JPIS JURNAL PENDIDIKAN ILMU SOSIAL

p-ISSN: 1412-3835
e-ISSN: 2541-4569
VOL 35, NO.2, DES 2025

DEVELOPMENT OF AUGMENTED REALITY BASED SNAKES AND LADDERS GAME TO ENHANCE SOCIAL STUDIES LEARNING MOTIVATION AND ENVIRONMENTAL AWARENESS

Ardania[1], Hendri Prastiyono[2], Nuansa Bayu Segara[3], Nurul Hasanah[4], Carmela S. Dizon[5]

[1,2,3,4] Faculty of Social Sciences and Law, Universitas Negeri Surabaya
[5] Graduate of School, Angeles University Foundation, Philippines
email: ardania.22071@mhs.unesa.ac.id

ABSTRACT

This study aims to develop a snake and ladder game media based on Augmented Reality that is feasible and effective in increasing the motivation to learn social studies and environmental awareness. This development research uses the Borg and Gall model modified into 8 stages, namely (1) potential and problems, (2) data collection, (3) product design, (4) design validation, (5) design revision (6) product trial (7) product revision (8) usage trial. The research design uses a quasi-experimental design with nonequivalent control group design. This study involved media experts, material experts, social studies teachers, and eighth-grade students of SMP Labschool UNESA 2. Data were collected through interviews, observations, questionnaires, and tests. The results of the study showed that the snake and ladder game media based on augmented reality was declared "very feasible". The N-gain test results showed that social studies learning motivation obtained 0.61 and environmental awareness of 0.56, in the moderate category. These results indicate that the snakes and ladders game media based on augmented reality is quite effective in increasing social studies learning motivation and environmental awareness. In addition, the results of the independent sample t-test showed a significance value of 0.00 < 0.05, there was a significant difference between the experimental and control classes, which had a significant effect on social studies learning motivation and environmental awareness. Therefore, the snakes and ladders game media based on augmented reality can be used by teachers as an alternative interactive and interesting social studies learning media to encourage active student involvement.

Keywords: *Learning media, snakes and ladders game, augmented reality, motivation to learn social studies, environmental awareness*

Received: *12 Desember 2025*
Accepted: *27 Desember 2025*
Published: *30 Desember 2025*

INTRODUCTION

The Sustainable Development Goals (SDGs) are the United Nations global targets for achieving sustainable development by 2030. One of the goals is SDGs 4, which emphasizes quality education that builds Pancasila based character education to face the challenges of the 21st century (Sapnanda & Simanjuntak, 2024). 21st century skills are the key to producing quality human resources (Prastiyono et al., 2023). Social Sciences (IPS) is a field of study that studies people, places, and the environment. It plays a crucial role because it provides insight into the dynamics of social, cultural, economic, and geographical life (Nafisah et al., 2025). Social studies learning plays a role in shaping students to become active individuals, have social sensitivity, are responsible, and are able to understand the relationship between humans and their environment (Ariani et al., 2021).

The social studies learning process still faces various challenges. Although various facilities and learning media have been provided to support the teaching and learning process, their utilization has not been able to optimally increase student engagement. Ideal learning emphasizes the active role of both teachers and students, with students positioned as the primary subjects in the learning process. However, social studies material rich in abstract concepts that are difficult for students to grasp often leads to low learning motivation (Nikmawati et al., 2023). This can focus thinking and create a pleasant atmosphere, so media is needed to support the learning process (Sulaiman & Huda, 2024). Through social studies learning, students are closer to the environment so that students can understand its benefits in a more real way (Haryati, 2023).

The current reality of social studies learning does not fully reflect ideal learning conditions. The delivery of material is still dominated by lectures. The emphasis on memorization without in-depth understanding and the lack of encouragement for critical thinking make it difficult for students to grasp concepts (Kristina & Nagara, 2023). This causes students to feel bored and their interest in social studies decreases. Students with low motivation tend to be less diligent and less serious about completing assignments (Ariani et al., 2021). One of the causes of low motivation to learn social studies is the limited learning media, which only relies on visual media, so that the learning experience is less interactive and interesting (Khairunisa et al., 2020).

In addition to the issue of motivation to learn social studies, students' environmental awareness remains a concern. Various environmental issues, such as flooding, air pollution, and exploitation of natural resources, pose real challenges for students. A lack of curiosity and knowledge about these issues contributes to low environmental awareness (Permatasari et al., 2024). Students are not yet fully aware of the negative consequences of their behavior on environmental sustainability. Despite the existence of Adiwiyata schools, students' environmental awareness remains low due to their limited environmental knowledge, resulting in weak concern (Segara et al., 2023). Many students damage school plants, do not maintain cleanliness and throw rubbish carelessly (Labobar & Kapojos, 2023). This

p-ISSN: 1412-3835
e-ISSN: 2541-4569
VOL 35, NO.2, DES 2025

condition shows the need for a learning approach that not only conveys knowledge, but is also able to foster attitudes and awareness towards environmental conservation.

