

## Audio Visual Snakes and Ladders Game Development for SPLDV

Rifatus Sholikah<sup>1</sup>, Marhan Taufik<sup>2</sup>, Adi Slamet Kusumawardana<sup>3</sup>

Study Program of Mathematics Education, Universitas Muhammadiyah Malang  
Indonesia

Email: rifa.atu28@gmail.com,

---

<b>Corresponding author:</b>	<b>Abstract</b>
Rifatus Sholikah rifa.atu28@gmail.com,	Many students still need help understanding SPLDV material. This research aims to develop learning media for snakes and ladders assisted by audio-visual aids using valid and effective PPT to improve learning outcomes and student learning enthusiasm in learning the Two-Variable Linear Equation System. The study subjects were 18 grade VIII students at SMP Muhammadiyah 2 Malang. The research method used is development or Research and Development (R&D). Data collection techniques used are test questions and questionnaires. Data analysis techniques using data analysis, namely quantitative descriptive with and calculating the average value of the pretest and posttest and the average percentage of the questionnaire value and the categorization of the percentage results. The results of this study indicate that the average effect of media validation is 94% in the very good category. Student learning outcomes are seen from the average student scores before and after using the media, namely, 32.5 and 83.89, which states that there are differences in learning outcomes students before and after using the media, as well as from the response questionnaire data students' enthusiasm for learning obtained an average of 83.74% which means very good. This states that audio-visual assisted snake and ladder learning media using PPT in learning the Linear Equation System of Two Variables is valid and effective in improving learning outcomes and student learning enthusiasm in the learning process.
<b>Keywords:</b> development of learning media, snakes and ladders, learning outcomes, learning enthusiasm, two-variable linear equation system	

---

Sholikah, R., Taufik, M., & Kusumawardana, A., S. (2023). Audio Visual Snakes and Ladders Game Development for SPLDV. *Mathematics Education Journal*, 7(1), 73-85. DOI: 10.22219/mej.v7i1.23310

---

## INTRODUCTION

The world of education always has its way of making students have high abilities and creativity. Producing a young generation with knowledge, insight, and a good attitude is one of the goals of implementing the learning process. Therefore, Mathematics teachers, in particular, also have challenges getting students interested in mathematics. One alternative I can do is to use learning media to aid the learning process. According to Rahmah et al., (2018) learning media functions to enhance information and attitudes and can make it easier to receive information. Learning media also functions as a tool to regulate progress steps and provide feedback when learning takes place. With the media, students will feel energized by hearing the teacher explain. Still, the media will make students more interested in ongoing learning so that learning motivation is formed and the clarity of material delivery can be more readily accepted from abstract concepts and the ability to absorb or retain when Studying.

Activities carried out by a teacher in the learning process using the help of learning media. They are carried out directly (learning by doing) to find learning concepts, students will be happier, and the material provided will be stored in students' long-term memory (Deswita, 2020). Using props has started to change from hardware to software (Buana, 2019). . Learning media, at this time, are not always in the form of teaching aids that are operated manually, but there are also teaching aids that are made with the help of technology, for example, making learning media based on Android and the like. The industrial era 4.0 made learning media more easily accessed and implemented by students, so in making media, it must also be considered whether the steps in operating the media are straightforward and can be followed. According to Murdiyanto & Yudi (2014) in terms of abstract mathematics, learning objects, media, and teaching aids are needed to support the learning process so that it is more understandable to students.

One of the learning media that can be used to support the learning process is combining games that children often play by presenting them with learning mathematics. Game-based media can be created by adopting a type of game into learning media by modifying game rules, shapes, and appearance (Kartikaningtyas, et al., 2014). The presence of learning media gives an essential meaning to learning because media will facilitate the lack of clarity in the message for intermediaries (Ainina, 2014). The media can shorten the complexity of the material being explained to students. The game of snakes and ladders has something to do with children's games that attract attention. A way of playing that is enough to provoke the spirit of competition is relatively high because each player must play the game with the luck of the dice thrown, whether the value is a lot or a little. Some snakes can make player pieces go down numbers so that players are far behind their opponents, and some ladders can make players far superior to their friends.

