

Introduction of Luwu Culture Through Adobe Flash Educational Game: Its Influence on Elementary School Students' Metacognition

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ABSTRACT

This study aims to evaluate the effectiveness of introducing Luwu culture through educational word puzzle games on students' metacognitive abilities. The research method used is the experimental design of one group pretest-posttest with a sampling technique using saturated sampling, resulting in a sample size of 14 students. Data collection is done through tests, observations, and questionnaires, with data analysis performed descriptively. The results show that the use of educational game media is effective for students, indicated by a significant increase in their usage through the educational word puzzle game media with an n-gain value of 0.48, active participation of students at 84%, and positive responses from students regarding the use of educational word puzzle games at 80%.

Keywords: *Luwu Culture, Educational Games, Adobe Flash*

ABSTRAK

Penelitian ini bertujuan untuk mengevaluasi seberapa efektif pengenalan budaya Luwu melalui game edukasi susun kata terhadap kemampuan metakognitif peserta didik. Metode penelitian yang digunakan adalah desain eksperimental one group pretest-posttest dengan pengambilan sampel menggunakan teknik sampel jenuh, yang menghasilkan jumlah sampel sebanyak 14 peserta didik. Pengumpulan data dilakukan melalui tes, observasi, dan angket, dengan analisis data dilakukan secara deskriptif. Hasil penelitian menunjukkan bahwa penggunaan media game edukasi efektif terhadap peserta didik, ditandai dengan peningkatan signifikan pada penggunaan media tersebut dengan nilai n-gain sebesar 0,48, partisipasi aktif peserta didik sebesar 84%, dan respons positif peserta didik terhadap media game edukasi susun kata sebesar 80%.

Kata Kunci: *Budaya Luwu, Game Edukasi, Adobe Flash*

INTRODUCTION

The development of technology has changed many aspects of human life, including in the field of education. The use of gadgets, especially smartphones, has become very common in Indonesian society, with around 63.3% of the population using smartphones in 2019 (Rini & Huriah, 2020). In the education sector, gadgets are used as important learning tools. Schools and other educational institutions utilize this technology by incorporating various educational apps, online platforms, and digital resources into the teaching and learning process. This allows students to learn independently and personally according to their needs, while also enhancing interaction between teachers and students through various apps and digital tools (Surachman et al., 2024). However, the use of gadgets also poses challenges, such as the risk of technology addiction which can disrupt students' concentration and productivity (Aprilaini & Sari, 2023). Therefore, the role of educators and parents is crucial in monitoring gadget usage to maintain balance and productivity.

The use of technology in education has had a significant impact on elementary school students' understanding of culture. Although there are concerns that gadget use may reduce

students' interest in local culture, with the right approach, technology can be an effective means of enriching their understanding of culture (Sari et al., 2024). For example, teachers can utilize online learning platforms to present interactive and engaging materials about local culture. Thus, students not only learn about Luwu culture or other local cultures theoretically but can also experience them firsthand through technology. Additionally, with easy access to information through the internet, students can conduct their own research on their own culture, thereby enhancing their understanding and appreciation of their cultural heritage (Junida & Mutmainnah, 2023). However, it is important to remember that the use of technology must also be accompanied by appropriate guidance to ensure that students remain connected to their own culture and are not influenced by external cultures introduced by technology. Thus, technology can be an effective tool for strengthening, rather than diminishing, students' understanding of culture in elementary school.

The importance of culture for students, especially Luwu culture, cannot be underestimated. Culture is not just the heritage of ancestors that needs to be learned but also an identity deeply rooted in every individual (Hidayat et al., 2023). For students, understanding and appreciating Luwu culture is not only about knowing traditions or customs but also understanding the values embedded in it. Luwu culture teaches cooperation, mutual assistance, local wisdom, and mutual respect, all of which are important foundations in shaping students' characters and personalities (Shaleh, 2020). Furthermore, learning Luwu culture also opens wide windows for students to understand the diversity of cultures in Indonesia, strengthen national identity, and preserve and conserve cultural heritage for future generations. Therefore, the integrity of Luwu culture is not only important for local identity but also plays a major role in shaping quality and responsible individuals for students at State Elementary School 35 Pammanu.