Based on observations conducted at SMPN Labschool UNESA 2, similar conditions were also found, even though facilities such as LCDs were available and utilized through PowerPoint and books, student learning motivation was still low. This was reflected in the lack of curiosity and active participation of students in the IPS. Some of them did not take notes on the teacher's explanations, were noisy, did not bring social studies books and showed little enthusiasm in participating in social studies lessons. In terms of environmental awareness, Based on, Although most students have environmental awareness such as bringing supplies and minimizing plastic waste, negative behaviors were still found such as littering, damaging plants and not carrying out their duties. All school residents are responsible for keeping the school environment clean (Ismail, 2021). Considering that IPS studies natural phenomena and human interaction with the environment, especially in the material on the use of natural resources in class VIII, this subject has great potential as a means to foster students' environmental awareness (Lusiana, 2024). Therefore, innovative and interactive learning media are needed. One potential solution is an augmented reality-based snakes and ladders game.

The augmented reality-based snakes and ladders game integrates gaming and digital aspects to actively engage students with engaging interactive features and more adaptive media. This development aims to create engaging, interactive, and innovative learning media (Gultom et al., 2023). The snakes and ladders game media functions as an alternative, innovative, fun and interesting teaching method to convey material in a varied way to encourage students' learning motivation (Safitri & Soelistijo, 2025). Traditional games are an alternative, fun learning method so that students can easily understand the material (Prastiyono et al., 2022).

In line with technological advances, the traditional game of snakes and ladders needs to be combined with 21st-century technology. Students today have faster access to information, enjoy interactive games, and have parallel cognitive structures (Pranahadi et al., 2024). The advantages of augmented reality are presenting information interactively, supporting 3D presentations, visualizing abstract ideas and making it easier to understand social studies material through educational games (Salmiyanti et al., 2023).

Previous research conducted by Safitri & Soelistijo (2025) shows that the snakes and ladders game media for VIII students increases students' learning motivation, including enthusiasm for learning, activeness, and interest. Research by Suroiya & Prasetya (2021) the development of augmented reality learning media for Hindu-Buddhist kingdom heritage materials has shown very good and satisfactory results. Cahyaningrum & Bektiningsih (2024) developing augmented reality-based card view media on natural resources material has been proven valid, feasible, and effective in increasing student engagement and understanding. Based on this, this study aims to develop an augmented reality-based snakes and ladders game media

that is feasible and effective in increasing students' motivation to learn social studies and environmental awareness.

RESEARCH METHOD

This method uses the Borg and Gall model. The reason for using the Borg and Gall model is because it is a reference that is widely applied in development research and presents structured and systematic stages for creating products based on needs or problem analysis (Adelia & Purwoko, 2025). This model consists of 10 stages, however, in this study only up to eight stages were applied, namely: (1) potential and problems, (2) data collection, (3) product design, (4) design validation, (5) design revision (6) product trial (7) product revision (8) usage trial (Susanti & Sholihah, 2021).

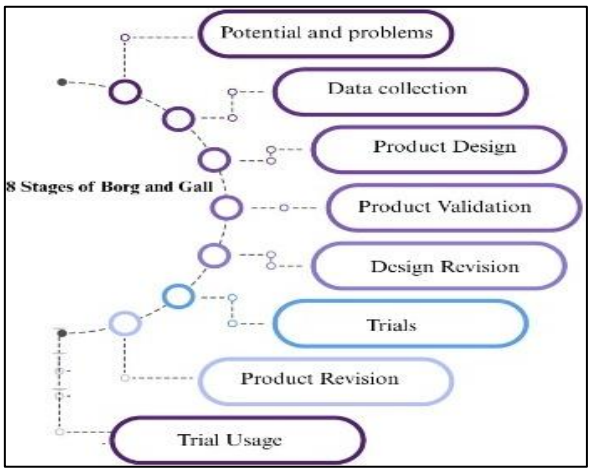

Figure 1.
The Eight Stages of Borg & Gall

This modification of the stages was carried out because the initial eight stages were effective enough to produce a development product that was feasible, practical, and effective for use in learning. The development research used a quasi-experimental design with a Nonequivalent Control Group Design, as shown in Table 1.

Tabel 1.
Quasi-Experimental Desain Nonequivalent Control Group Design

Class	Pretest	Treatment	Posttest
Experiment	O1	X	O2
Control	O3	-	O4

A quasi-experimental design with an Unequal Control Group Design was used. The experimental group (grade 8A) received learning using an Augmented Reality-based snakes and ladders game, while the control group (grade 8B) used PowerPoint media. Pre-tests (O1, O3) and post-tests (O2, O4) were given to measure students' final abilities.

The validation of the augmented reality-based snakes and ladders game involved two media expert validators and one material expert validator from the UNESA Social Studies lecturer. This experiment was conducted in class 8 A as the control class and class B as the experimental class, each class consisting of 29 students, with the total number of students at SMP Labschool Unesa 2 being 58 students.

Data were collected in both qualitative and quantitative forms. Qualitative data were obtained from responses and suggestions from media experts and subject matter experts, interviews, and observations. Quantitative data consisted of product assessment scores from validators. Additionally, a questionnaire was used to measure students' motivation to learn social studies using a Likert scale of 1-4, and a pretest and posttest were used to measure students' environmental awareness. Student ability indicators measured using the instruments are shown in Table 2.