Snakes and ladders game is also classified as a traditional game that children rarely play because they are more interested in games on their gadgets. This makes snakes and ladders media essential to be used as learning media because it can familiarize students with traditional games that are rarely played. Besides, it also attracts students' enthusiasm to play and learn. According to Jannah (2019) , Snakes and ladders games can be used as a medium to attract students' motivation, process skills, and problem-solving abilities to participate in the learning process. This game can only be played directly with the teacher's help explaining its rules and how to play it. However, when there is audio-visual assistance using PPT which can explain the flow of the game, the game can be operated by students independently.

Audio media containing messages in auditive form (only heard) can stimulate children's thoughts, feelings, attention, and willingness to understand/learn the contents of the theme, such as audio/radio tapes, and can convey knowledge information such as verbal explanations in class (Rohani, 2019; Asmara, 2015). Apart from just audio, there is also media using audio-visual. According to Yusra (2019) audio means radio (sound), and visual means graphics and images that can be seen, so audio-visual can be defined as a combination of images and sound. Continuing from several media, using audio and visuals can also be used to convey messages. It can stimulate students' thoughts, feelings, attention, and willingness to learn to encourage intentional, purposeful, and controlled

learning processes (Kristanto, 2011). So that with the help of the teacher or not, students can already operate the existing media because the media used already has audio-visual assistance using PPT, which can help students efficiently operate the media.

Learning that is assisted by audio-visual assisted snakes and ladders game media using PowerPoint Template (PPT) is interesting. It can make students operate the media independently because it can be operated by opening the PPT to find out the game instructions given. Also, students can listen to the explanation in the PPT. This can increase the concentration and focus of students because they have to understand the questions given from the PPT carefully to understand the message conveyed. Snakes and ladders media with audio-visual assistance in the form of PPT can be an attractive alternative learning media because it can make students more interested in answering questions, gathering information from each question, and feeling challenged to be able to finish the game and becoming winner so that it will encourage students more active in the learning process and can also spur students to think critically.

Mathematics is classified as a complex and abstract subject, making it difficult for students to learn if they only use student handbook sources to understand. The result is that the scores obtained are also low. This statement is based on the results of the 2018 Program for International Student Assessment (PISA) assessment which states that Indonesia is ranked 75th out of 81 countries worldwide. Indonesia needs to improve the quality of education, especially in mathematics, an essential and influential science in learning. The National Research Council (NRC) also states that mathematics significantly influences and contributes directly to business, finance, health, and defense. (Mukarromah, 2020; Mukarromah & Siskawati, 2020). Factors from learning outcomes and low learning enthusiasm include the learning factor of less effective students, students who do not feel motivated during the learning process, and the need for more clarity in the material provided. This can impact student learning outcomes that do not reach the minimum completeness criteria because by simply explaining without props, students will have difficulty understanding concepts and are less interested in the explanations given by the teacher if only through the lecture method.

Learning that occurs at this time is still very minimal, using learning media to aid learning in schools. The use of teaching aids in a school is still underused because it is felt that it requires a relatively long time to operate learning media. This is one of the reasons teachers refrain from using learning media in the teaching and learning process. Learning media can increase student motivation and enthusiasm for learning and can increase memory in student memory. Because with a little game, students will feel happy, and their memories of the learning that has been done will have more of an impression on their memory.

Previous research conducted research with learning media similar to the snakes and ladders game so that it can be used as an alternative that can help the learning process because it provides a direct experience in learning while playing, and got the result that the media is valid, practical and effective for use in learning. Mathematics (Putri dan Tri 2018; Prambudi dan Tri 2020; Mar'atusholihah et al., 2019). Like this research, Kurnia (2016) also explained that Android-based snakes and ladders learning media could be a fun learning alternative in class. Furthermore,

as stated by Hadi (2013) there is an increased understanding of concepts, and student activities during learning have increased in a better direction when using snakes and ladders media. This proves that snakes and ladders media need to be developed when learning because, with the help of learning media, students will have more enthusiasm and high learning motivation. It can make students more able to develop their critical thinking.

Based on the explanation above, there has been no development of snakes and ladders learning media which contains instructions for working on questions and is used to see learning outcomes and student enthusiasm for learning. The snakes and ladders game which is designed with a variety of questions and various levels of difficulty accompanied by interesting pictures, will make students feel fun and have a high curiosity about using this snakes and ladders learning media. In the end, when the learning process is complete and after using this media, students will quickly master the material and allow the material learned by playing to enter into students' long-term memory so that it can have a distinct impression on students. Therefore, in responding to the problems that occur, the researcher formulates the problem, namely how the validity of audio-visual assisted snakes and ladders learning media using PPT and the effectiveness of the media to improve learning outcomes and student enthusiasm in learning the Linear Equation System of Two Variables. The goal is to develop audio-visual-assisted snakes and ladders learning media using valid and effective PPT to improve learning outcomes and student learning enthusiasm in learning the Two-Variable Linear Equation System.

