



Development of Snakes and Ladders Media on Solid Geometry Materials for Fifth-Grade Students' Learning Interests

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Abstract

Mathematics is one of the subjects that students are less interested in, especially in elementary schools. The problems in elementary school are students do not focus on learning, are afraid to answer teacher questions, and make the class less active during the learning process. It is due to the lack of learning media compared to thematic learning during the mathematics learning process. Hence, this study aimed to develop a valid and practical snake and ladder learning media on solid geometry material and determine the effect on students' learning interest after using the media. The research method employed was the R&D method with the 4-D developmental model. The subjects were 39 elementary school students in Palembang, South Sumatra. Through validation, educator, and student response questionnaires, data were collected. The results uncovered that the validators' validation obtained a mean validation score of 88.13%, with a very valid category. The results of student responses based on trials got a mean score of 91.05%, with a very practical category. Besides, the student learning interest questionnaire results attained a mean score of 80.25%, with a very high category. It was not only seen in the results of filling out the student's interest in learning instruments but also during the learning process. Consequently, the learning process became active; students became interested in playing while learning and dared to answer questions voluntarily. It implies that this research is vital so that the learning media continues to develop to generate student learning interest, particularly in solid geometry mathematics subjects.

Keywords:

Snakes and Ladders, Solid Geometry, Learning Interest

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Abstrak

Matematika merupakan salah satu mata pelajaran yang kurang diminati siswa, khususnya di sekolah dasar. Permasalahan yang terjadi pada siswa SD yaitu siswa tidak fokus pada saat pembelajaran, takut dalam menjawab pertanyaan guru dan membuat kelas menjadi kurang aktif pada saat proses pembelajaran. Hal tersebut dikarenakan, kurangnya media pembelajaran pada saat proses pembelajaran matematika dibanding pembelajaran tematik. Sehingga penelitian ini bertujuan menghasilkan media pembelajaran ular tangga pada materi bangun ruang yang valid, praktis dan untuk mengetahui efek minat belajar siswa setelah penggunaan media pembelajaran tersebut. Metode penelitian yang digunakan adalah metode R&D dengan model pengembangan 4-D. Subjek penelitian ini adalah 39 siswa sekolah dasar di Palembang, Sumatera Selatan. Pengumpulan data dilakukan dengan angket validasi, angket pendidik dan angket respons siswa. Hasil penelitian menunjukkan bahwa validasi para validator mendapatkan skor rata-rata validasi 88,13% dengan kategori sangat valid. Hasil respons siswa berdasarkan uji coba mendapatkan skor rata-rata 91,05% dengan kategori sangat praktis. Hasil angket minat belajar siswa mendapatkan skor rata-rata 80,25% dengan kategori sangat tinggi. Hal tersebut tidak hanya terlihat pada hasil pengisian instrumen minat belajar siswa, tetapi terdapat juga pada saat proses pembelajaran. Proses pembelajaran menjadi aktif dimana siswa menjadi tertarik dalam bermain sambil belajar dan berani dalam menjawab pertanyaan tanpa diminta oleh guru. Penelitian ini sangat penting dilaksanakan, agar media pembelajaran terus berkembang sehingga akan menimbulkan minat belajar siswa, khususnya pada mata pelajaran matematika materi bangun ruang.

Kata Kunci:

Ular Tangga, Bangun Ruang, Minat Belajar

Cara Mensitasi:

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INTRODUCTION

Mathematics is one of the subjects found in elementary school with three fields: algebra, analysis, and geometry. In the content standard of the Regulation of the Minister of National Education of the Republic of Indonesia Number 22 of 2006, learning mathematics aims to make students appreciate the usefulness of mathematics in everyday life: having curiosity, attention, interest in learning mathematics, and a tenacious attitude and confidence in solving problems (Sodiq & Trisniawati, 2020).

One of the essential needs of learning mathematics activities is learning interest since it will affect the effectiveness of learning activities. If students' interest in learning is low, it will also cause low learning outcomes (Nissa & Renoningtyas, 2021). Interest can arise, one of which is the use of learning media because it can make learning fun and help teachers deliver material (Fakhrudin & Kuswidyanarko, 2020).