Table 2.
Student Ability Indicators

No.	Social Studies Learning Motivation	Environmental Awareness
1.	Desire to succeed	Concern for environmental damage and health
2.	Awareness in learning	Curiosity and self-determination in environmental sustainability
3.	Perseverance in completing tasks	Critical attitude in solving environmental problems
4.	Never giving up in the face of difficulties	Responsibility towards the environment
5.	Interest in learning	Awareness of the potential of local wisdom in the region

Data analysis was conducted to assess the product's feasibility by material and media experts before it was piloted on students. The research instrument was first tested for validity using product-moment analysis, reliability using Cronbach's alpha, and the test items were explained to determine the level of difficulty and discriminatory power.

After the instrument was declared feasible, it was processed through normality and homogeneity tests as statistical prerequisites. The primary data analysis was conducted using an independent sample t-test with a 5% significance level and N-gain to measure improvements in students' motivation to learn Social Studies and environmental awareness. To measure the effectiveness of product research and development, the proposed hypotheses are as follows:

H_1: *There is an influence of the use of snakes and ladders game media based on Augmented Reality in increasing students' motivation to learn social studies and environmental awareness.*

If H_0 < significance 0,05, means H_0 accepted. If H_0 > significance 0,05, means H_0 rejected.

The results of this analysis were used to determine the feasibility of the media product according to the criteria applied in the field trial, as shown in Table 3.

Table 3.
Feasibility Criteria for Product Research and Development

No.	Score In Percent	Eligibility Category	Information
1.	81% ≤ V ≤ 100%	Very Feasible	Media can be used without revision
2.	61% ≤ V ≤ 81%	Feasible	Media can be used but needs minor revisions
3.	41% ≤ V ≤ 61%	Quite Feasible	The media can be used, but moderate revisions are needed.
4.	21% ≤ V ≤ 41%	Less Feasible	It is recommended not to use the media as it needs major revision.
5.	0% ≤ V ≤ 21%	Not Feasible	Media cannot be used

Source: Nufus et al. (2021)

Expert validation formula to determine the suitability of media from (Nufus et al., 2021) namely as follows:

$$\text{Va} = \frac{TSe}{TSh} x\ 100\%$$

Information:
Va = Expert validity
Tse = Total score obtained
TSh = Maximum total score

RESULTS AND DISCUSSION

RESULTS

Media development in the product design of the snakes and ladders game based on augmented reality, researchers designed the product by compiling a plan based on the findings that had been collected previously and based on the needs of students. The following is a picture of the media design of the snakes and ladders game based on augmented reality as follows.

1. The guidebook is used to provide technical instructions in playing the snakes and ladders game based on augmented reality, starting from the introduction, table of contents, media description, purpose of using the media, game components, playing procedures, additional provisions and handling of game obstacles, assessment guidelines, closing and author's biodata. This book has 2 versions, namely the printed version and the flibook version which can later be accessed by students through the barcode on the start box. Researchers designed the guidebook according to the material, namely the utilization of natural resources. This guidebook is made of Glossy 210 gsm Art Carton material with A6 size.

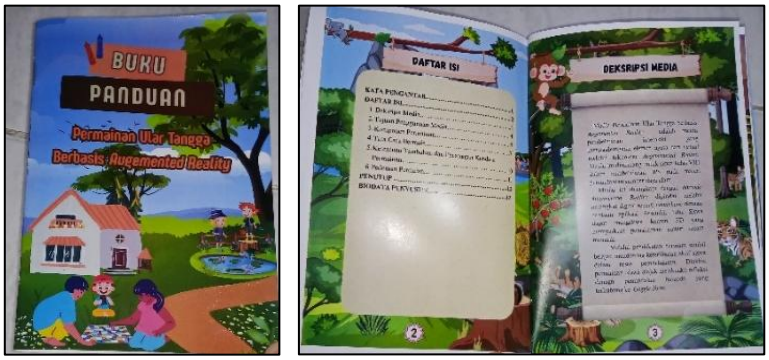

Figure 2.
Guidebook

2. Dice are used to determine the number of moves a player must take on a snakes and ladders board game. They are 20x20 cm cubes, each side having numbers 1-6. The dice are made of cardboard covered with a thick buffalo green coating.

Figure 3.
Dice

3. Pawns are used to mark group positions in the snakes and ladders board game. Pawns are custom-made from wood, measuring 7-7.5 cm and 13-14 cm tall. Each pawn is painted by researchers in brown, yellow, green, white, and blue to differentiate between groups in the game.

Figure 4.
Pawn

4. A natural resources-themed snakes and ladders board game. This board is printed on banner material measuring 240x200 cm. The snakes and ladders board has colored squares with specific functions. The purple start square contains a flibook-shaped guidebook. The green square is for knowledge cards, the red square is for challenge cards, and the yellow square with a gift icon is for

p-ISSN: 1412-3835
e-ISSN: 2541-4569
VOL 35, NO.2, DES 2025

surprise cards. The orange finish square is equipped with a barcode to a Google Form link as a reflection. The other squares will be blue and white for variations.