## RESEARCH METHOD

This research uses a quantitative descriptive approach. It is research and development or Research and Development (R&D). The development model used in this research is ADDIE (Analysis, Design, Development, Implementation, and Evaluation). This research took 18 class VIII students of SMP Muhammadiyah Malang for the 2021/2022 academic year. The complete address of SMP Muhammadiyah 2 Malang is Jl. Lt. Gen. Sutoyo No. 68, Purwanto, Kec. Blimbing, Malang City, East Java 65122. The time of research was carried out in August 2022. The research procedure was:

### Analysis

Conducting needs analysis and curriculum analysis, as what is to be measured is an increase in learning outcomes and enthusiasm for learning, indicators for measuring improvement in learning outcomes and enthusiasm for learning are given as follows:

Table 1: Learning Outcome Indicators

Basic Competency	Sub Indicators
Describes a system of two-variable linear equations and their solutions related to contextual problems	Develop a mathematical model of a system of two-variable linear equations
Solve problems related to systems of two-variable linear equations.	Determine the x and y values of a system of two-variable linear equations using the substitution and elimination method.

---

Solve contextual problems related to systems of two-variable linear equations using mixed methods correctly.

---

(adapted Nurtanto & Sofyan, 2015)

Table 2: Indicators of Enthusiasm for Learning

Indicator	Sub Indicator
Perseverance in learning	1. Attendance at school
Tenacious in the face of adversity	2. Follow the learning room
Interest and sharp attention in learning	3. Attitude towards adversity
Independent in learning	4. Efforts to overcome difficulties
	5. Enthusiasm in following the lesson
	6. Desire for achievement
	7. Using opportunities outside class hours to study

(Adapted Amri, 2019)

### Design

Designing snakes and ladders media, making instruments in the form of pretest and post-test question sheets, then preparing questions and work instructions that will be used in learning media, compiling audio that will be used to understand questions in the snakes and ladders game, compiling student response questionnaires. Instruments for the validation sheet of media questions, media validation, pretest, and post-test validation questions, and student response questionnaire validation. The references that will be used for the questions prepared in the media come from the following books, Bambang et al. (2019), with the title *Practically Mastering Middle School/MTs Mathematics*. Furthermore, Marquarius (2015) with the book title *King Bank Mathematics Questions for Middle School Grades 7, 8, & 9*, Djumanta (2005) with the book title *Let's Understand Mathematical Concepts for Class VIII*, Lianingsih (2020) with the book title *Deepening Series of Middle School / MTs Mathematics Problems Grades 7, 8, 9*, and Fahrurrozi et al. (2015) with the book title *Top No. 1 Class 8 Middle School/MTs Daily Deuteronomy*.

### Development

This stage will focus on assessing several instruments that will be used in research, including pretest and post-test questions, student questionnaire sheets, and the production of learning media, which already contains pictures that will be used as questions in the snakes and ladders game, as well as preparing points -essential points of the questions to be presented, as well as the questions explained in audio form.

### Implementation

Implementation in field conditions, which will be directly given to 18 students to determine the constraints and how students respond when operating the media, and distribute pretest and post-test questions and response questionnaires. Furthermore, the data is processed quantitatively.

## Evaluation

The evaluation includes the results of the validity of the pretest and post-test questions, the validity of the questions on the media, the validity of the snakes and ladders learning media, as well as the results of the student enthusiasm questionnaire for learning media, and the test results of students after using learning media to see the feasibility of learning media that has been implemented.

Data was collected quantitatively with instruments like test questions and student response questionnaires. Furthermore, data analysis was carried out by validation analysis, averaging the results of the pretest and post-test scores, and calculating the percentage of student response questionnaires.