However, the problem of low motivation was also experienced by one elementary school in Palembang City, South Sumatra. Based on an unstructured interview with the homeroom teacher of grade VB, information was obtained that student learning outcomes in mathematics were in the lowest position compared to other subjects. The comparison of scores between these subjects can be seen in the following graph.

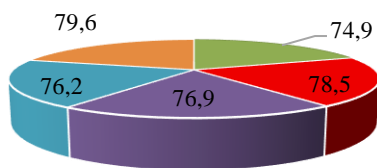


Figure 1. Mean Scores of Class VB Students

The identification revealed problems, including the lack of student learning interest during the learning process. Lack of student learning interest was observed during the learning process: students were not focused, could not answer teacher questions, were afraid to answer teacher questions, and made the class less active. It was due to the lack of learning media compared to thematic learning

during the mathematics learning process, particularly on solid geometry material. In learning solid geometry, students found it challenging to understand the solid geometry's (cuboids and cubes) volume and area and comprehend the attributes of cuboids and cubes. During the learning process, the homeroom teacher for class VB used the game method in the learning process and got a positive response from students. The game method employed was by guessing the picture.

These problems aligned with a study by Putri & Pujiastuti (2021) in Serang Regency, showing that students had difficulty learning solid geometry, especially understanding nets (cubes and cuboids), and had difficulty answering volume questions about cubes and cuboids), thus requiring learning media that can increase student learning interest. Similar problems have also become a concern in previous research by Chuseri et al. (2021) revealed when working on solid geometry questions, students' scores below the passing grade (KKM) had a mean of 53.71, with the percentage of students below the KKM of 81.25% because students had difficulty in working on HOTS (Higher-order thinking skills) type questions.

Further, one way to deal with motivational problems is to use learning media that involves students. In this case, three types of learning media comprise audio, audiovisual, and visual. Visual media is one of the easiest learning media to carry and obtain as it only uses the sense of sight in the learning process, such as pictures. Besides, one of the visual media that can provide students' learning interest is educational games. With educational games, students can play while learning to instill an understanding of the material being studied (Risnawati et al., 2018).

One of the educational games that can be utilized during the learning process is the snake and ladder game. In a study that has been conducted by Sudarmika et al. (2018), the snake and ladder game developed could increase interest, with an initial mean value of 26.17 to 63.96 on the material of theme 7, sub-theme 1, about ethnic diversity and religion in my country. Another research that has been carried out by Rizqo et al. (2020) used the ADDIE development model and uncovered that the snake and ladder developed could

boost students' learning motivation, with an initial mean value of 45.9 to 68.5.

Departing from the problems explained above, the researchers proposed a solution to develop a visual learning media, i.e., snake and ladder learning media on cuboids and cubes material for students' learning interest, which has not been done in the trial class. The snake and ladder game was developed as usual; walking was determined by throwing dice and moving using pawns (Fadila, Yuanta & Suryarini, 2021).

The difference between the snake and ladder learning media developed by researchers and other researchers is in the smart and magic cards during the snake and ladder learning process. In the card, there were challenges and questions regarding the material of cuboids and cubes, including attributes, volumes, and cube roots, which should be answered during the game. Through questions on snakes and ladders with magic and smart cards, it is expected that students can be directly involved in answering questions and solving challenges in the game. Snakes and Ladders learning media can also make the class active and fun (Aziz, 2018).

For this reason, the development of this learning media is expected to produce a stage of developing a valid and practical snake and ladder learning media on solid geometry, and generating student learning interest after using snake and ladder learning media about solid geometry.

METHODS

This study applied the research & development (R&D) approach. Research & development (R&D) can also be interpreted as a study that aims to find or develop a product and test its effectiveness (Hamzah in Lubis & Masniladevi, 2020). This study intended to produce a snake and ladder learning media on solid geometry material for fifth-grade students' learning interests. The method employed in this development was 4-D, consisting of four stages: defining, designing, developing, and disseminating (Yanti et al., 2021). Furthermore, data collection techniques in this snake and ladder development research utilized several types: interviews, documentation, and questionnaires. Data

analysis techniques were then carried out to obtain learning media in the form of a quality snake and ladder game that met the validity and practicality and affected students' learning interests.

RESULTS AND DISCUSSION

Result

The product of this research and development was a snake and ladder learning media on solid geometry material in fifth grade for students' learning interests. The snake and ladder learning media contained solid geometry questions, smart cards, and magic cards.

