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Article

Validity of Learning Media "Nebula Quest: Space Ladder Snake" in Improving Student Problem Solving

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ABSTRACT

Education involves a deliberate effort to create a learning environment that encourages students' full potential. Innovative learning media, such as ladder snake games, can encourage active and collaborative learning. The purpose of this research is to develop learning media to make it easier for students to develop problem solving skills on class VII materials about the earth and the solar system. The method used in research is Research and Development (R&D) with Borg and Gall development models, namely with steps to research and information collection, planning, product initial form development, and product validation. The product validation stage uses a questionnaire to determine the feasibility of the product using descriptive qualitative data analysis techniques. The validation results by expert received excellent categories with the highest percentage on the ease of use aspect of 93%, the language use aspect of 90%, the media presentation aspect of 88%, and the lowest percentage on the media design aspect of 86% and the media quality aspect of 78%. The validation results show that the learning media "Nebula Quest: Space Ladder Snake" effectively fulfills the analysis of the planning implementation part of the problem solving learning model and is suitable for further development with improvements.

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INTRODUCTION

Education according to the SISDIKNAS Law No.20 of 2003 is a conscious and planned effort to create a learning atmosphere that allows students to actively develop their potential, achieve (accept) self-control, intelligence, social skills, spirituality, personality, and noble morals (Indah, 2020). Experts such as Plato, Aristotle, Ibn Muqaffa, and Ki Hajar Dewantara emphasized the importance of education in developing the body, mind, senses, and character (Agustiani et al., 2023). In general, education is a planned process to develop human potential, aiming for harmonious growth and development in personal and social life, developing harmoniously in life, both personally and in society.

Learning activities are the core of the educational process at school. Learning is also a direct experience for the teacher as a facilitator. The role of the teacher is not only limited to the delivery of knowledge, but also the development of the potential of students through various roles such as, teachers as facilitators, mentors, encouragers, motivators, effective

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communicators, and assessors of learning outcomes to determine the understanding of students (Sapriyah, 2019). Board games as educational games are applied to enhance the teaching and learning process and have become a popular educational method. This type of game involves movement on a board that follows certain rules (Yusof et al., 2021). Educational games can attract students to enjoy their learning time. In addition, games can help students understand the idea of teaching material well and improve communication and problem-solving skills (Ibrahim et al., 2018)

The snakes and ladders game is a board game that involves two or more people. The game consists of several small squares, with some squares connected by images of stairs and snakes (Syawaluddin et al., 2020). Players use dice to determine the steps of the pieces in the snakes and ladders game, which has material and questions in each box to help remember the lesson. The snakes and ladders game encourages learners to actively learn, discover learning outcomes, and collaborate, making it a fun learning experience (Rahmawati et al., n.d., 2018).

In analyzing the learning module about the Earth and Solar System that uses the problem solving method according to Polya (1973), there are several important stages that are considered. Among others, Understanding the problem (understanding the problem), devising a plan (planning a solution), carrying out the plan (implementing the plan), and looking back (checking back). However, from the results of the analysis of problem solving according to Polya (1973) in the module that has been observed, there are deficiencies in the implementation of planning. To complement the deficiencies in the implementation of planning, learning innovations in the form of snakes and ladders are made with the hope of making it easier for students to do learning, improve the implementation of planning in learning, improve existing deficiencies, improve student learning outcomes, and also effectively train students' problem-solving skills, as explained through the stages of problem-solving according to Polya (1973).

At the stage of understanding the problem, learners focus on details and must read each question in the box to understand the problem in depth, so that learners' analytical and critical skills can develop. Furthermore, at the planning stage, learners organize thoughts systematically and plan strategic steps to solve the problem. At the plan execution stage, learners apply practical knowledge by answering questions and performing actions to progress in the game. Finally, at the re-examination stage, learners evaluate results and consider alternatives, which helps learners develop the ability to reflect on the experience gained.

Learning outcomes are the expected achievements of learners in learning, which are aligned with predetermined criteria and educational objectives. Learning outcomes can be measured through changes in behavior and grades obtained by students. One indicator of good learning outcomes is students' understanding of the subject matter, which is included in the cognitive domain (Ramadani et al., 2023).

