites that is oriented towards a deep learning approach to increase engagement, conceptual understanding, and optimal student learning outcomes.

## Method

Although studies have shown the effectiveness of using Google Sites, deep learning approaches, and

interactive learning media separately, there are still research gaps that integrate these three aspects specifically in English learning at the high school level. Therefore, it is necessary to develop interactive learning media based on Google Sites that is oriented towards a deep learning approach to increase engagement, conceptual understanding, and optimal student learning outcomes (Okpatrioka, 2023).

The development model used in this study is ADDIE (Analysis, Design, Development, Implementation, Evaluation). This model was chosen because it is systematic, structured, and flexible in the development of learning products (Adriani et al., 2020; Branch, 2009). In addition, the ADDIE model allows for an ongoing evaluation and revision process at every stage, so that the resulting products can be adjusted to user needs and real conditions in the field. The first stage is analysis which aims to identify learning needs. At this stage, curriculum analysis, product needs analysis, and student characteristics analysis are carried out. Data was collected through observations, interviews, and questionnaires to teachers and students. The analysis is focused on phase E English learning, especially analytical exposition text materials, as well as readiness to use technology in learning.

The second stage is design which includes the preparation of learning objectives, material development, selection of learning strategies and media, and the design of deep learning-based activity flows. Learning activities are designed by integrating the stages of understanding, applying, and reflecting to encourage meaningful learning. Media design is poured in the form of menu structures and web-based interactive displays.

The third stage is development, which is the process of creating interactive learning media based on Google Sites that integrates various multimedia elements such as text, videos, quizzes, and reflective activities. The developed product is then validated by media experts, subject matter experts, and linguists to ensure the feasibility of content, display, and language usage. The validation results are used as a basis for product revisions before the implementation stage. The fourth stage is implementation, which is the application of learning media that has been developed to students. The implementation was carried out through limited trials and field trials on phase E high school students at SMAN 7 Padang. This stage aims to determine the level of practicality of using media and its effectiveness in improving student engagement and learning outcomes. The last stage is evaluation which is carried out in a formative and summative manner. Formative evaluation is carried out at each stage of development to improve the product, while summative evaluation is carried out to assess the final quality of the product

based on aspects of validity, practicality, and effectiveness.

The subjects of this study consist of media experts, material experts, and linguists from lecturers, as well as English teachers and E phase students at SMAN 7 Padang. The object of the research is an interactive learning media based on Google Sites oriented deep learning that was developed. The research instruments used include observation sheets and interviews for needs analysis, expert validation questionnaires using the Likert scale, practicality questionnaires using the Guttman scale, and learning outcome tests in the form of pretests and posttests. Data collection techniques are carried out through observation, interviews, questionnaires, and learning outcome tests. Data analysis techniques are carried out qualitatively and quantitatively. Validity and practicality analysis uses descriptive statistics in the form of percentages to determine the feasibility level of the product. An N-gain calculation was carried out to determine the increase in student learning outcomes based on pretest and posttest scores. Meanwhile, qualitative data from observations and interviews were analyzed thematically to strengthen the research results.

## Result and Discussion

This study uses the ADDIE (Analysis, Design, Development, Implementation, Evaluation) development model to produce interactive learning media based on Google Sites oriented to deep learning on analytical exposition text materials at the high school level. The results of the study include three main aspects, namely validity, practicality, and effectiveness. At the analysis stage, it was found that English learning is still dominated by a teacher-centered approach, limited media use, and not optimal reflective activities. The results of the questionnaire showed that 78% of students had difficulty understanding and reflecting on the material, while 100% of students expressed a need for interactive learning media. In addition, the characteristics of students who tend to be visual, digital oriented, and have high access to smartphones indicate readiness for the implementation of web-based media.

At the design and development stage, the media is designed by integrating deep learning principles through three main stages, namely understanding, applying, and reflecting. The media contains various interactive features such as videos, quizzes, learning activities, as well as the integration of supporting platforms such as Edpuzzle and Google Form.

The results of the validity test showed that the developed media was in the category of very valid. Validation by media experts obtained a score of 95.7%, material experts 95.0%, and linguists 94.7%. These

results show that the media has met the feasibility aspects in terms of appearance, content, and language use, so that it is feasible to be implemented in learning.



Figure 1. Initial media appearance

At the implementation stage, a practicality test was carried out on teachers and students at SMAN 7 Padang. The results show that the media has a very high level of practicality. The assessment from teachers obtained an average of 94.61%, while from students it was 90.17%, both of which were in the category of "very practical". This indicates that the media is easy to use, efficient, and useful in supporting learning. Furthermore, at the evaluation stage, an effectiveness test is carried out through pretest and posttest. The results showed a significant increase in student learning outcomes, with an average pretest score of 58.7 increasing to 89.7 in the posttest. The N-gain value of 0.85 is in the high category, which shows that learning media is effective in improving students' understanding of the material.