Defining

In Defining stage, there are four steps conducted. The four main stages aim to determine and define the learning requirements at the next Stage.

The initial-final analysis is the collection of information carried out during observation. The initial analysis results revealed that the underlying problems in this study included a lack of student learning interest, students not focusing on the learning process, students could not answer the teacher's questions, students being afraid of answering questions, and the lack of learning media in mathematics, especially on solid geometry material at the school.

After conducting the initial-final analysis, the student analysis stage was carried out. The student analysis stage was about the characteristics of students following the design and learning tools. These characteristics included the students' background knowledge and cognitive development. In this case, class VB students had various characteristics during the learning process. From the results of interviews with the homeroom teacher of class VB, the number of female students was 22, and the number of male students was 17, who had the same birth year, i.e., 2011. The student's characters during the learning process demonstrated that students in class VB had various characteristics during the learning process, where some liked to play while learning, some liked to study in groups, and some liked to learn individually.

Afterward, an assignment analysis was carried out, such as the material provided and

the source material used by the teacher to teach. Assignments and materials the teacher gave came from student books with material on geometry (cubes and cuboids). The material contained in solid geometry was the attributes, volume, and cube roots.

Furthermore, the learning objectives stage was performed to formulate the assignment analysis and student analysis results, which became indicators of the achievement of student learning interests. Learning objectives were then made from the analysis of students and materials derived from indicators. Basic competencies (KD) taken from this research were KD. 3.5 (Explaining and determining the volume of solid geometry using volume units, such as unit cubes and the relationship of the cube with the cube root) and KD 3.6 (Creating simple solid geometry nets, such as cubes and cuboids).

Designing

At the design stage for prototype I, four main steps consisted of the preparation of questions, media selection, format selection, and initial design.

The preparation of questions was the initial stage in the design stage. The questions were prepared based on the material in the student's book to achieve basic competence (KD) and indicators. The questions' preparation was also divided into three types, i.e., easy, medium, and difficult. It included the material of the cuboids' volume, the cubes' volume, the cuboids' attributes, the cube's attributes, and the cube root.

Furthermore, the media selection was made to determine the appropriate learning media to help convey the material during the learning process to make students more interactive. The media selection process was adjusted to the assignment analysis, material analysis, student characteristics, and facilities available at the school. The media chosen was snake and ladder media with visual graphic media type, with a size of 50 cm x 50 cm, and adjusted to the size of the class in the field.

After that, the format selection stage was carried out by adjusting the colors used in the learning media, and this activity produced prototype I. The format selection utilized the Canva application to design snakes and ladders, smart cards, magic cards, and game procedures.

After the format selection stage, an initial design was carried out to produce prototype I and validated at the development stage. The initial design began by arranging the overall layout, such as pictures of snakes, ladders, questions, and lucky cards so that the shape could attract students' interest to play while learning. In addition, this study had four preliminary designs: snake and ladder, smart card, magic card, and game procedure designs. The explanations for the three plans are as follows:

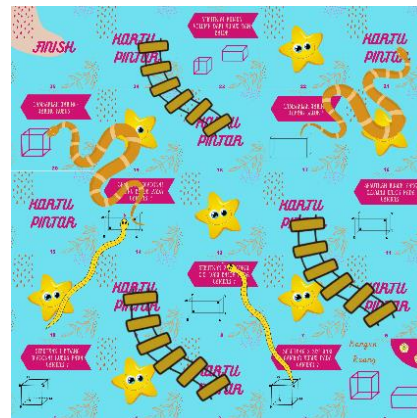


Figure 2. Snakes and Ladders Board

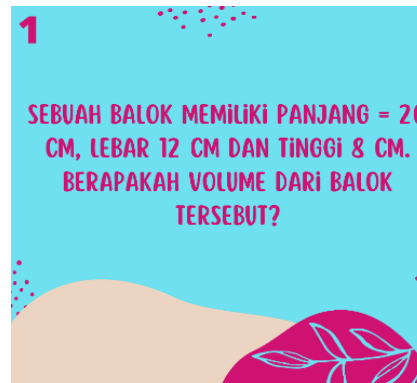


Figure 3. Smart Card Design

The smart card contained difficult questions. When students succeeded in answering the questions on the smart card, students were invited to advance one box from the student's initial position. On the smart card, there were 20 questions that students should answer randomly.



