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Interactive Photosynthesis Media Design Based on Seren Taun Local Wisdom to Improve Students' Critical Thinking Skills

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ABSTRACT

This research is motivated by the limited integration of local wisdom in learning and the use of digital interactive learning media by teachers. This study aims to develop and test the feasibility, practicality, and effectiveness of interactive learning media based on local wisdom of the Seren Taun traditional ceremony using the Genially platform on the Photosynthesis material of the Natural Sciences content to improve students' critical thinking skills. The research method used is Research and Development (R&D) with the ADDIE development model. The research subjects involved 24 fourth-grade students of SDN 4 Kuningan as samples. Data collection was carried out through validation sheets, response questionnaires, and tests (pre-test and post-test). The results of the study showed that the developed interactive media was "Very Feasible" based on the assessment of media experts by 88% and material experts by 86%. This media was also declared "Very Practical" based on the average score of teacher and student responses which reached 80%. Furthermore, the effectiveness test showed a significant increase in students' critical thinking skills with an N-Gain score of 0.55 (category "Medium"). Based on these results, it can be concluded that interactive learning media based on local wisdom Seren Taun is effective in improving the critical thinking skills of fourth grade elementary school students.

A. INTRODUCTION

The use of interactive media in learning is currently increasingly common to transform the teaching and learning process to make it more effective, accessible, and engaging for students (Lestari et al., 2024), where technological advances also change the way people think, work, and live (Feri & Zulherman, 2021). This condition requires educators to be proficient in digital and critical thinking to design optimal learning experiences (Murwani et al., 2025), especially in Natural Science (IPA) learning in elementary schools, which is very important for developing students' critical and objective thinking skills through the study of the surrounding environment (Luh Gita Sri Antari et al., 2019; Syaflin, 2022). One important material that requires special attention is where the abstract concept really needs the support of appropriate interactive learning media so that students can understand the process in real terms and not just imagine it (KE Putri et al., 2020).

Learning media is an important part of science education. Because science content is abstract, it can be tailored to students' operational-concrete cognitive abilities.(Arsy & Hanif, 2024).Teachers are expected to be able to apply innovative teaching models and media to improve the quality of learning. (Luh Gita Sri Antari et al., 2019) He stated that the strategy that teachers can use is to create a pleasant learning atmosphere and actively involve students in the learning process.

In observations conducted by the author at State Elementary School 4 Kuningan, the author found that science learning was still not in accordance with the strategies that should be implemented by teachers. Teachers still use conventional learning models that cause science learning to be less meaningful and enjoyable. In science learning, students tend to be active only in the Project Based Learning (PJBL) learning method, while in the learning process it is impossible to only use this method. Science learning at State Elementary School 4 Kuningan is currently not optimal because teachers are constrained by the complexity and time required to create interactive media, so they tend to choose simple media that are less able to stimulate students' critical thinking skills. In addition, the integration of local wisdom in learning materials is still neglected due to the dominance of global materials.

Teachers in Indonesia have a significant opportunity to incorporate local wisdom into the educational process thanks to the country's policy system. The main problem is their inability to integrate ecological skills into the learning process.(Dwianto et al., 2017).(Handayani et al., 2023) He stated that, despite the development of creative and innovative technology, in today's digital age, disharmony often exists between humans and God, humans and their environment, and humans. In reality, much valuable local wisdom has not been integrated into the learning process. While some teachers in Indonesia have attempted to integrate local wisdom, these efforts remain limited.(Dwianto et al., 2017).

Teachers have not optimally developed learning media, therefore teachers only utilize the learning media available at school.(Cris Smaramanik Dwiqi et al., 2020).In the midst of easy access to information in the digital era, critical thinking skills have become a crucial competency. However, in practice, the application of Higher-Order Thinking Skills in elementary school education remains limited. Teachers often rely on memorization and comprehension, which are lower-order thinking skills.(Nasution et al., 2024).