### Discussion

The results of the study show that Google Sites-based interactive learning media oriented to deep learning has a high level of validity, practicality, and effectiveness. These findings confirm that the integration of technology and the right pedagogical approach can significantly improve the quality of learning. From the aspect of validity, the high score obtained shows that the media has met quality standards both in terms of design, materials, and language. The revision process based on expert input contributes to improving the visual appearance, language consistency, and clarity of the material. The high validity results in this study are in line with the findings Syaadah et al. (2025) and Irwan et al. (2021) which states that web-based learning media that go through a systematic expert validation process tends to have high quality and are suitable for use in learning.

From the aspect of practicality, the positive response from teachers and students shows that the media is not only easy to use but also able to increase student involvement in learning. Interactive features such as videos, quizzes, and reflective activities provide a more engaging and less monotonous learning experience. The high level of media practicality in this study is in line with the findings Tamrin et al. (2024) and Ginting et al. (2023) which states that Google Sites is an easy-to-use, flexible, and able to increase students' motivation to learn.

From the aspect of effectiveness, a significant increase in learning outcomes shows that the deep learning approach integrated in the media is able to encourage a deeper understanding of concepts. The designed activities focus not only on knowledge transfer, but also on the process of critical thinking, analysis, and reflection. This is in accordance with the characteristics of 21st-century learning that emphasizes the development of higher-order thinking skills.

The improvement in student learning outcomes in this study is in line with the findings Chen (2025), Roemintoyo et al. (2022) and Wu et al. (2023) which shows that the use of technology-based interactive learning media significantly improves students' understanding and thinking skills. In addition, the success of this media is also influenced by the suitability of the design with the characteristics of digital-native students. Multimedia integration, flexible access, and activity-based learning provide a more personalized and adaptive learning experience. Thus, this media not only functions as a learning tool, but also as a means to create a meaningful learning experience.

However, this study still has limitations, such as the scope of material that is limited to one topic, the context of the research that is only conducted in one school, and the measurement of effectiveness that still focuses on cognitive aspects. Therefore, further research is recommended to develop media on a broader range of subjects, test in different contexts, and measure aspects of 21st century skills more comprehensively.

## Conclusion

The development of interactive learning media based on Google Sites oriented to deep learning is carried out through the ADDIE model which includes the stages of analysis, design, development, implementation, and evaluation. The results of the study showed that the developed media had a very decent level of validity, very high practicality, and high effectiveness as shown by the increase in learning outcomes from the average high category pretest. Thus, this medium has proven to be feasible, practical, and effective in English learning in high school.

## Acknowledgments

Thank you to my family for their support and motivation, to my lecturers and supervisors at the sekolah pascasarjana, Universitas Negeri Padang for their guidance, as well as to the principal and teacher council and students as my research subjects in this research

## Author Contributions

Conceptualization, R. and A.B.; methodology, R.; software, R.; validation, Z.Z., M.F.A. and R.; formal analysis, R.; investigation, R.; resources, R.; data curation, R.; writing—original draft preparation, R.; writing—review and editing, R.; visualization, R.; All authors have read and agreed to the published version of the manuscript."

## Funding

This research received no external funding.

## Conflicts of Interest

The authors declare no conflict of interest.

## References

- Adriani, D., Lubis, P., & Triono, M. (2020). Teaching material development of educational research methodology with Addie Models. In *3rd International Conference Community Research and Service Engagements, IC2RSE 2019*. <https://doi.org/10.4108/eai.4-12-2019.2293793>
- Afandi, T., & Khobir, A. (2025). Strategi Pembelajaran di Era Digital: Gamifikasi dan Metode Inkuiri dalam Meningkatkan Belajar Siswa Sekolah Dasar. *Jurnal Pendidikan Anak Usia Dini Dan Kewarganegaraan*, 2(2), 24–39. <https://doi.org/10.61132/paud.v2i2.368>
- Ali, A., Maniboey, L. C., Megawati, R., Djarwo, C. F., & Listiani, H. (2024). *Media Pembelajaran Interaktif: Teori Komprehensif dan Pengembangan Media Pembelajaran Interaktif di Sekolah Dasar*. PT. Sonpedia Publishing Indonesia.
- Astarina, R., Yerizon, Bentri, A., & Zainil, M. (2024). Development of Interactive Learning Media Assisted by Google Sites in Building Materials for Elementary Schools Grade V. *Jurnal Penelitian Pendidikan IPA*, 10(SpecialIssue), 226–233. <https://doi.org/10.29303/jppipa.v10iSpecialIssue.8555>
- Branch, R. M. (2009). *Instructional Design: The ADDIE Approach*. Springer US. <https://doi.org/10.1007/978-0-387-09506-6>
- Chen, C. (2025). Entertainment social media based on deep learning and interactive experience application in English e-learning teaching system. *Entertainment Computing*, 52. <https://doi.org/10.1016/j.entcom.2024.100846>
- Chen, L. (2024). Integrating Deep Learning-Based Educational Technologies in Biotechnology