Based on the background that has been described, the problem formulations in this study are, 1) How can the learning media "Nebula Quest: Space Ladder Snake" can help overcome the shortcomings in the stage of implementing the plan in the problem solving approach by Polya? 2) What are the results of the validity of the learning media "Nebula Quest: Space Ladder Snake" in improving problem solving skills in student**METHODS**

This 2D learning media development uses a qualitative descriptive research method with a Research and Development (R&D) approach based on the Borg and Gall model. The development process reached the validation stage. The development of 2D learning media is only carried out until the fourth stage, namely validation.

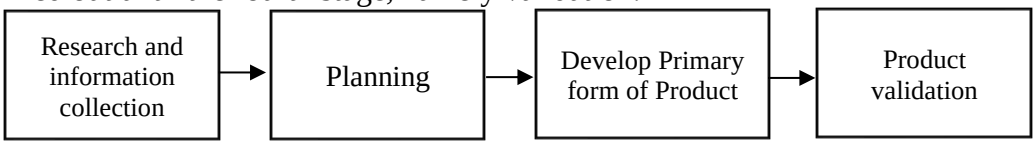

Figure 1. Research Phase

In the research and information collection stage, data was obtained from the review of junior high school teaching modules based on the stages of Problem Solving according to Polya. In this review mapping, the researcher verified and rechecked the solution taken. As a result, the researcher found a lack of solutions at the stage of implementing the plan.

In the planning stage, researchers designed 2D learning media based on snakes and ladders games to facilitate students' problem solving and collaboration skills. The material focus on the concept of earth and solar system created the name of the learning media type "Nebula Quest: Space Snakes and Ladders."

In the develop primary form of product stage, researchers made 2D learning media "NEBULA QUEST" in printed form, according to planning, namely the concept of a modified snakes and ladders game by adding questions in certain boxes that must be answered by students.

This stage is carried out after the product is finished, namely to determine the extent of the validity of the learning media "Nebula Quest". This validation was carried out by a media expert and a material expert covering aspects of design, language, ease of use, presentation, and media quality (Susilo., et al, 2021). The data from this validation were analyzed descriptively qualitatively and the percentage of feasibility was calculated using the formula listed in (1). The results of this calculation serve to determine the eligibility criteria based on Table 1.

$$Percentage\ (N) = \frac{Score\ obtained}{Total\ score} x\ 100 \quad (1)$$

Table 1. Rating Scale

Score Percentage (%)	Interpretation
0% - 24,99%	Deficient
25% - 49,99%	Average
50% - 74,99%	Good
75% - 100%	Excellent

Source: Setiawan, Candra A (2014)

RESULTS AND DISCUSSION

RESULTS

The validity of the snakes and ladders learning media 'Nebula Quest' in improving students' problem solving skills involved two experts (validators) and resulted in the data presented in Figure 2.

Table 2. Recapitulation of Validation Result Data

No.	Aspect	Percentage	Category
1.	Media Design Aspect	86%	Excellent
2.	Languange Use Aspect	90%	Excellent
3.	Ease of Use Aspect	93%	Excellent
4.	Media Presentation Aspect	88%	Excellent
5.	Media Quality Aspect	78%	Excellent

The validation results showed that the learning media "Nebula Quest" was rated excellent on various aspects. The media design aspect obtained a percentage of 86%, indicating that the media design was considered excellent by the validator. The aspect of language use received a percentage of 90%, confirming that the language used in this media is excellent and easy to understand. The ease of use aspect reached 93%, indicating that this media is very easy to use by students. The media presentation aspect was also rated excellent with a percentage of 88%, indicating that the media presentation was appropriate and interesting. The media quality aspect obtained a percentage of 78%, which is also included in the excellent category.

From the results of the highest aspect validation is in the ease of use aspect of 93%, the language use aspect of 90%, and the media presentation aspect of 88%, while the aspect with

the lowest validation is in the aspect of media design 86% and the aspect of media quality 78%. Learning media can be used to fulfill the results of the analysis of carrying out the plan section in the problem solving learning model and is feasible to proceed to the next stage with improvements in the instructional quality aspects of the media quality aspects with suggestions from experts, namely providing illustrations and practice questions related to the daily lives of students.