Media can be said to be a bridge connecting the provider and recipient of material. In school learning, the provider is the teacher and the recipient is the student.(Nengsih et al., 2024).The use of interactive learning media can improve students' conceptual mastery and critical thinking skills. Another advantage of interactive learning media is that it can be accessed via a computer or smartphone, making it easier for students to use.(Arsy & Hanif, 2024).

Critical thinking skills and awareness of local culture need to be developed through learning.(Hikmawati et al., 2020)Efforts that can be made to improve students' critical thinking skills can be done by developing teaching materials based on local wisdom.(Nur et al., 2017). Elementary science learning aims to train students to explore nature, think critically, and solve problems in their environment objectively so as to create a

meaningful learning process.(Intan Nabila et al., 2024).Effective and strategic solutions to address educational challenges in the digital age. The use of learning media can improve students' critical thinking skills and, in turn, facilitate the teaching and learning process (Indriani & Gularso, 2022:219).

Local wisdom is everything related to the potential of a region which is the result of human thought or human work which contains noble values and is passed down from generation to generation so that it becomes a characteristic of the region.(Wardani & Suniasih, 2022).To help students better understand science concepts and develop process skills, local culture or local wisdom that has developed in society or in a region can be used.(Putu Sri Ratna Dewi et al., 2017). Learning materials that link local wisdom can create meaningful learning that is appropriate to the student's environment.(Fuad et al., 2020).Through the theme of local wisdom, students will be able to pay more attention to their culture so that they can continue to preserve it.(Ratna et al., 2024)

Research result(Sintya Devi & Wira Bayu, 2020)Regarding critical thinking assisted by media, based on the analysis, it can be concluded that there is an influence of the visual media-assisted learning model on the science learning outcomes of elementary school students. Likewise, the results of the research(Nur et al., 2017)Regarding ethnoscience learning on students' critical thinking skills, it can be concluded that ethnoscience learning is effective, as indicated by the increase in students' critical thinking skills.

The difference between this study and previous relevant research lies in the development of Genially-based interactive media for fourth-grade elementary school students, by integrating local wisdom of the Seren Taun traditional ceremony which has never been studied in this context. This media is specifically designed to train students' critical thinking skills in the Science subject Chapter 1 Sub-Chapter "Photosynthesis". This study will analyze in depth how these aspects of local wisdom can improve students' critical thinking skills through the use of the developed interactive media.

The novelty of this research is linking science learning on photosynthesis material with the values of local wisdom of Seren Taun in Kuningan, West Java. The difference with previous research which tends to be limited to the use of static or passive visual media, this proposal implements interactive media as the main instrument, in other words the novelty in this research lies in the integration of local wisdom of Seren Taun and interactive learning media on photosynthesis material which has not been explored in depth in previous studies.

Genially is an online learning media creation platform that is easily accessible, practical, and flexible, with the advantage of presenting engaging materials in the form of text, images, video, audio, animation, and interactive games (HR Putri et al., 2023). This platform also provides unlimited collaborative features that are easy to use by teachers and students, from interactive buttons to design customization (Hermita et al., 2022). By integrating aspects of local wisdom into this Genially-based interactive media, the research conducted not only offers innovative and relevant teaching material solutions to students' environments but also provides new empirical evidence that is crucial for curriculum development and effective and contextual learning practices.

Technological transformation in education requires teachers to be adaptive and aware of technological developments in order to integrate them into the learning process (Syaflin, 2022). Based on this, this study aims to determine and measure the effectiveness of the use of interactive media Genially based on local wisdom Seren Taun in improving critical thinking skills of fourth-grade elementary school students. Based on this background, the researcher is interested in conducting a study entitled "Genially in Learning: Interactive Media Design Based on Local Wisdom to Improve Students' Critical Thinking Skills on the Topic of Photosynthesis" which is expected to be able to make a real contribution to the innovation of learning media that is more contextual, interactive, and in accordance with the demands of 21st-century education.