Figure 4. Magic Card Design

A lucky card was obtained during the game of snakes and ladders when students stopped at the box saying, "Magic Card." Magic cards could only be used once; once used, they were placed at the bottom of the sequence of other magic cards. If the student succeeded in collecting the nets of cubes/cuboids, the student was considered to win the game. This magic card consisted of 25 cards at random.

Development

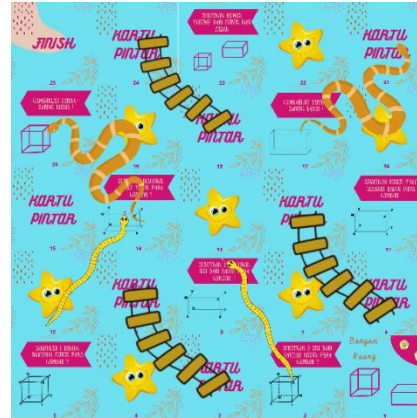
The development stage aimed to get prototype II, which had been revised based on input from three experts. In the development stage, two main steps included expert evaluation and product testing.

1. Expert Evaluation

Three validators evaluated the product to provide input on the learning media and learning materials for prototype I. After being given input and suggestions, the researchers performed the revision stage and then validated it again with the validators.

The first stage was the experts' evaluation, i.e., giving comments and suggestions for learning media and learning materials on the product to obtain prototype II. The comments and suggestions on media evaluation consisted of changing the size of the ladder snake from the initial size of 50 cm x 50 cm to 1 m x 1 m; changing the color of the ladder snake to a cream color; changing the font type and size; adding restriction lines on snake and ladder products; adding "Start" to the first box of the ladder snake. Meanwhile, comments and suggestions on learning materials were changing the written form into an actual picture form. There needed to be

story questions, and the numbers should not be too high. Moreover, the differences between prototype I and prototype II are presented below picture.

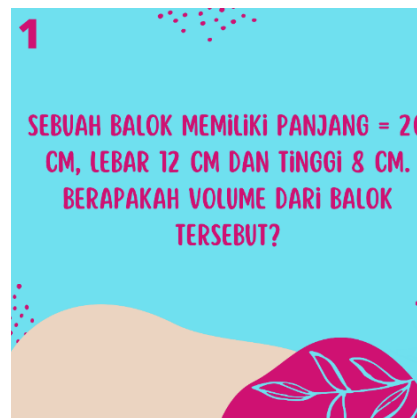


(a)



(b)

Figure 5. Snakes and Ladders Board before revision (a) and after revision (b)



(a)



(b)

Figure 6. The Smart Card Design before revision (a) and after revision (b)



(a)



(b)

Figure 1. Magic Card Design before revision (a) and after revision (b)

Meanwhile, the outline of media evaluation is as follows:

Table 1. Aspects of Media Evaluation

No	Aspect	Indicator
1	Consistency	Practicality and media size
2	Format	Layout, clarity of presentation of information, and attractiveness of appearance
3	Organization	The use of sentences and conformity to the characteristics of the child
4	Design	The use of image illustrations, image resolution, color contrast, adjusted size, and typeface

Furthermore, the media validation results can be seen in the table below.

Table 2. Mean Value of Media

No	Name	Score
1	Validator I	78.3%
2	Validator II	90 %
3	Validator III	93 %
Total		87.1 %

Based on the evaluation of the three validators who assessed the instructional media design, the mean value was then calculated, resulting in 87.1%, with a very valid qualification level.

Meanwhile, the outline for the evaluation of learning materials is presented below.

Table 3. Aspects of Material Evaluation

No	Aspect	Indicator
1	Material	The conformity with KD, mathematical indicators, learning objectives, implementation, and user characteristics
2	Image Illustration	The conformity of the image illustration supports the achievement of learning objectives and is easy to understand.

3	Guidance and information	It contains systematic steps and provides explanations to users.
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The material validation results can be seen in the table below.