## RESULTS AND DISCUSSION

This research used the Research and Development (R&D) type, carried out in class VIII of SMP Muhammadiyah 2 Malang, and school researchers five times. At the first and second meetings met with the mathematics teacher and curriculum deputy to ask for permission to conduct research and seek information on learning mathematics at school. Next, the researcher returned to school to conduct research, where in the research process took three meetings, where the initial meeting gave pretest questions and divided groups, the second meeting carried out media implementation to students, and the last meeting was given post-test questions and questionnaires. The following research develops a product in the form of audio-visual aided snakes and ladders learning media in PowerPoint (PPT) in the Two Variable Linear Equations System (SLDV) material. The stages that have been carried out the results are as follows:

### 1. Analysis

Needs analysis here the researcher met with the class VIII mathematics teacher with Mrs. Astri as the resource person to collect reference material as a study of literature and information about media that had been used in schools to support mathematics learning so that the results were obtained that SMP Muhammadiyah Malang schools still did not use learning media as tools to support learning mathematics in schools.

Curriculum analysis at this stage is carried out by analyzing the applicable curriculum as a formulation of indicators and learning objectives by the established Basic Competency (KD). The applicable curriculum is then used as a guideline for selecting material and questions to be prepared in the media to be developed.

Table 3. Question Indicators in the Media

No.	Basic competencies	Indicators of Competence Achievement
1	3.5 Describe a system of two-variable linear equations and their solutions related to contextual problems	3.5.1 Creating a mathematical model for a system of two-variable linear equations 3.5.2 Solving a System of Two Variable Linear Equations (SPLDV)
2	4.5 Solve problems related to systems of two-variable linear equations	4.5.1 Analyzing and solving problems related to the System of Linear Equations of Two Variables.

---

#### 4.5.2 Creating a mathematical model and solving it from everyday problems related to the System of Two Variable Linear Equations

---

So that from the following indicators, the purpose of this lesson is to understand the concept of SPLDV, write mathematical models of SPLDV problems, solve questions related to SPLDV, create mathematical models, and solve everyday problems related to SPLDV.

## 2. Design

At this stage, the researcher begins to compile learning media that will be developed, starting from looking for book references to compiling questions that will be presented in learning media based on essential competencies and pretest-posttest questions that will be tested on students.

The references that will be used for the questions prepared in the media come from the following books, Bambang et al. (2019), with the title Practically Mastering Middle School/MTs Mathematics. Furthermore, Marquarius (2015) with the book title King Bank Mathematics Questions for Middle School Grades 7, 8, & 9, Djumanta (2005) with the book title Let's Understand Mathematical Concepts for Class VIII, Lianingsih (2020) with the book title Deepening Series of Middle School / MTs Mathematics Problems Grades 7, 8, 9, and Fahrurrozi et al. (2015) with the book title Top No. 1 Class 8 Middle School/MTs Daily Deuteronomy. The following references are used to compile questions that will be given to the media, totaling 36 questions of type A and B in appendix 3.

Next, develop the concept of the snakes and ladders game, and search for SPLDV explanatory videos on YouTube that will be presented to the media. So, from the collection of concepts that have been compiled, three parts will be in the media, namely the introduction section containing the cover and game instructions, then the contents section containing the game of snakes and ladders, and the contents of each number which consists of two questions, and instructions for working on the questions, then the section cover containing the last number as the winner of the game and acknowledgments.

For the learning media compiled, the following is a display of audio and visual-assisted snakes and ladders media:

### a. Introductory section



Figure 2. Cover Media PPT

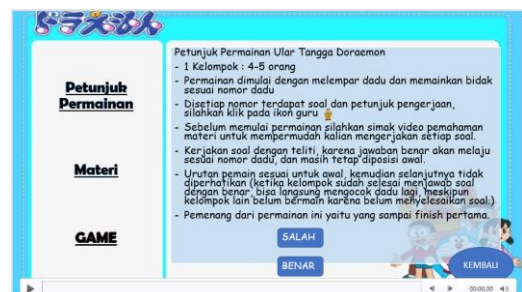


Figure 3. Game Instructions

b. Content Section



Figure 4. SPLDV Learning Videos



Figure 5. Doraemon's Snakes and Ladders Board

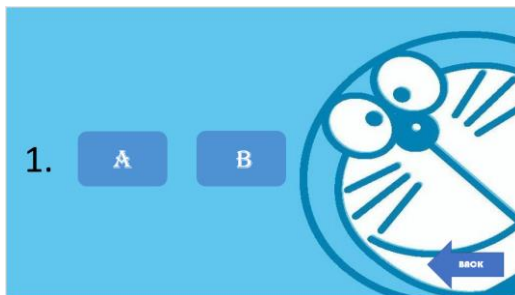


Figure 6. Two Types of Questions for Each Non-Decreasing Number

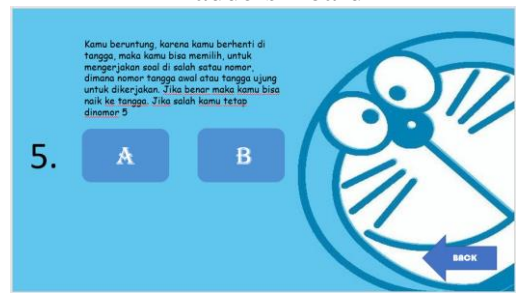


Figure 7. For questions that have stairs, you are allowed to choose the bottom number or the top number to work on in order to climb the ladder

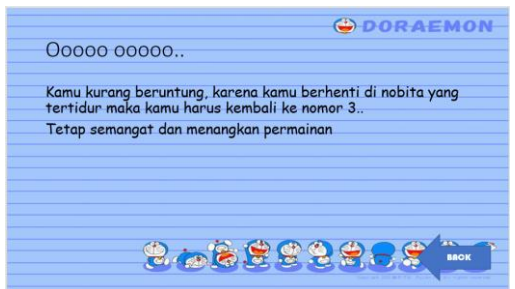


Figure 8. Command to go down to the bottom number because there is a down sign



Figure 9. Questions for types A and B for each number will be of the same type but differ in the coefficients and what will be asked will be explained in the audio.

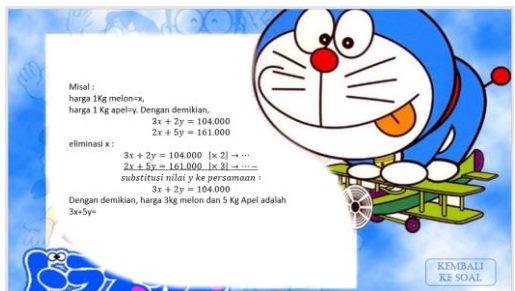


Figure 10. Instructions for work on each number if you need work instructions



c. Closing Section



Figure 11. Number 42 Game  
Winner



Figure 12. Acknowledgments

The next step is to compile a questionnaire instrument and pretest and post-test questions. Moreover, finally compiling, the learning media assessment instrument, media question assessment, pretest and post-test item assessment, and questionnaire assessment.

### 3. Development

At this development stage, it aims to determine the feasibility of the media that has been designed. After being assessed by the validator, the media will be revised according to the suggestions from the validator. The validator consisted of two selected experts: a media expert lecturer and a math teacher at SMP Muhammadiyah 2 Malang.

The validation results from the results of the first and second validator assessments obtained an average for validating questions on media which was 83.75% which could be categorized as very valid to be used as questions in learning media whose calculations can be seen in Appendix 9. In the first validator assessment and secondly, the average for learning media validation is 94% which can be categorized as very valid to be used as a learning medium for SPLDV material in grade 8 junior high school students with the calculations that can be seen in Appendix 10. Then validate the test questions whose results are obtained by an assessment. The first and second validators found in Appendix 11 obtained an average of for pretest and post-test validation on the media, which was 87.5% which could be categorized as very valid to be used as test questions for students. Lastly is the questionnaire validation, which gets the first and second validator's assessment according to Appendix 12. Hence, the average for validating the student response questionnaire is 93.75% which can be categorized as very valid to be used as an assessment to see student learning outcomes.

### 4. Implementation

In this implementation part, after the media and questions are declared appropriate for use, the audio and visual rocky snakes and ladders learning media using PPT are used for classroom learning. The application of snakes and ladders media was given to 18 students selected and carried out for three meetings. The first friendship is playing a learning video to give students an idea of the SPLDV material that will be studied and used in the media. After explaining the video and asking and answering the material, pretest questions

were given, and the division of groups in each group consisted of 4-5 students. Furthermore, for the second meeting, the game of snakes and ladders was directly carried out on the media that had been made. The last meeting gave post-test question sheets and student questionnaires. To further analyze the results of the scores obtained by students as follows:

Table 4. Pretest and Posttest Calculation Results.