B. RESEARCH METHODS

The type of research used is Research and Development (R&D) with the ADDIE development model which includes five main stages: Analysis, Design, Development, Implementation, and Evaluation (Mike Nurmala S et al., 2024; Loso Judijanto et al., 2024). This flow was chosen because it is very suitable for producing and testing interactive media innovations based on relevant local wisdom. This research was conducted at SDN 4 Kuningan with a population of 32 fourth-grade students, where a sample of 24 students was taken to understand the characteristics of the population. Research data was collected comprehensively through observation, interviews, questionnaires, and documentation techniques.

The data analysis method applied combines qualitative and quantitative descriptive approaches. Qualitative data in the form of input, criticism, and suggestions from validators were used in a targeted manner to improve and refine the quality of the developed media. Meanwhile, quantitative data in the form of numerical scores were analyzed using a One-Group Pretest-Posttest Design (Creswell & Creswell, 2018). This before-after design was applied without a control group to directly observe, measure, and compare improvements in students' cognitive learning outcomes and critical thinking skills before and after treatment, as described below:

$$\mathbf{O1\ X\ O2} \qquad \mathbf{(1)}$$

The effectiveness test in the field can be evaluated through a learning outcome test of fourth-grade students at SDN 4 Kuningan, using a pre-test and post-test. The formula used to calculate the learning outcome score is:(Creswell & Creswell, 2018).

$$\mathbf{X} = \frac{\boldsymbol{\Sigma M}}{\boldsymbol{Mm}} \mathbf{\times\ 100\%} \qquad \mathbf{(2)}$$

X = Percentage score for each research aspect
ΣM = Total score for each aspect of the research
Mm = Maximum score for each research aspect

Table 1. Eligibility Criteria by Media Experts and Subject Matter Experts

Achievement Score	Category
81% - 100%	Very Worthy
61% - 80%	Worthy
41% - 60%	Quite Decent
21% - 40%	Not feasible
0% - 20%	Totally Unworthy

The collected data was then processed using statistical analysis to test the research hypotheses. The hypothesis tests used in this study were the t-test and the N-Gain test. However, before conducting the hypothesis testing, a normality test was first performed.

C. HASIL DAN PEMBAHASAN

The development of this research product was carried out using the ADDIE development model. Each stage of this research is described as follows:

1. Analysis

During the analysis phase, it was discovered that the science learning process in fourth grade at SD Negeri 4 Kuningan was still hampered by students' lack of focus, as evidenced by their chatty behavior, inattention to teacher explanations, and frequent requests for permission to leave the classroom. This potentially demotivating and degrading learning outcomes stems from the suboptimal use of interactive learning media. As a result, students tend to quickly become bored and fed up, despite their strong interest in interactive learning innovations in the current technological era.

2. Design

The next stage is planning (design), where researchers create a media plan using a storyboard, integrating local wisdom-based photosynthesis material into science learning. Each media menu is designed to be more interactive to facilitate student understanding. In the teaching and learning process, media is not merely a tool but also serves as an important tool for clarifying messages and information delivery to students (Luh Gita Sri Antari et al., 2019; Atang Sutisna et al., 2023).