Figure 5.
Snakes and Ladders Board

5. Augmented reality cards are designed as part of the snakes and ladders game media. On the front side of the card there is an image depicting the potential and causes of changes in natural resources. The back side contains an augmented reality barcode. The snakes and ladders game has 27 cards in different colors. The cards consist of 10 green knowledge cards containing two case study videos and questions. 10 red challenge cards contain tasks or activities that players must complete. Eight yellow surprise cards contain clues that students must guess. Each card is equipped with an Augmented Reality barcode.

Figure 6.
Knowledge Card

Figure 7.
Challenge Card

Figure 8.
Surprise Card

6. This Google Form is used for student reflection after completing the game. The purpose of this reflection is to determine students' understanding of the material

and the engaging nature of the media used. This Google Form can be accessed via the barcode on the finish box.

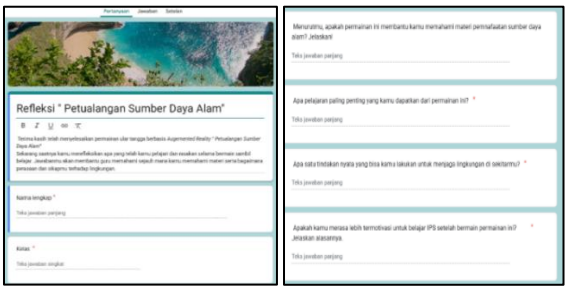

Figure 9.
Reflection of the g-form

Feasibility was achieved through a design validation process by subject matter and media experts, followed by design revisions based on input from the validators. A summary of the feasibility test results can be seen in Table 4.

Table 4.
Feasibility Results by Media Experts

No.	Assessment Aspects	Score Obtained	
		Validator 1	Validator 2
1.	Appearance	27	26
2.	Attractiveness and Effectiveness	20	19
3.	Media Presentation	40	33
4.	Material	11	10
	Total	98	88
	Percentage	98%	88%
	Total Average Score	**93%**	
	Category	**Very Feasible**	

Based on Table 4, media expert validator 1 gave a total score of 98, which, when calculated using a percentage formula, yields 98%. This result indicates that the media is deemed "very suitable" for use in terms of suitability. Meanwhile, media expert validator 2's assessment yielded a score of 88, with a percentage of 88%. This result indicates that the media is "very suitable" for use. Overall, the average score from both media expert validators was 93%, thus declaring the augmented reality-based snakes and ladders game "very suitable" for use.

In addition to validation for the media aspect, the augmented reality-based snakes and ladders game was also validated for its social studies content. The following are the results of the feasibility test by the social studies learning material experts in Table 5.

Table 5.
Feasibility Results by Material Experts

No.	Assessment Aspects	Score Obtained
1.	Curiculum	15
2.	Teaching Module	19
3.	Content Eligibility	41
4.	Language Eligibility	17
	Total	**92**
	Presentation	**92%**
	Category	**Very Feasible**

Based on table 5, the total score given by the material expert validator on the curriculum aspect obtained a score of 15, the teaching module aspect a score of 19, the content feasibility aspect a score of 41 and the language feasibility aspect a score of 17. Overall, a score of 92% was obtained, which indicates that the snakes and ladders game media based on augmented reality that was developed was declared "very feasible". Overall, the combined results of the validation by media experts and material experts can be seen in table 6.

Table 6.
Feasibility Results by Media and Material Experts

No.	Validator	Total Score	Maximum Total	%	Category
1.	Media	186	100	93%	Very Feasible
2.	Material	92	100	92%	Very Feasible
Total Overall Aspects		**278**	**300**	**92,6%**	**Very Feasible**

Based on the data, the average overall validation score by media and material experts was 92.6%, with a very feasible criterion. Based on the validation results, the augmented reality-based snakes and ladders game media was declared " Very Feasible " to use. This conclusion was obtained from the results of the material and media validation test, which showed that the product had met the eligibility criteria for use in school learning. However, the validators also provided input and suggestions that were used to improve the product. The validators' input and suggestions were used to improve the product. This input can be seen in Table 7.

Table 7.
Suggestions and Input from Validators

No.	Validator	Suggestion	Follow-up Improvements
1.	Media Expert	The sentences on the cards are taken from social studies books and articles without sources.	Added reference sources to sentences taken from social studies books/articles
2.	Materials Expert	The learning module identity is incomplete (compiler name, academic year, semester) Researchers used learning outcomes for 2022.	The module identity is completed with the name of the compiler, academic year, and semester. Researchers used learning outcomes for 2025.

No.	Validator	Suggestion	Follow-up Improvements
		The initial stimulus is less contextual because it highlights salmon, better relating the material to local conditions.	The material has been linked to Indonesian fishery resources.
		The image of the trash is taken from Google so it is less contextual	The image of the trash was replaced with a photo taken directly from the environment.