No	Name	Pretest	Posttest
1.	APR	20	80
2.	CML	40	90
3.	APH	50	95
4.	ASP	35	95
5.	SO	80	95
6.	JKI	35	90
7.	MHE	20	90
8.	AKZ	20	85
9.	EPS	10	70
10.	AZH	35	80
11.	SAQA	50	75
12.	AMS	30	90
13.	ADA	35	90
14.	DIF	5	70
15.	BBAM	40	80
16.	DMPS	20	75
17.	FA	40	85
18.	RBP	20	75
<b>Average</b>		<b>32,5</b>	<b>83,89</b>

Based on the data obtained, it can be seen from the results of the student's pretest score, which obtained an average result of 32.5 so this result is still below the KKM, while the post-test score gets an average of 83.89 so it is more than the KKM score.

## 5. Evaluation

The last part is the evaluation or assessment stage. This assessment was carried out to determine the feasibility of audio-visual assisted snakes and ladders learning media using the PPT that had been prepared. The results of the validation of the pretest and post-test questions got an average of 93.75%, the validity of the questions on the media got an average of 83.75%, and the validity of the snakes and ladders learning media got an average of 94%. The three validation results can be categorized as "very valid" and suitable for use in the spirit of student learning after using snakes and ladders media, which is given in the form of a student response questionnaire.

This research was conducted to develop audio and visual-assisted snakes and ladders learning media in PPT on SPLDV material by applying the R&D method with the ADDIE research model. Some stages include analysis, design, development, implementation, and evaluation. At the analysis stage, a needs and curriculum analysis is carried out, namely by collecting information and references from the teacher to be used as a guide for preparing the media, and then at the design

stage, starting to compile the media by compiling questions on the media by the reference books that have been selected, and compiling the concept of the snakes and ladders media to be used, as well as compiling an assessment instrument in the form of student response questionnaire sheets, pretest, and post-test questions, media validation sheets, media validation sheets, pretest, and post-test validation sheets. The next stage is development. At this stage, an assessment of the questions on the media that will be used is carried out so that it has been validated, as well as an assessment of the media itself. In addition, validation was also carried out for pretest and post-test questions and student response questionnaires. Next is the implementation stage, where the researcher starts by distributing pretest sheets to students. Learning is carried out using snakes and ladders learning media and giving post-test questions and questionnaires at the end of the lesson. The final stage is evaluating the learning media of snakes and ladders.

The media developed is a learning media for snakes and ladders. It contains videos explaining the material, questions, and work instructions to make it easier for students to understand the two-variable Linear Equation System. The results obtained from media development in media validity can be considered valid, with an average value of 94% in the very good category. This is comparable to research conducted by Yuniarta (2019), which states that the media has 86% validity in the very good category.

When tested on media, students also got good results; it can be seen from the learning outcomes of students who were tested using post-test questions student learning outcomes were better than before using the media and experienced a significant increase, as can be seen from the average student learning outcomes before using the media is 32.5 while after using the media it is 83.89. With the following results, it can be seen that there are differences in student learning outcomes in the SPLDV material before and after using audio-visual assisted snakes and ladders media using PPT. These results are in line with those carried out by Prambudi & Yuniarta (2020) which explain that the results of student scores have changed from the average pretest and post-test scores, which have increased learning outcomes when there is learning media assistance. The questionnaire given to students as a response after conducting learning using the media has results that are in line with Mar'atusholihah et al. (2019) which explain that student responses to learning with the help of snakes and ladders are very good. The Two-Variable Linear Equation System can trigger student enthusiasm for learning.

## **CONCLUSION**

The results of the development of the media show that the learning media made are very valid according to the results of the assessment of questions on the media with an average percentage of 83.75% which is in the very good category. The assessment results of valid learning media also match the assessment of media experts with an average percentage of 94% with a very good category. From the validation results above, using PPT, audio and visual-assisted snake and ladder learning media is very valid. The learning outcomes obtained by students when before and after using the media there is a change in learning outcomes, namely with an average score of 32.5 for the pretest and an average score of for the posttest is 83.89. From here, the difference in results is quite significant.