Based on observations at State Elementary School 35 Pammanu, there are real challenges in improving students' understanding of Luwu culture. Although located in an area rich in cultural heritage, most students lack a deep understanding of their local culture. When activities related to Luwu customs are held, only a few students show enthusiasm or have adequate knowledge. Moreover, the Luwu regional language is increasingly marginalized, with the majority of students preferring to communicate in Indonesian or even English. This indicates the need for further efforts to introduce and enhance students' understanding of Luwu culture so that they can understand and appreciate the rich and valuable cultural heritage of their region. This condition highlights the importance of serious attention from the school and the surrounding community to address the low understanding of students regarding Luwu culture. Inclusive and sustainable approaches are needed, where all parties involved, including teachers, parents, and community leaders, work together to create a learning environment that supports Luwu cultural learning. Furthermore, the integration of Luwu cultural values into all school activities, both in formal curricula and extracurricular activities, is also crucial so that students can experience the cultural diversity of their region. With continuous and comprehensive efforts, it is hoped that students' understanding and appreciation of Luwu culture at State Elementary School 35 Pammanu can significantly increase, providing a positive impact on the development of local culture and student identity.

Introducing Luwu culture through educational games like Adobe Flash is an interesting innovation. With gaming technology, the younger generation of Luwu can learn about their cultural heritage interactively and enjoyably (Triyono & Priatna, 2020). Word puzzle games with Luwu culture themes deepen understanding of traditions, language, and local wisdom. Each stage of the game takes players to explore Luwu myths, folk tales, and customs. Thus, educational game media like this are not only effective as learning tools but also strengthen cultural identity and pride in ancestral heritage amidst globalization. It is hoped that the Adobe Flash word puzzle game introducing Luwu culture will enhance the understanding and appreciation of the younger generation for their own cultural heritage. Through interactive playing experiences, they not only gain new knowledge but also develop love for their culture and local identity. Furthermore, this educational gaming media is effective in promoting Luwu culture to the wider community, both within and beyond the region, as part of efforts to preserve and disseminate cultural richness for future generations.

Several relevant studies have been conducted to discuss Adobe Flash-based Word Puzzle educational game media (Anzari & Puriza, 2021; Ardhiyah & Radia, 2020; Rezi & Pramudita, 2020; Savitri, 2023; Yuliawati et al., 2020). These studies highlight various aspects of using these games in the learning context. One study examines the effectiveness of Word Puzzle games in improving the reading and writing abilities of elementary school students. The results show that regular use of this game can significantly improve students' reading and writing skills (Savitri, 2023). Another study focuses on student responses to this game, finding that most students feel more motivated and excited to learn through the use of Adobe Flash Word Puzzle games. Additionally, there are also studies that observe aspects of game design, such as difficulty level, engagement, and artificial intelligence used in its development. Findings from these studies provide valuable insights for educators in integrating Adobe Flash Word Puzzle educational game media into the curriculum and daily learning.

The uniqueness of this research lies in its specific focus on integrating Luwu culture into Word Puzzle educational game media using Adobe Flash. Unlike similar studies that may be more general, this research specifically examines how Luwu culture can be integrated into the design and content of the game. This includes the use of regional languages, cultural symbols, local stories, and traditional Luwu values in the development of educational games. This approach aims to strengthen students' cultural identity, enhance their understanding of Luwu cultural heritage, and advocate cultural diversity in the learning process. Thus, this research provides a unique contribution to enriching the literature on the use of educational game media in the cultural education context.

METHODS OF RESEARCH

This study is a quantitative research employing the experimental method with a pre-experimental design. The research design utilized is a one-group pretest-posttest design, with the population consisting of all fourth-grade students of State Elementary School 35 Pammanu, totaling 14 individuals. The sampling technique used was saturated sampling, where the sample was drawn from the entire population. The data collection methods employed include tests, observations, and questionnaires. The research instruments comprised pretest and posttest questions totaling 10 essay questions with cognitive levels of

C4 and C5, observation sheets to assess students' learning activities, and a questionnaire with a Likert scale containing 11 statements to evaluate students' responses to the use of word stacking educational game media. The data analysis techniques used include descriptive statistical analysis and n-gain test analysis. Descriptive analysis was utilized to provide a systematic description of students' metacognitive abilities before and after using the word stacking educational game media. Meanwhile, the n-gain test analysis was employed to assess the effectiveness of using the educational game media on students' metacognitive abilities.

RESULTS AND DISCUSSION

Students' Metacognitive

The results of this study provide answers to the formulated problems. Prior to using this media, data was obtained from a pretest completed by 14 students. The data was then analyzed, and the results are listed in Table 1. After the implementation of the media, a posttest analysis was also conducted to assess its effectiveness in enhancing student understanding.