After validation and improvements were made based on input from material and media experts, a small group trial was conducted with 15 students to determine media usage and teacher and student responses. The trial results were used as the basis for product revisions so that the media could be used optimally in social studies learning. The researchers reviewed the product and refined it based on suggestions provided by social studies teachers at SMP Labschool UNESA 2 (see Table 8).

Table 8.
Product Revisions

No.	Before Revision	After Revision
1.	Snakes and Ladders game board size 110x90cm	The size of the snakes and ladders game board has been enlarged to 240x200cm
2.	The shark icon on one of the surprise cards is too small.	The shark icon on one of the surprise cards has been enlarged.

The augmented reality-based snakes and ladders game was implemented in the experimental class. After the learning process was completed, questionnaire and test data were collected. These data were then processed to determine students' social studies learning motivation and environmental awareness before and after the media use. Furthermore, the media's effectiveness was analyzed using and independent sample t-test and an N-Gain test. Normality (Table 9) and homogeneity (Table 10) tests were previously conducted. independent sample t-test and an N-Gain test. Normality (Table 9) and homogeneity (Table 10) tests were previously conducted.

Table 9.
Normality Test

Ability	Group	Shapiro Wilk		
		Statistics	df	Sig.
Social Studies Learning Motivation	Experiment	.931	29	.060
	Control	.938	29	.091
Environmental Awareness	Experiment	.931	29	.059
	Control	.934	29	0.69

Table 10.
Homogeneity Test

	Levence statistic	df1	df2	Sig.
Social Studies Learning Motivation	.707	1	56	.404
Environmental Awareness	1.155	1	56	.287

Based on Table 9, the results for the experimental class are sig. > 0.05 so that the data can be concluded to be normally distributed. Table 10 shows the sig. > 0.05, which means that the learning outcome data of both classes have homogeneous variance. Thus, further testing, especially the independent sample t-test, can be conducted to determine whether or not there is a significant difference between the social studies learning motivation and environmental awareness of the control and experimental classes in the use of augmented reality based snakes and ladders game media. Based on the results of data processing, the t-test calculation is shown in Table 11.

Table 11.
Independent Sample t-Test

		f	Sig.	t	df	Sig.(2-tailed)
Social Studies Learning Motivation	Equal Variances assumed	.638	.428	-5.259	56	.000
	Equal variances not assumed			-5.276	55.981	.000
Environmental Awareness	Equal Variances assumed	1.155	.287	4.391	56	.000
	Equal Variances assumed			4.391	54.414	.000

The t-test results in Table 11 show a significance value of 0.000 < 0.050, meaning H_1 is accepted and H_0 is rejected. This means that the use of Augmented Reality based snakes and ladders game media has a significant effect on increasing students' motivation to learn social studies and environmental awareness. Furthermore, an N-gain test was conducted to determine the effectiveness of using media in increasing motivation to learn social studies and environmental awareness in the control and experimental classes. This test was used to see the extent to which students' abilities improved after the application of the augmented reality-based snakes and ladders game media. The results of the N-Gain test can be seen in Table 12.

Table 12.
N-Gain Test

Ability	Group	N	Min	Max	Mean	Information
Social Studies	Control	29	-.50	.63	.1386	Low
Learning Motivation	Experiment	29	.07	1.00	.6150	Medium
Environmental	Control	29	.14	.70	.3288	Medium
Awareness	Experiment	29	.20	1.00	.5625	Medium

Based on the interpretation of normalized N-gain, the average value of the experimental class of 0,61falls into the "medium" category at 0.30≤gain<0.70 and the average value of the control class of 0,13 falls into the "low" category because it is at 0.00≤gain<0.30. Meanwhile, the average value of the experimental class of 0,56 and the average value of the control class of 0,32 in environmental awareness fall into the "medium" category.

DISCUSSION

Feasibility of the Augmented Reality-Based Snakes and Ladders Game

The feasibility of the augmented reality-based snakes and ladders game was assessed through design validation by media and content experts. The goal was to assess the suitability of the developed learning media for use before implementing it with students (Sandra et al., 2022). Based on the media validation results, it was declared valid and suitable for use in social studies learning. The media validation results from media expert validators 1 and 2 obtained an average value of 93% with a very suitable criterion. The media validation score showed that the media had met the aspects of appearance, attractiveness, effectiveness, materials and media presentation. This indicates that the integration of augmented reality technology in the snakes and ladders game is able to provide an interesting learning media, can be applied, and supports the achievement of social studies learning objectives.

Meanwhile, the validator's validation of the material yielded an average score of 92%, categorizing it as very suitable for use. This result indicates that the material presented aligns with the Merdeka curriculum, is content-appropriate, and language-appropriate, and is tailored to student characteristics, thus supporting conceptual understanding and achieving learning objectives. The feasibility of snakes and ladders media, strengthened by research Sari et al. (2021) the validation results showed that media experts gave a score of 96.67% and material experts a score of 97.50%. Both scores categorized as very suitable for trial implementation. Therefore, the augmented reality-based snakes and ladders game is deemed suitable for use in social studies learning.