DISCUSSION

Table 3. Results of Ease of Use Aspect Validation Test by Media Experts

No.	Validation Aspect	Score	Maximum Score	Percentage
A.	**Ease of Use of Media**			
1.	The use of snakes and ladders game media is very easy to use	4	5	80%
2.	With playing instructions, it is easy for users to use the snakes and ladders game media.	5	5	100%
B.	**Media View**			
3.	Clarity of instructions for using the snakes and ladders game media.	5	5	100%
	TOTAL	14	15	93%

The ease of use aspect obtained the highest percentage because the "Nebula Quest" media was designed with the concept of learning while playing. At the understanding the problem stage, the ease of use of the media helps learners capture the context and content of the problem without being distracted by technical difficulties. In addition, learners can also identify key elements of the problem and explore various aspects that need to be analyzed because when there is a mistake in understanding, the next step will be wrong. Conversely, if the problem presented is well understood, the chances of getting the correct solution are much greater (Romadiastri, 2021) . At the devising a plan stage, the ease of use of the media helps students access relevant information and formulate strategies to solve problems without difficulty in understanding its use. Ease of use impacts the carrying out the plan stage by helping learners focus on implementing the steps that have been planned. The media also supports collaboration between students which allows students to discuss and work together in carrying out students' plans (Pradita, 2021). Achieved. Easy-to-use media helps students remember the steps taken and assess the effectiveness of the solution, and allows for more focused reflection without technical difficulties.

Table 4. Results of the Language Use Aspect Validation Test by Material Experts

No.	Validation Aspect	Score	Maximum Score	Percentage
A.	**Quality of Language Usage**			
1.	The language used in the snakes and ladders game media is easy for students to understand.	4	5	80%
2.	Accuracy in writing and choosing the language used in the snakes and ladders game media.	5	5	100%
	TOTAL	9	10	90%

The aspect of language use obtained the second highest percentage in the validity results because language is one aspect that has an important role in learning communication between teachers and students (Wicaksono, 2016). The language used in the snakes and ladders learning media "Nebula Quest" is Indonesian with accuracy in writing and word selection so that learning media is easily understood by students. At the understanding the problem stage, the use of language helps learners understand the context and core of the problem so that learners can focus on important elements without confusion. The use of language also makes it easier for learners in the devising a plan stage by helping learners understand instructions and

information so that it allows learners to formulate problem-solving strategies quickly and accurately. At the carrying out the plan stage, the ease of language use allows learners to focus on implementing the plan without difficulty understanding what to do. At the looking back stage, the ease of language helps learners more easily reflect on the steps taken, evaluate the results, and identify whether the solution applied is correct or needs to be improved.

Table 5. Results of Media Presentation Aspect Validation Test by Media Experts

No.	Validation Aspect	Score	Maximum Score	Percentage
A.	**Technical Quality of Media**			
1.	Clarity of instructions for using the snakes and ladders game media.	5	5	100%
2.	The attractiveness of the appearance of the game board, question cards, and information cards on the snakes and ladders game media.	4	5	80%
3.	The readability of the questions and the information presented is clear.	4	5	80%
4.	The accuracy of the placement of the question boxes and information boxes on the snakes and ladders game board.	4	5	80%
5.	The snakes and ladders game media can be used repeatedly.	5	5	100%
	TOTAL	22	25	88%

The media presentation aspect gets the third highest validity because the instructions for use and question cards are presented in Indonesian with words that are easy to understand. The question cards have different designs according to the level of difficulty so that they can attract students' interest. The media is also made from durable materials so that it can be used repeatedly. At the understanding the problem stage, media that is presented in an interesting and easy-to-understand manner helps learners quickly capture the context and content of the problem, and makes it easier for learners to identify key elements for deeper analysis. Interesting and easy-to-understand media presentations have a positive impact in the devising a plan stage. Learners can quickly understand information, see relationships between concepts, and formulate effective strategies to solve problems. Good media presentation at the carrying out the plan stage is very influential in making it easier for learners to carry out the plan smoothly and in accordance with instructions so as to reduce the possibility of errors in its implementation. Good media presentation also has a big influence on the looking back stage. At this stage, learners evaluate the process and results that have been achieved. Clear and interesting media makes it easier for learners to reflect on the steps taken and assess the effectiveness of the solution, so that learners can identify parts that work and those that need to be improved. The media improvement suggestion from the validator is that the font size in the questions needs to be enlarged so that it can be read by all students, not just students who are playing snakes and ladders learning media.