- Training: An Effectiveness Evaluation from a Hybrid Education Perspective. *Journal of Commercial Biotechnology*, 29(3), 416–426. <https://doi.org/10.5912/jcb2240>
- Delvita, Yulianti, E., & Arrahim, D. (2025). Pengembangan Media Pembelajaran Interaktif Berbasis Website untuk Meningkatkan Kemampuan Berpikir Kritis dan Literasi Kesehatan Siswa pada Materi Sistem Pertahanan Tubuh Kelas XI SMA. *Jurnal Penelitian Pendidikan IPA*, 10(12), 11092–11108. <https://doi.org/10.29303/jppipa.v10i12.8843>
- Fadhlurahman, M. Z., Irwandani, & Firmansyah, D. (2026). Deep Learning in Elementary School: Systematic Literature Review. *Jurnal Penelitian Pendidikan IPA*, 12(3), 8–19. <https://doi.org/10.29303/jppipa.v12i3.14362>
- Ginting, D., Abda, M. I., Maq, M., Karina, M., Sari, I., Ichsan Abda, M., Maq, M. M., & Sari, N. I. (2023). Pelatihan Kreativitas Guru dalam Pengembangan Media Pembelajaran Interaktif Dengan Aplikasi Filmora Sebagai Upaya Meningkatkan Kompetensi Profesionalisme Guru. *Journal of Human And Education*, 3(3), 124. Retrieved from <https://jahe.or.id/index.php/jahe/article/view/329>
- Irwan, I. W., & Aznam, N. (2021). Development of interactive learning media based on guided inquiry in chemical equilibrium. *J. Phys. Conf. Ser.*, 1806(1). <https://doi.org/10.1088/1742-6596/1806/1/012183>
- Islami, A. P., Eliwanti, E., & Syarfi, M. (2021). E-Module Development with an Environmental Approach for Improving English Skills. *Proc. URICET - Universitas Riau Int. Conf. Educ. Technol.*, 520–524. Scopus. <https://doi.org/10.1109/URICET53378.2021.9865908>
- Lusiani, Vidhiasi, D. M., & Supriyanto. (2026). The Implementation of a Deep Learning Approach Using QR Code-Based Learning Media to Enhance High School Students' Academic Performance in Kinematics. *Jurnal Penelitian Pendidikan IPA*, 12(1), 521–536. <https://doi.org/10.29303/jppipa.v12i1.13484>
- Maryani, M., Nisak, M. S., & Supriadi, B. (2022). Implementasi Media Pembelajaran Berbasis Web Google Sites Untuk Meningkatkan Kemampuan Memecahkan Masalah Siswa SMA Pokok Bahasan Gelombang Bunyi. *Jurnal Penelitian Pendidikan IPA*, 8(4), 2430–2438. <https://doi.org/10.29303/jppipa.v8i4.2037>
- Mayangsari, N., Sari, C. K., Syakir, A., Nadia, H., & Jailani, M. (2025). Google Sites-Problem-Based Learning: A Media to Support Proportion Learning. In *AIP Conf. Proc.* (Vol. 3142, Issue 1). <https://doi.org/10.1063/5.0262304>
- Noviarni, N., Ahmadi, A., Rahmadina, D. O., Mardini, P., & Amelia, R. (2023). The Development of Mathematics Learning Media Using Google Sites Web Based on an Integrated Contextual Approach to Islamic Values for Junior High School Students in Riau, Indonesia. In *BIO. Web. Conf.* (Vol. 79). EDP Sciences. <https://doi.org/10.1051/bioconf/20237907001>
- Okpatrioka. (2023). Research And Development (R&D) Penelitian Yang Inovatif Dalam Pendidikan. *Dharma Acariya Nusantara: Jurnal Pendidikan, Bahasa Dan Budaya*, 1(1), 86–100. <https://doi.org/10.47861/jdan.v1i1.154>
- Roemintoyo, R., & Budiarto, M. K. (2022). Optimizing the utilization of computer-based technology through interactive multimedia development for entrepreneurship learning. *World Journal on Educational Technology: Current Issues*, 14(1), 147–163. <https://doi.org/10.18844/wjet.v14i1.6711>
- Syaadah, R. S., Paristiowati, M., Astuti, T. N., Hanifah, S., Salsabila, D., Agustin, F. S., & Alia, A. R. (2025). Development of an Interactive Learning Website Using a Deep Learning Approach on Thermodynamics Material. In *J. Phys. Conf. Ser.* (Vol. 3139, Issue 1). <https://doi.org/10.1088/1742-6596/3139/1/012090>
- Tamrin, A., Budiyanto, C. W., Alimuddin, A., & Minghat, A. D. (2024). The effectiveness of the use of Google Sites-Based mobile learning to improve 21st-Century Skills of vocational high school students. *Data and Metadata*, 3. <https://doi.org/10.56294/dm2024.398>
- Wu, C., Lin, Z., & He, J. (2022). The relationship between digital literacy, deep learning, and higher-order thinking in higher education. *Computers & Education*, 184, 104528. Retrieved from <https://www.sciencedirect.com/science/article/pii/S0360131522001574>
- Wu, J., & Ni, Z. (2023). English Online Learning System Based on Web. In *Lect. Notes Electr. Eng.: 1045 LNEE* (pp. 185–191). Springer Science and Business Media Deutschland GmbH. [https://doi.org/10.1007/978-981-99-2287-1\\_27](https://doi.org/10.1007/978-981-99-2287-1_27)