The Effectiveness of Augmented Reality-Based Snakes and Ladders Game Media in Increasing Social Studies Learning Motivation and Environmental Awareness

The application of augmented reality-based snakes and ladders game media in social studies learning for class VIII of SMP Labschool Unesa 2 has been proven to have a significant influence on students' learning motivation and environmental

awareness. The results of the independent sample t-test showed a significance value of 0.00 < 0.05, which indicates a significant difference between the experimental class and the control class. In the aspect of social studies learning motivation, the N-gain value of 0.61 is quite effective, indicating that the developed media is more effective than conventional learning. Meanwhile, in the aspect of environmental awareness, the N-gain value of 0.56 means it is quite effective in increasing students' learning motivation and environmental awareness.

This study revealed new findings when implementing an augmented reality-based snakes and ladders game, showing that students enthusiastically participated in the learning process. Students were not only actively engaged in the game but also able to relate the material to real-world situations in their local environment. This was evident when answering questions on the knowledge cards through discussions, striving to provide correct answers, and striving to be the group that completed the game the fastest. This finding is reinforced by research (Fernando et al., 2024) A person will achieve the desired learning outcomes if they have a desire to learn to achieve optimal results. During learning with the snakes and ladders game media based on augmented reality, students showed high motivation to learn social studies which was reflected when students remained focused on completing each game activity, even though sometimes it took time to understand the augmented reality display. Students were able to complete assignments on time when asked to present, follow the rules well and ask questions when they encountered difficulties.

This condition indicates a high level of motivation to learn social studies, which is characterized by students' desire to be actively involved in the learning process. In line with this, according to (Munzir, 2025) Motivated students tend to have initiative in understanding the material, seek additional learning resources, and show perseverance in completing assignments.

Several students described environmental issues they encountered, such as flooding, garbage accumulation in rivers, and murky water conditions in Surabaya. They also shared their experiences observing people in their neighborhoods dumping trash in rivers and discharging household wastewater directly into the river. This is in line with research findings (Krüger & Bodemer, 2022), that the application and investigation of multimedia design principles in augmented reality learning environments, the use of multimedia design principles in Augmented reality has been proven to be able to support deeper student understanding and involvement.

Student engagement and enthusiasm increased as they interacted with the knowledge cards, which displayed a case study example of trash dumped on a roadside in Jombang. During the lesson, students spontaneously shared their experiences seeing trash in their surroundings. This led to new findings that using an augmented reality-based snakes and ladders game can create meaningful learning and raise students' awareness of the importance of environmental protection.

Referring to David Ausubel's theory of meaningful learning, the learning process occurs when new information is connected to students' existing knowledge. This occurs when students connect new phenomena to their real-life experiences, thus facilitating their understanding of the information learned (Basyir et al., 2022). Meaningful social studies learning is necessary to foster a caring attitude toward the environment in students. This is achieved by ensuring the material's benefits are felt and applied in their daily lives.

During the learning process, groups that receive challenge cards carry out direct activities in the school environment, such as sorting organic and inorganic waste and identifying waste such as gallons that can be recycled. According to Febriyanti et al. (2023) W = waste sorting can help raise students' awareness of the importance of maintaining a healthy school environment through proper waste sorting. Students also identified beneficial plants around the school, such as ginger, aloe vera, and turmeric, and conducted water and oil experiments to understand environmental pollution caused by oil waste. Through these activities, students actively build understanding based on direct experience, rather than simply receiving teacher explanations.

This is in line with constructivism theory, students actively construct their understanding of what they have learned by collecting information and interpreting it and relating it to their previous experiences (Suryana et al., 2022). The link between social studies learning motivation and environmental awareness can be seen in the role of student motivation in influencing the continuity and success of the learning process. The learning process will be effective if students are highly motivated, as motivation encourages them to be more active, enthusiastic, and diligent in learning the material (Dawolo et al., 2024). Environmental awareness can be fostered through providing relevant knowledge and understanding, which is influenced by students' curiosity and motivation to learn.

CONCLUSION

Based on the results of the research and discussion, it can be concluded that the developed augmented reality-based snakes and ladders game media is feasible and effective for use in Class VIII Social Studies learning on the material of natural resource utilization. The feasibility of the augmented reality snakes and ladders game media is reviewed from the validation aspects of media experts and material experts conducted by UNESA Social Studies lecturers. The validation results obtained from media experts were 93% and material experts 92%. The results of the Independent Sample t-test showed a significant difference between the experimental class and the control class (sig. 0.00 <0.05). The effectiveness of social studies learning motivation obtained an N-gain of 0,61 and environmental awareness of 0,56 both of which are included in the medium category. Thus, the augmented reality-based snakes and ladders game media is quite effective in increasing student motivation in learning social studies and caring for the environment. Recommendations for teachers are recommended to utilize augmented reality-based snakes and ladders as an innovative alternative to social

studies learning to increase students' learning motivation and environmental awareness. Furthermore, further researchers are advised to develop and refine augmented reality-based media to optimize its effectiveness and examine its impact on other variables.