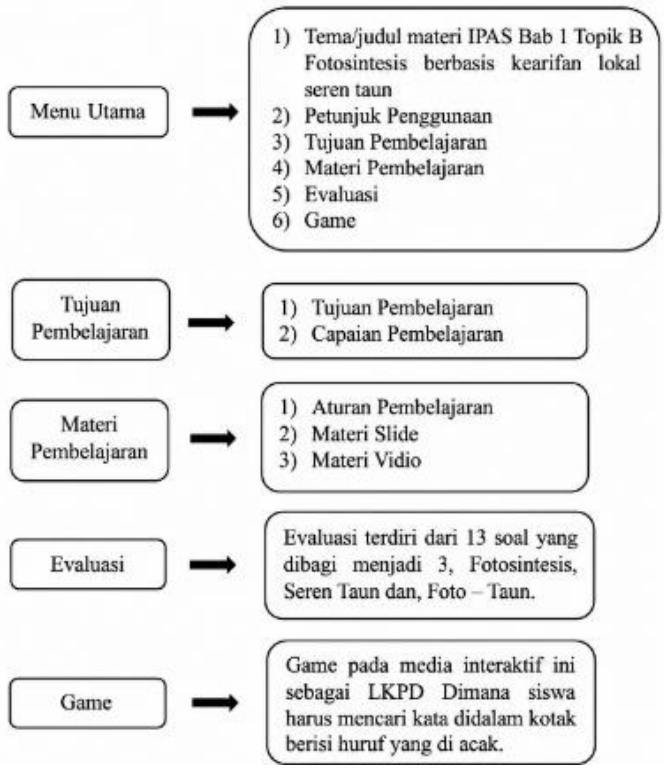

Figure 1. Genially Interactive Media Storyboard

Teachers are required to deliver material interactively, actively, and creatively so that students can understand the lesson quickly and accurately (Nengsih et al., 2024; Atang Sutisna et al., 2024). To ensure that the learning message is conveyed effectively and that students are enthusiastic about receiving it, teachers must use interactive media that can attract attention and improve their critical thinking skills

3. Development

The third stage is development. At this stage, researchers begin producing media by arranging images and scenes. The initial step is to create a splash screen, followed by a homepage menu containing user instructions and learning objectives. Next, researchers design the main menu, which includes a material menu, learning objectives, an evaluation menu, and a game menu aligned with the Student Worksheet (LKPD). The material menu is presented in the form of slides and learning videos, while the evaluation menu uses an interactive quiz method.

Figure 2. Genially Interactive Media Design Development Results

After the design was finalized, the researchers engaged media and content experts to validate the feasibility of the local wisdom-based Genially learning media. This validation stage was crucial to measure the product's validity and ensure that the developed media met student needs and optimally supported the learning process

before field testing. The following is a presentation of the validation results from the experts.

Table 2. Recapitulation of Eligibility Aspect Score Percentage

No	Validator	Percentage	Eligibility
1	Media Expert	88%	Very Worthy
2	Subject Matter Expert	86%	Very Worthy

The media feasibility test was conducted by a media expert, namely Dena Latif Setiawan, M.Kom., a lecturer at the Muhammadiyah University of Kuningan. This media validation instrument includes 10 interrelated statements. The results of data processing show an average score of 88%. Thus, this local wisdom-based interactive media Genially is categorized as "Very Appropriate" for use in learning Social Sciences Chapter 1 Topic B for grade IV of SD Negeri 4 Kuningan. The material feasibility test was conducted by an expert validator, Dr. Nana Sutarna, M.Pd., a lecturer at the Muhammadiyah University of Kuningan. This material validation instrument consists of 10 interrelated statements. Based on the results of data analysis, the average value of the material validation reached 86%, so that the developed media meets the "Very Appropriate" category for application in learning.

4. Implementation

The next stage is implementation, where validated interactive media based on Genially is applied in science learning to motivate and train students' critical thinking. Unlike the research by Sitinjak et al. (2025), which only used Genially for a final evaluation quiz, the media in this study excels in visual simplicity, accessibility, and student engagement. Its use is also expanded to deliver in-depth material and present educational games directly integrated with student worksheets to optimally stimulate critical thinking skills.

5. Evaluation

The final stage of this research was an evaluation to measure students' critical thinking skills through field test feedback from teachers and students. The evaluation results provided important recommendations in the form of adding videos of the Seren Taun traditional process and photosynthesis to increase the media's effectiveness and interactivity. Overall, this stage confirmed that the Genially media developed met the eligibility criteria, but required further visual refinement to effectively bridge students' local knowledge with modern scientific concepts.