Table 6. Media Design Aspect Validation Test Results by Media Experts

No.	Validation Aspect	Score	Maximum Score	Percentage
A. Media Cover Design				
1.	The attractiveness of the cover design of the snakes and ladders game media.	5	5	100%
2.	Clarity of media cover identity.	4	5	80%
3.	Color harmony on media cover display.	5	5	100%
B. Displayed Image Quality				
4.	The quality of the image displayed with the applied material.	4	5	80%
5.	The size of the images used on the snakes and ladders game board is proportional.	4	5	80%

No.	Validation Aspect	Score	Maximum Score	Percentage
C. Clarity of Displayed Text				
6.	The text used in the snakes and ladders game media can be read well.	4	5	80%
7.	Suitability of font selection.	4	5	80%
D. Media View				
8.	The color combination in the snakes and ladders game media is arranged well and attractively.	5	5	100%
9.	The design of the snakes and ladders game media display has a high appeal for students.	4	5	80%
E. Layout				
10.	The suitability of the layout of images and writing on the snakes and ladders game media.	4	5	80%
	Total	43	50	86%

The aspect of media design has a low percentage because the appearance of the question card is less interesting, the accuracy of the placement of the question box on the snakes and ladders game board is not appropriate. The quality of media design on learning media should get a higher percentage because interesting presentation can increase learners' interest and facilitate their understanding. In the understanding the problem stage, interesting and structured media presentations will make it easier for learners to understand the context of the problem, which will support the next steps in formulating and implementing solutions. In the media design, it is necessary to improve a more attractive visual layout, with more proportional text size adjustments and more harmonious color combinations to make it easier to understand and attract students' attention. The use of better quality images can also help improve the visual appeal of the media.

Figure 7. Results of Media Quality Aspect Validation Test by Material Experts

No.	Validation Aspect	Score	Maximum Score	Percentage
A.	**Quality of Content in Media**			
1.	Suitability of material content with Learning Outcomes.	4	5	80%
2.	Suitability of material content with learning objectives.	4	5	80%
3.	Suitability of illustrations to the material.	4	5	80%
4.	Ease of understanding the material.	3	5	60%
5.	Easy to understand language suitability.	4	5	80%
B.	**Instructional Quality**			
6.	Providing illustrations close to students' daily lives.	4	5	80%
7.	Suitability of practice questions to the material.	4	5	80%
8.	The questions given are adjusted to the material.	4	5	80%
9.	Suitability of the question level to student development.	4	5	80%
10.	Alignment between questions and answers in the exercises.	4	5	80%
	TOTAL	39	50	78%

The media quality aspect has the lowest percentage because the material is less relevant to students' daily lives, hampering their ability to solve problems and apply learning concepts. Weaknesses in media quality reduce the effectiveness of learning, so understanding is limited to theory (Jihad, 2008). This can reduce learning motivation which negatively affects the achievement of educational goals (Culaste, 2011). Lack of concept understanding hinders students in applying the material in everyday life, especially if the problems faced are irrelevant (Izzati et al., 2021). In addition, low problem-solving ability limits critical and applicative thinking skills, which impacts the quality of human resources (Santosa & Us, 2016). Media quality should receive a higher percentage because relevant and quality materials can directly improve learners' understanding and their engagement in the learning process. In media quality, there is a need for improvement in presenting material related to students' daily lives. Adding

story problems related to real situations or illustrations about the application of concepts in everyday life. With examples that are close to their daily experiences, learners will be better able to relate the theory learned to the situations they experience (Nugroho et al., 2023). Involving learners in the creation of problems from their personal experiences increases relevance and engagement, while practicing problem-solving skills to face increasingly complex daily challenges (Adhar, 2012).

CONCLUSION

From the validity results, it can be seen that the snakes and ladders learning media "Nebula Quest" in developing problem solving skills in students has been validated and obtained the highest validation percentage results are in the aspect of ease of use with a percentage of 93%, the aspect of language use with a percentage of 90%, and the aspect of media presentation with a percentage of 88%. While the lowest percentage is obtained from validation in the aspect of media design with a percentage of 86% and aspects of media quality with a percentage of 78%. The suggestions given by validators for improving learning media are the font size in the questions needs to be enlarged so that it can be read by all students, not just students who are playing snakes and ladders learning media and adding story problems related to real situations or illustrations about the application of concepts in everyday life so that students can connect the concepts that have been learned with problems encountered in everyday life. Based on the validity results, it can be seen that the learning media can be used to fulfill the results of the analysis of the planning implementation section in the problem solving learning model and is feasible to proceed to the next stage with improvements in the instructional quality aspects of the media quality aspects with suggestions from experts, namely providing illustrations and practice questions related to the daily lives of students.

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