REFERENCES

Ariani, K. B., Sukadi, S., & Kertih, I. W. (2021). Kontribusi Konsep Diri, Motivasi Belajar dan Minat Belajar Terhadap Prestasi Belajar IPS Siswa SMP N 1 Mengwi. *Media Komunikasi FPIPS*, *20*(2), 139-150. https://doi.org/10.23887/mkfis.v20i2.37537.

Basyir, M. S., Aqimi Dinana, & Diana Devi, A. (2022). Kontribusi Teori Belajar Kognitivisme David P. Ausubel dan Robert M. Gagne dalam Proses Pembelajaran. *Jurnal Pendidikan Madrasah*, *7*(1), 89–100. https://doi.org/10.14421/jpm.2022.71.12.

Cahyaningrum, S. F., & Bektiningsih, K. (2024). Development of Card View Media Based on Augmented Reality Technology for Natural Resource Materials. *Jurnal Penelitian Pendidikan IPA*, *10*(11), 8662–8670. https://doi.org/10.29303/jppipa.v10i11.7612.

Dawolo, Y. M. Z. D., Lase, A., Harefa, Y., & Laoli, E. S. (2024). Pengaruh Motivasi Belajar Terhadap Hasil Belajar Siswa Pada Mata Pelajaran Ips Terpadu Di Kelas Viii Smp Negeri 1 Alasa Tahun Pelajaran 2023/2024. *Jurnal Serunai Ilmu Pendidikan*, *10*(2), 295–303.

Febriyanti, R., Rahayu, N. V. A., Pitaloka, W. D., Yakob, A., & Samsuri, M. (2023). Edukasi Pemilahan Sampah sebagai Upaya Penanganan Masalah Sampah di SD Muhammadiyah Baitul Fallah Mojogedang. *Buletin KKN Pendidikan*, *5*(1), 37–45. https://doi.org/10.23917/bkkndik.v5i1.22456.

Fernando, Y., Andriani, P., & Syam, H. (2024). Pentingnya Motivasi Belajar Dalam Meningkatkan Hasil Belajar Siswa. *ALFIHRIS: Jurnal Inspirasi Pendidikan*, *2*(3), 61-68.

Gultom, S. T., Sinaga, R., & Silaban, R. (2023). Application of Scientific Approach-Based Learning Assisted by Question Cards and Ladder Snake Media for Evaluating Learning Outcomes. *Jurnal Penelitian Pendidikan IPA*, *9*(10), 8091–8098. https://doi.org/10.29303/jppipa.v9i10.2633.

Haryati, P. (2023). Problem Based Learning Meningkatkan Keaktifan dan Hasil Belajar Kelas Vii A Semester Genap Mata Pelajaran IPS di SMP Negeri 1 Girimarto Tahun Pelajaran 2022/2023. *Jurnal Jaringan Penelitian Pengembangan Penerapan Inovasi Pendidikan (Jarlitbang), 9*(2), 105–114. https://doi.org/10.59344/jarlitbang.v9i2.140.

Ismail, M. J. (2021). Pendidikan Karakter Peduli Lingkungan Dan Menjaga Kebersihan Di Sekolah. *Guru Tua : Jurnal Pendidikan Dan Pembelajaran*, *4*(1), 59–68. https://doi.org/10.31970/gurutua.v4i1.67.

Khairunisa, W., Taufik, A. N., & Pamungkas, T. A. (2020). Pengembangan Augmented reality Berbantuan Assemblr edu dalam Menumbuhkan Motivasi Belajar Siswa SMP Kelas VIII. *Jurnal Pendidikan MIPA*, *14*(4), 1177-1185.

Kristina, M., & Nagara, E. S. (2023). The Use of Visual Media as One Alternative to Improve Students' Learning Motivation. *JECE (Journal of Ethics and Character Education)*, *1*(2), 49–58.

Krüger, J. M., & Bodemer, D. (2022). Application and Investigation of Multimedia Design Principles in Augmented Reality Learning Environments. *Information (Switzerland)*, *13*(2), 74. https://doi.org/10.3390/info13020074.

Labobar, J., & Kapojos, S. (2023). Membangun Kesadaran Lingkungan: Implementasi Pendidikan Lingkungan Hidup di SMP Negeri Distrik Sentani. *Civic Education and Social Science Journal (CESSJ)*, *5*(2), 94–109. https://journal.univetbantara.ac.id/index.php/cessj/article/view/4602.

Lusiana. (2024). Membangun Kesadaran Lingkungan Melalui Pembelajaran IPS Pada Siswa Kelas 4 Sekolah Dasar. *Pena Edukasia*, *2*(4), 145–148.

Munzir, A. (2025). Pengaruh Motivasi Belajar dan Minat Belajar Terhadap Hasil Belajar IPS Siswa Kelas VIII di SMP Al-Ikhlas. *JPGENUS: Jurnal Pendidikan Generasi Nusantara*, *3*(1), 103–109. https://doi.org/10.61787/7pxp6p14.

Nafisah, D., Muhammad Ilyas Marzuqi, H. P., Niswatin, & Asnimawati. (2025). Developing Teaching Materials on Basic Social Studies Concepts Through SDGs-Integrated Case Studies for Prospective Teachers. *Jurnal Penelitian dan Pengembangan Pendidikan*, *12*(4), 1064–1074.