Table 4. Mean Value of Material

No	Name	Score
1	Validator I	80%
2	Validator II	92.5 %
3	Validator III	95%
Total		89.16 %

Based on the evaluation of the three validators who assessed the learning materials, the mean value was then calculated and obtained a result of 89.16%, with a very valid qualification level.

Based on the overall validity evaluation of the snake and ladder learning media from the three validators, namely material and media experts, described above, the snake ladder learning media developed was categorized as very valid, with an overall mean percentage score of 88.13%. The recapitulation of the validity evaluation overall results of the three validators can be seen in Table 5 below.

Table 5. Mean Value of Validation

Validator	Number of Items	Score Obtained	Mean Percentage of Experts
Media Expert	15	52.3	87.10%
Material Expert	10	35.6	89.16%
Total	25	87.9	88.13%

The score obtained from all components was 87.9, with 25 statements. Thus, the mean score obtained by all components was included in the very valid category. It had an overall mean score of 88.13% from a maximum score of 100%.

2. Product Trial

After performing the stages of expert evaluation and producing prototype II, the following stages were testing (trying) the

learning media. The trial stage in grade VB was conducted twice: a small group trial and a large group trial, which were the study subjects. The trial was conducted to see the practicality and effect of interest after using learning media.

In the first stage, a small group trial consisting of eight students was carried out, and the results were 89.5%, with a very valid qualification level. The small group test showed that there was also no need to revise the snake and ladder learning media developed.

In the second stage, a large group trial of 39 students resulted in 89.92%, with a very practical category. In the large group test, students did not provide comments, so there was no need to revise the snake and ladder learning media developed; they did not only provide practical questionnaire evaluation on large group trials.

Disseminating

After doing the validity by the validator and practicality in small and large group trials, the snake and ladder media was disseminated in different classes while testing the instrument of student learning interest. During the process of disseminating the use of snakes and ladders learning media, the researchers got the validity result data on the instrument test of student learning interest, i.e., 15 statements were declared valid, five statements were stated as not valid, and getting the reliability result data of 0.903, with a total of 20 items.

After disseminating and testing the instrument in grade VC, the researchers conducted a questionnaire on students' learning interests after using the snake and ladder learning media and obtained a score of 80.25%, with a very high qualification level.

Discussion

The urgency of developing snake and ladder media as alternative media is indeed following current conditions. Learning needs visual illustrations through actual objects and interactive games, especially mathematics learning, which requires instilling interesting concepts and learning. In this study, the composition of media content was considered appropriate, indicating that this snake and ladder media used appropriate learning

principles and was relevant to the desired basic competencies. In addition, motivation has proven to be a component that has been the focus of several previous studies (Aziz, 2018). This snake and ladder media was also declared feasible for various aspects as it used several interface elements and references from previous similar applications. It is consistent with relevant previous research of Asiah et al. (2021).

The test results also showed students' learning interest at a superior level. It is following the results of previous research by Zuhriyah (2020) that the snake and ladder learning media could help teachers in the learning process as an alternative to solving problems in the classroom, i.e., students often experience boredom during the learning process. A study from Yanti et al. (2021) also found that developing snake and ladder learning media could help teachers improve student learning outcomes.

Furthermore, this research's limitation is that it was not tested for learning outcomes. However, if the learning interest increases, it is expected that learning outcomes will also increase. It reinforces some results of previous studies in which the media proved effective. For this reason, teachers and learning developers are expected to continue to see the importance of using alternative media to enhance the quality of learning.

CONCLUSION

This research and development aimed to develop learning media in the form of a snakes and ladders game on solid geometry material in fifth grade to students' interest in learning. Based on the development results and discussion, it can be concluded that the development stage of this snake and ladder learning media used the 4-D development stages, starting with defining design, development, and dissemination stages.

The results of developing snake ladder learning media on solid geometry material in fifth grade on students' interest in learning were very valid and practical. They obtained a very high level of qualification for students' learning interests after utilizing snake ladder learning media. In addition, the learning process became active; students became

interested in playing while learning, answered the teacher's questions, and were brave in answering questions without being asked by the teacher. Therefore, it is vital to carry out this research so that the learning media continues to develop, generating student learning interest, specifically in solid geometry mathematics subjects. Moreover, the snake and ladder learning media developed by previous researchers primarily used thematic subjects compared to mathematics subjects, especially solid geometry material.

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