Table 1 Descriptive Analysis of Pretest

N	Range	Min	Max	Mean	Std. Deviation	Variance
14	25	50	75	62.14	9.550	91.209

Based on the descriptive analysis results in Table 1, it can be concluded that the students' abilities before using Adobe Flash media have an average score of 62.14, with a standard deviation reaching 9.550. The range of data from the lowest to the highest score is 25, with the maximum score reaching 75 and the minimum score being 50 out of a total of 14 students who were sampled. Further information regarding the categorization of students' ability scores before using word stacking media can be found in Table 2.

Table 2 Categorization of Learners' Ability Before Using Educational Media Stacking words

No	Interval	Frequency	Category	Percentage
1	0-40	0	Very Low	0%
2	41-55	6	Low	43%
3	56-70	4	Medium	28,5%
4	71-85	4	High	28,5%
5	86-100	0	Very High	0%

Table 2 shows that out of five categories (very low, low, moderate, high, and very high), only three categories were achieved. There are 6 students in the low category with a percentage of 43%, 4 students in the moderate category with a percentage of 28.5%, and 4 students in the high category with a percentage of 28.5%. Thus, based on the average scores of the metacognitive ability test in Social Studies, it can be concluded that 43% of students were in the low category before using the word stacking media.

The analysis results indicate that before the implementation of Adobe Flash word stacking media, most students in the class had relatively low metacognitive abilities. This is reflected in the relatively below-standard average scores, as well as the distribution of students, the majority of whom were in the low and moderate categories. The low category indicates limited understanding of the taught concepts, while the moderate category suggests

that their abilities still need improvement to achieve optimal understanding. Therefore, the presence of Adobe Flash word stacking media is important as an effort to improve students' understanding to obtain better metacognitive abilities. By utilizing this interactive media, it is hoped that students can be more actively engaged in learning and improve their abilities to understand the material and solve problems more effectively.

The metacognitive abilities of the Social Studies students after using the word stacking media were obtained from the posttest questions answered by 14 students. This data is presented in table 3.

Table 3 Descriptive Analysis of Posttest

N	Range	Min	Max	Mean	Std. Deviation	Variance
14	30	65	95	79.64	10.645	90.210

Based on Table 3, it can be seen that the metacognitive abilities of students after using word stacking media obtained an average score of 79.64, with a standard deviation of 10.645. The maximum score obtained was 95 and the minimum score was 65, resulting in a data range of 30 with a sample size of 14 students. This indicates that the metacognitive abilities of IPS students after using word stacking media are higher compared to before using word stacking media. The categorization of metacognitive ability scores of students after using word stacking media can be seen in Table 4.

Table 4 Categorization of Metacognitive Ability of Students After Using Word Stacking Media

No	Interval	Frequency	Category	Percentage
1	0-40	0	Very Low	0%
2	41-55	0	Low	0%
3	56-70	4	Medium	28,5%
4	71-85	6	High	43%
5	86-100	4	Very High	28,5%

Table 4 shows that only three categories were achieved out of the five available options (very low, low, moderate, high, and very high). The three categories obtained are 4 students in the moderate category with a percentage of 28.5%, 6 students in the high category with a percentage of 43%, and 4 students in the very high category with a percentage of 28.5%. Based on the average score of the metacognitive ability test in IPS (Social Studies) of students after using the word stacking media, the result obtained is 43% in the high category. The use of word stacking media on students' IPS metacognitive abilities can be considered effective if two or more out of three indicators meet the success criteria. The success criteria for effectiveness are: (1) if the metacognitive ability test in IPS of students using the n-gain test experiences a minimum increase in the moderate categorization or n-gain value ≥ 0.3 . (2) if $\geq 75\%$ of students actively participate in learning. (3) if $\geq 75\%$ of students give positive responses regarding the use of word stacking media. Furthermore, to further measure this improvement, an analysis was conducted using the n-gain test, the results of which are presented in Table 5. From these results, an n-gain value of 0.48 was obtained, which falls into the moderate categorization according to the established criteria. This means that, overall, the improvement in students' metacognitive abilities after using word stacking media can be categorized as moderate. These results affirm that word stacking media has a positive

impact on enhancing students' metacognitive abilities, while also providing empirical evidence of its effectiveness in the classroom learning context.