Furthermore, to determine the effectiveness of the media in increasing student enthusiasm for learning can be seen from the student response questionnaire data. The results obtained were 81.74% in a very good category, and it can be concluded that students are eager to learn if there is the help of learning media. Development of audio-visual-assisted snakes and ladders learning media using PPT when implemented to students, student learning outcomes which are analyzed by calculating the average student scores and student enthusiasm for learning as seen from the student response questionnaire stated that student learning outcomes have increased and students have enthusiasm which is very good when the learning process with the help of learning media. So it can be concluded that audio and visually assisted snakes and ladders learning media using PPT on the material of the Two-Variable Linear Equation System (SPLDV) developed can be said to be very valid and effective for increasing learning outcomes and student learning enthusiasm

## REFERENCES

- Deswita, H., Pengaraian, U. P., Studi, P., Matematika, P., Pengaraian, U. P., Hulu, R., & Sumatri, L. (2020). *Respons siswa terhadap alat peraga laga sumatri (ular tangga sudut istimewa-trigonometri)*. 9(April), 28–40.
- Ernanida, E., & Yusra, R. Al. (2019). Media Audio Visual dalam Pembelajaran PAI. *Murabby: Jurnal Pendidikan Islam*, 2(1), 101–112. <https://doi.org/10.15548/mrb.v2i1.333>
- Karakter, M., Aktivitas, D. A. N., & Smp, S. (2014). *Pengembangan media game ular tangga bervisi sets*. 3(3).
- Kristanto, A. (2011). *commit to user*.
- Kristen, U., & Wacana, S. (2020). *Pengembangan media bus race algebra pada materi*. 04(01), 8–22.
- Kurnia, I., Pratiwi, N., & Aristya, P. D. (2016). Pengembangan Media Pembelajaran Ular Tangga Berbasis Android Pada Pokok Bahasan Gejala Pemanasan. *Jurnal Pembelajaran Fisika*, 7(1), 54–61.
- Mar'atusholihah, H., Priyanto, W., & Damayani, A. T. (2019). Pengembangan Media Pembelajaran Tematik Ular Tangga Berbagai Pekerjaan. *Jurnal Mimbar PGSD Undiksha*, 7(3), 253–260.
- Mar, H., Priyanto, W., & Damayani, A. T. (2019). *Pengembangan Media Pembelajaran Tematik Ular Tangga Berbagai Pekerjaan*. 253–260.
- Mukarromah, L., Siskawati, F. S., Matematika, P., Jember, U. I., & Normal, N. (2020). *Pengembangan Game Edukasi “ Hotsnaker ” Berbantuan Vlog Sebagai Alternatif Media Pembelajaran Matematika Di Era New*.
- Nurtanto, M., & Sofyan, H. (n.d.). *Implementasi Problem-Based Learning Untuk Meningkatkan Hasil Belajar Kognitif , Psikomotor , The Implementation Of Problem-Based Learning To Improve Learning Outcomes Of Cognitive , Psychomotor , And Affective Of Students In*. 5(November 2015), 352–364.
- Prambudi, E. Y., & Yuniarta, T. N. H. (2020). Pengembangan Media Bus Race Algebra Pada Materi Bentuk Aljabar Untuk Siswa Kelas VII SMP. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 4(1), 8–22. <https://doi.org/10.31004/cendekia.v4i1.150>

- Rahmah, S., Saragih, D., & Maulidah, R. H. (2018). *Efektifitas Pemanfaatan Media Pembelajaran Akademik Mahasiswa Program Studi Pendidikan Matematika*. 768–773.
- Sains, F., & Banda, U. I. N. A. (2015). *Pengembangan Media Pembelajaran Berbasis Audio Visual Tentang Pembuatan Koloid Anjar Purba Asmara*. 15(2), 156–178.
- Sejarah, J., Sosial, F. I., & Semarang, U. N. (2014). *Pemanfaatan Media Audio Visual Sebagai Sumber*. 3(1).
- Trigonometry, O. F., Materi, P., & Kelas, T. (2018). *XXXIV No. 2, Desember 2018 e-ISSN: (2)*, 88–100.
- Yunianta, T. N. H. (2019). LEARNING MEDIA DEVELOPMENT OF BOARD GAME “THE LABYRINTH OF TRIGONOMETRY” IN TRIGONOMETRY MATERIALS FOR THE 10th GRADE SENIOR HIGH SCHOOL. *Satya Widya*, 34(2), 88–100. <https://doi.org/10.24246/j.sw.2018.v34.i2.p88-100>