Nikmawati, U., Aryani, I. K., & Yuliani, S. K. W. (2023). The Effecttiviness of using Android-Based Social Science Learning Media to Increase Student Knowladge Competence. *Proceedings Series on Social Sciences & Humanities*, *12*, 15–21. https://doi.org/10.30595/pssh.v12i.767.

Nufus, H., Nurdin, E., & Ariawan, R. (2021). Integrasi Nilai Keislaman dan Kemampuan Komunikasi Matematis Pada Buku Ajar Program Linier. *Jurnal Gantang*, *6*(1), 47–60. https://doi.org/10.31629/jg.v6i1.2556.

Permatasari, D., Latip, A., & Purnamasari, S. (2024). Implementasi Media Powtoon Berbasis Socio-Scientific Issues Pada Materi Pencemaran Lingkungan Untuk Meningkatkan Kesadaran Lingkungan Siswa. *INKUIRI: Jurnal Pendidikan IPA*, *13*(1), 9–17. https://doi.org/10.20961/inkuiri.v13i1.80043.

Pranahadi, T. Y., Yani, I., & Nefosano, H. (2024). The Use of Augmented Reality (AR) Media to Enhance Student Motivation Learning. *Jurnal BIOEDUIN*, *14*(1), 30–37. https://doi.org/10.15575/bioeduin.v14i1.31544.

Prastiyono, H., Amin, S., Fadirubun, F. F., Sitohang, L. L., & Yuni, C. (2022). The Collaboration Learning Interactive Multimedia using Traditional Games "Benteng-Bentengan" in Geography Subject for High Schools. *Proceeding International Conference on Islamic Education*, *7*, 536–546.

Prastiyono, H., Widodo, B. S., Utaya, S., Sumarmi, Astina, I. K., Saiful, & Amin, P. I. (2023). The Development of Geomobile App-Based Outdoor Study to Improve Critical-Social Abilities and Collaborative in the 21st Century. *International Journal of Interactive Mobile Technologies (IJIM)*, *17*(24), 79–95.

Safitri, A. P., & Soelistijo, D. (2025). Pengembangan Media Ular Tangga Untuk Meningkatkan Motivasi Belajar Siswa Kelas VIII SMP. *Journal of Language, Literature, and Arts*, *7*(1), 1–23. https://doi.org/10.17977/um064v5i12025p44-53.

Salmiyanti, S., Erita, Y., Putri, R. S., & Nivetiken, N. (2023). Augmented Reality (AR) in Learning Social Science (IPS) in Elementary Schools. *Journal of Digital Learning and Distance Education*, *1*(10), 298–305. https://doi.org/10.56778/jdlde.v1i10.51.

Sandra, H. K., Dt. Tanamir, M., & Afryansih, N. (2022). Kelayakan dan Praktikalitas Media Pembelajaran Thunkable Berbasis Android Pada Materi Ketahanan Pangan Industri dan Energi. *Journal Horizon Pendidikan*, *2*(1), 43–53.

Sapnanda, D., & Simanjuntak, A. (2024). Implementasi Projek Penguatan Profil Pelajar Pancasila dalam Pembelajaran IPS. *The Indonesia Journal of Social Studies*, *7*(1), 158–181.

Sari, D. P. P., Murtono, & Utomo, S. (2021). Pengembangan Media Pembelajaran Interaktif IPS Berbasis Problem Based Learning dan Ular Tangga. *Jurnal Pendidikan Edutama, 8*(1), 1-12. https://doi.org/10.30734/jpe.v8i1.1305.

Segara, N. B., Suprijono, A., & Marzuqi, M. I. (2023). Outdoor Learning Model by Utilizing Mount Penanggungan Cultural Heritage to Realize Education for Sustainable Development. *Indonesian Journal of Educational Research and Review*, *6*(2), 356–371.

Sulaiman, M., & Huda, N. (2024). The Influence of Teacher Teaching Methods and Learning Motivation on The Learning Outcomes of IPS Subjects of Senior High School Mambaus Sholihin Students Suci Manyar Gresik. *MADANI: Jurnal Pendidikan IPS Dan Ilmu Sosial*, *02*(02), 121–131.

Suroiya, M., & Prasetya, S. P. (2021). Pengembangan Media Pembelajaran Augmented Reality Pada Materi Peninggalan Kerajaan Hindu-Budha di Indonesia. *SOSEARCH : Social Science Educational Research*, *1*(2), 93–104. https://doi.org/10.26740/sosearch.v1n2.p93-104.

Suryana, E., Aprina, M. P., & Harto, K. (2022). Teori Konstruktivistik dan Implikasinya dalam Pembelajaran. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *5*(7), 2070–2080. https://doi.org/10.54371/jiip.v5i7.666.

Susanti, E. D., & Sholihah, U. (2021). Pengembangan E-Modul Berbasis Flip Pdf Corporate Pada Materi Luas dan Volume Bola. *RANGE: Jurnal Pendidikan Matematika*, *3*(1), 37–46. https://doi.org/10.32938/jpm.v3i1.1275.