Table 5 N-Gain Score

Pretest	Posttest	N-Gain
62,14	79,64	0.48

If the average n-gain score of students is 0.48, converted into the three categories above, then the average n-gain score falls within the interval of 0.3 to 0.7, meaning the improvement in students' metacognitive abilities in IPS using word stacking media generally falls within the moderate category. For more details, refer to Table 6.

Table 6 Categorization of Improvement by N-Gain Score

N-Gain Value	Category	Frequency	Percentage
$g > 0,7$	High	4	28.5%
$0,3 \leq g < 0,7$	Medium	6	43%
$g < 0,3$	Low	4	28.5%

The findings of this research are supported by previous studies that have shown a positive relationship between the use of technology media in learning and the improvement of students' metacognitive abilities. Various studies have highlighted the effectiveness of various types of learning media, including interactive media such as educational games, in enhancing students' ability to understand and regulate their own thinking processes. For example, research by Kii & Dewa (2020) indicated that the use of computer simulations in learning can stimulate students to employ more sophisticated metacognitive strategies in problem-solving. Similar findings were also observed in the study by Zalillah & Alfurqan (2022), which found that the use of interactive games in learning can strengthen students' ability to manage knowledge and control their thinking processes. Additionally, recent research by Asnan et al., (2022) affirmed that the use of technology media specifically designed to enhance students' metacognitive abilities can have a significant impact on learning. Therefore, the findings of this study are in line with these findings and provide an important additional contribution to strengthening the evidence of the importance of integrating technology in the development of students' metacognitive abilities.

The results of this research are also supported by relevant theories in the field of metacognition and learning. One theory that supports this is the Regulation Theory proposed by Flavell (1979). This theory states that metacognition involves processes of regulation, monitoring, and evaluation of ongoing cognitive processes. In the context of using word stacking media, students are confronted with tasks that require them to regulate and monitor their own understanding of the material being learned. With direct feedback from the media, students can enhance their ability to regulate and monitor their understanding, in line with the principles of Cognitive Regulation Theory. Additionally, Constructivism Theory, developed by Piaget (1970) and Vygotsky (1978), also supports the findings of this research. This theory emphasizes that learning is an active process in which students actively construct their understanding through interaction with their learning environment. In the context of using word stacking media, students have the opportunity to actively engage in learning,

constructing their own knowledge through interaction with the media. By building their own understanding, students can significantly enhance their metacognitive abilities.

Thus, the results of this research are consistent with existing metacognition and learning theories, indicating that the use of word stacking media can provide strong support in developing students' metacognitive abilities. Integrating these theories with empirical research findings provides a more complete and in-depth understanding of the students' learning process and provides a strong foundation for the development of more effective learning strategies in the future.

Student Activity

After observing three meetings, observations were conducted on students' activities using word stacking media. The observations included students' interaction with the game, their level of engagement, and changes in engagement levels from meeting to meeting. The observation data is presented in Table 7.

Table 7 Results of Observation of Student Activities

No	Aspects	Meeting			Percentage
		I	II	III	
1	Activeness	75	80	19	78%
2	Discipline	79	82	80	80%
3	Knowledge	82	79	75	79%
4	Politeness	100	98	100	99%

Table 7 showing the results of student activity observations, it can be seen that their activity percentage reaches 78%, discipline level is 80%, knowledge reaches 79%, and politeness level reaches 99%. Based on the four activities observed over three meetings, the average percentage of student activities reaches 84%. This means that more than or equal to 75% of students are actively involved in the learning process. Thus, it can be concluded that student participation in learning meets the success standards.

The high level of student participation in learning activities using word stacking media reflects the success of the learning approach. Active interaction with the game, discipline maintenance, good understanding of the material, and high level of politeness indicate adequate engagement in the learning process, in accordance with the principles of learning theories. Furthermore, positive changes in the level of engagement from meeting to meeting indicate the adaptability of students to the learning methods used. These observation results concretely demonstrate the success of using word stacking media in enhancing student participation and engagement in the learning process, which is a key factor in achieving effective and sustainable learning goals. Observations showing active student participation also indicate that word stacking media can maintain students' interest and motivation in learning, while support from aspects such as discipline, knowledge, and politeness provide important indications of a conducive learning environment. Overall, these observation results contribute significantly to understanding how word stacking media can be an effective tool in creating a supportive learning environment for holistic student development.