Table 3. Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.178	24	.048	.952	24	.306
Posttest	.125	24	.200*	.965	24	.553

a. Lilliefors Significance Correction

Based on the results of data analysis, learning media based on local wisdom Seren Taun on Photosynthesis material has been proven effective in improving the critical

thinking skills of fourth grade students of SD Negeri 4 Kuningan. This effectiveness is demonstrated through statistical tests (pretest and posttest scores, normality test, paired sample t-test, and N-Gain test), where the average student score increased significantly from 0.306 to 0.553. This increase indicates a real development in understanding and reflects the high level of student involvement in the interactive, fun, and easy-to-understand learning process.

Table 4. Uji t

Paired Samples Test

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Pretest - Posttest	-3.167	.565	.115	-3.405	-2.928	-27.474	23	.000

The Shapiro-Wilk normality test showed that the pretest and posttest data were normally distributed with significance values of 0.306 and 0.553, respectively ($p > 0.05$). This stable and reasonable data distribution met the requirements for continuing the analysis to the parametric statistical stage. The paired sample t-test results showed a significance value of 0.000 ($p < 0.05$), which proved a significant difference between the pretest and posttest results. The use of learning media in the learning process was proven to have a significant effect on improving student learning outcomes. This finding strengthens the evidence that the local wisdom-based science learning media Seren Taun is effectively applied in learning.

Table 5. N-Gain

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Ngain	24	0	1	.55	.198
Valid N (listwise)	24				

Based on the results of data analysis, learning media based on local wisdom Seren Taun on Photosynthesis material has been proven effective in improving the critical thinking skills of fourth grade students of SD Negeri 4 Kuningan. This effectiveness is demonstrated through statistical tests (pretest and posttest scores, normality test, paired sample t-test, and N-Gain test), where the average student score increased significantly from 0.306 to 0.553. This increase indicates a real development in understanding and reflects the high level of student involvement in the interactive, fun, and easy-to-understand learning process.

The science learning topic of Photosynthesis based on the local wisdom of Seren Taun aims to foster students' love for the local culture of Kuningan Regency, West Java. The developed media successfully presented the content in an interesting and easily understood form for fourth-grade students of SD Negeri 4 Kuningan. The implementation of this media has proven effective in improving students' critical thinking skills. Evidence of this effectiveness is demonstrated through statistical

analysis and the relevance of the media content to character values and its suitability for the cognitive and social development stages of elementary school students. This media is very suitable for use as an alternative in science learning based on the local wisdom of Seren Taun.

Strengthened by research conducted by(Putri et al., 2023)with the title "Development of Genially-based history learning media to increase high school students' interest in learning", the results of the study show that the use of Genially media is effective in increasing interest in learning history of class X students at SMA Negeri 1 Indralaya.

D. CONCLUSION AND SUGGESTIONS

This research successfully developed interactive learning media based on local wisdom through the Genially platform with a systematic ADDIE model. This digital innovation on Photosynthesis material for grade IV Science was declared very feasible and practical for use in SD Negeri 4 Kuningan. This feasibility status was proven by the achievement of a score of 88% from media experts and 86% from material experts who fell into the "Very Feasible" criteria, and was reinforced by a positive response of 80% from teachers and students, which confirmed the practicality and adaptability of this media in the field.

Furthermore, the implementation of this Genially-based interactive learning media has proven effective in improving the critical thinking skills of fourth-grade students at SD Negeri 4 Kuningan. This effectiveness is demonstrated by a significant increase in learning outcomes between before (pre-test) and after (post-test) the use of the media. Through the acquisition of an N-Gain score of 0.55 which is included in the "Moderate" category, this local wisdom-based interactive media is empirically able to stimulate active involvement and sharpen students' critical thinking skills in solving contextual problems.

Based on the conclusions and limitations of the research, the researchers propose several strategic recommendations to relevant parties to optimize the sustainability of this innovation. Teachers and schools are advised to develop similar interactive media for other materials, supported by training or workshops to improve teachers' skills in integrating technology in the classroom. Furthermore, the government, as policymakers, is expected to promote educational policies that are friendly to digital technology innovation. Finally, future researchers are advised to develop similar media with a broader range of materials and test them in different school groups to assess the consistency and effectiveness of their impact more comprehensively.

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