Active student interaction with the game, discipline maintenance, good understanding of the material, and high level of politeness reflect adequate engagement in the learning process. These findings are supported by relevant research highlighting the importance of student

activity in achieving effective learning. Students who are actively engaged in learning tend to have a better understanding of the material, be more enthusiastic about learning, and be better able to overcome learning challenges (Fahmi & Wiguna, 2023; Melati et al., 2023). The results of these studies are consistent with the findings of these observations, affirming that student activity has a significant positive impact on learning.

Support for the observation results of student activity is also supported by relevant learning theories. Constructivism theory, for example, emphasizes the importance of active student engagement in constructing their own knowledge through interaction with learning materials. According to this theory, when students are actively engaged in learning, they are better able to understand the concepts taught and relate them to their own experiences. In addition, motivation theories such as intrinsic motivation theory assert that student engagement and activity in learning are driven by their intrinsic needs to seek challenges, expand their knowledge, and feel competent. Therefore, the observation results of student activity supported by relevant research are also consistent with theoretical frameworks that emphasize the importance of student engagement in achieving effective and sustainable learning.

Students' Response

Data on students' responses to learning using word puzzle media were collected through the distribution of questionnaires containing 11 statements. A total of 14 students filled out the questionnaire, and the analysis results showed an average percentage of positive responses from students towards the use of word puzzle media at 80%. This means that more than 75% of students provided positive feedback on the use of this media. This positive response is consistent with the function of word puzzle media, which is designed to facilitate material delivery, provide clear information, enhance learning motivation, and facilitate understanding of abstract concepts through direct interaction between teachers and students. Thus, it can be concluded that students' responses to the use of word puzzle media meet the success criteria.

This research scientifically provides strong support for the effectiveness of using word puzzle media in learning. With an average percentage of positive student responses reaching 80%, this indicates that word puzzle media is capable of eliciting good responses from students in the context of learning. This finding is consistent with the explanation by Melati et al., (2023), stating that word puzzle media can enhance interaction between teachers and students, facilitate understanding of abstract material, and increase student learning motivation. As a result, this research contributes significantly to the literature on the effectiveness of learning media in enhancing the learning process in classrooms. Thus, the findings of this research can serve as a basis for the development of more effective and innovative learning strategies in the future.

Relevant theoretical support for the findings of this research can be found in the concepts of learning psychology and constructivist learning theory. According to constructivist theory, learning occurs when students actively engage in the construction of their own knowledge through direct experience and interaction with their learning environment (Suparlan, 2019). By using word puzzle media, students are directed to actively engage in learning, constructing their own knowledge through interaction with the game and interaction with the teacher. Additionally, multimedia learning theory also supports these

findings, indicating that the use of visual and interactive media such as games can enhance understanding and retention of information. Therefore, the findings of this research support the theoretical view that the use of word puzzle media can be an effective tool in enhancing student learning in the classroom.

Based on the results of metacognitive tests, observations of student engagement, and positive student responses, the use of Adobe Flash-based word puzzle educational games has been proven effective in improving students' metacognitive abilities. Test results showed a significant improvement in students' metacognitive abilities after using this media, as reflected in the increase in n-gain values in the moderate category. Observations of student engagement during learning also showed a high level of participation, with 84% of students actively involved in the learning process. Students' positive responses to the use of this media, reaching 80% of the total students who filled out the questionnaire, also affirm that this approach is well-received by students. Thus, it can be concluded that the use of Adobe Flash-based word puzzle educational games effectively contributes to enhancing students' metacognitive abilities.

CONCLUSION

Based on the results of metacognitive test, observations of student engagement, and positive feedback from students, it can be concluded that the utilization of word puzzle educational games based on Adobe Flash has successfully enhanced students' metacognitive abilities. There was a significant improvement in students' metacognitive abilities after using the media, as reflected by the increase in the moderate category of the n-gain score. Observations of student engagement also indicated high participation, with 84% of students actively involved in the learning process. The positive response from students toward this media, reaching 80% of the total surveyed students, confirms the acceptance of this approach. The effective utilization of word puzzle educational games based on Adobe Flash significantly contributes to improving students' metacognitive abilities. These findings can serve as a basis for teachers and education policymakers to integrate such media into the learning curriculum. Furthermore, this research makes an important contribution to the literature on the effectiveness of instructional media in developing students' metacognitive abilities, which can be a reference for further research. Recommendations for future researchers include conducting more in-depth studies on various aspects of using word puzzle educational games, including their long-term effects on the development of students' metacognitive abilities, as well as more specific and effective usage strategies. This will help deepen understanding of how technological media can optimally support student learning in the digital age.

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