



---

## **Development of Snake-Ladder Game as a Medium of Mathematics Learning for the Fourth-Grade Students of Primary School**

Debby May Puspita<sup>a\*</sup>, Edy Surya<sup>b</sup>

<sup>a,b</sup>*Graduate Student of Basic Education of Medan State University, Jl. Willem Iskandar PMedan, Indonesia*

<sup>a</sup>*Email: debbymay02@gmail.com*

<sup>b</sup>*Email: edy\_surya71@gmail.com*

### **Abstract**

This study aims to: (1) develop a snake-ladder game as a medium of mathematics learning in the fourth-grade students of primary school, (2) determine the student's response to the development of the game snake-ladder as a medium of mathematics learning for students of primary school. This research is classified as development research using research and development (R & D) method with application of ADDIE model. The development model used in this study is a procedural model that is a descriptive model that shows the steps that must be followed to produce products in the form of learning media that improve the effectiveness of students in the learning and teaching process. Data analysis technique used is descriptive qualitative analysis. The results showed that the game of snake-ladder as a learning medium developed has met the criteria of eligible and qualified to be used as a medium of learning for the subject of spatial structures. Based on the data obtained can be interpreted that media reviewers mention that from the aspect of the game the snake-ladder as a learning medium belong to the category of very good by 94.09%. From the aspect of student interest in learning by media of the snake-ladder game that is 85.27% belong to category of good. While the third aspect regarding the quality and appearance of the media, the snake-ladder game is declared excellent by 84.93%.

**Keywords:** Snake-ladder Game; Mathematics; Learning Medium.

---

\*Corresponding author.

## **1. Introduction**

Mathematics itself basically has an abstract base object. According to Soejadi in [10] "the mathematical abstraction is due to its abstract basic objects, i.e. facts, concepts, operations and principles". In general, the goal of mathematics in primary schools is that students are able and skilled at using mathematics. In addition, mathematics learning can also put pressure on reasoning in the application of mathematics. Meanwhile, according to Piaget, elementary school students whose age ranges from 6 or 7 years to 12 or 13 years are in a concrete operational phase. In this phase generally students are still tied to concrete objects or tend to think concretely, rationally and objectively in understanding a situation. To overcome this, varied media is required. According to [5] media is a necessary means to support learning. The use of media in the learning process can awaken and stimulate a learning desire for a person (Hamalik in [2]). One example of media that can be applied in this enrichment activity is the game. The use of games in learning can make students more active and have a fun learning experience.

For students at the primary level of primary school aged between 7 years to 12 years is basically intellectual development belonging to the concrete operational stage, because logic thinking is based on the physical manipulation of the objects [3]. In other words, the use of media in learning mathematics in primary school is necessary, because it is in line with the child's thinking stage. By using appropriate media or props, the child will be more aware of the real mathematics based on clear and visible facts [8]. So that students more easily understand the material being taught. The media used can be things that attract the attention of students such as games conducted in learning mathematics.

The game is one means that can be more interesting if prepared in a multimedia. In [13] it is argued that the game provides an interesting environment where students must follow the rules previously described and strive to achieve challenging goals. Various games in the world has grown rapidly, this is marked by the growing number of fans of the game [4]. There are some computer games that rule the game is not difficult, among them is a snake-ladder game. Most children are very familiar with and accustomed to using this game, especially with the rules of the game are simple. Learning materials that will be incorporated into a game of Snake-Ladder will help students in understanding a subject matter without making the student saturated with learning that is taught.

Schwartz in [9] suggests the characteristics of play are as follows:

1. Playing is interactive.
2. Playing is freedom, spontaneity, and non-coercion.
3. Playing is an interesting thing, and
4. Playing is open (unlimited), imaginative, expressive, creative and different.

Media is one of the factors that support the success of the learning process in schools because it can help the process of delivering information from teachers to students or vice versa.

The use of creative media can facilitate and improve the efficiency of learning so that learning objectives can be achieved. The media developed in this study is a snake-ladder game. The snake-ladder game is a game

performed by two or more people with a board consisting of small boxes and there are pictures of ladders and snakes interconnecting with other boxes [18].

Snake-ladder media includes visual media because it involves the sense of sight in using such media and is called graphical media because the snake-ladder media is presented in the form of images. Snake-ladder game is one type of game that is often played by children.

This game played by two or more people can train children to compete. In addition, a snake-ladder game can train children to work together and train them to act sportively [20]. According to Yudha [20] the game of snake-ladder is a type of competition game that is directed at the ability of cooperation and sportsmanship so as to engineer the social and moral experience of children.

This medium is adapted to the characteristics of the fourth-grade students of primary school as visual persons to absorb information with the help of images on each question and rely on their visual ability to obtain information. The images in this medium are attracting the attention of the students and increasing the motivation of the students to learn. Like other media, the snake-ladder media also has several advantages, including:

- a) Movable images of pawn can attract students' attention, and students can play an active role in moving such objects. This shows that students are involved not only intellectually but also physically.
- b) Learning can be arranged according to the need that is individually or in groups. In group learning students can work together in completing the tasks assigned by the teacher.

According to [14] a snake-ladder is a board game for children that are played by two or more people. Inside the board of games there are small boxes and in some boxes there are a number of ladders and snakes interconnecting with other boxes. This game can be used for all subjects and all levels of class, because students only answer questions through the game.

According to [17] the use of snake-ladder games has advantages such as:

- 1) Snake-ladder games can be used in teaching and learning activities because these activities are fun for students so that students are interested to learn while playing.
- 2) Students can participate in the learning process directly.
- 3) The snake-ladder game can be used to help all aspects of student development, one of which develops the intelligence of mathematical logic.
- 4) Snake-ladder games can stimulate students to learn to solve problems.

According to [20] instructional media is a tool that can help the process of learning and teaching and serves to clarify the message conveyed, so that the learning objectives will be achieved effectively and efficiently.

According to [1] the media is anything that can be used to channel the message from the sender to the receiver so as to stimulate the thoughts, feelings, attention, and interest of the student in such a way that the learning process takes place.

Learning is a tool that can channel the message, can stimulate the thoughts, feelings, and willingness of learners so as to encourage the learning process in the learners themselves. In the development of this media the focus is the development with the material of spatial structures. Planar structures are structures that are entirely located on one plane. This planar structure is a two-dimensional structure that has only long and wide and is bounded by a straight line or curve. In [7] it is mentioned that the various planar structures are triangular, rectangular (square, rectangle, parallelogram, diamond, kite, trapezoid), and circle.

## **2. Research method**

This research was conducted in Public Primary School 028227 of South Binjai, located on Jl. Gunung Bendahara, Binjai Estate of South Binjai District, Binjai Municipality. The sample in this study is the fourth-grade students, amounting to 20 students. The study was conducted on February 9, 2017.

### **2.1. Research Design**

This research uses Research and Development (R & D) approach. In [16] it was proposed that research and development is a research method used to produce a particular product, and test the effectiveness of the product. The product developed in this research is a media game snake-ladder as a medium of learning in students of primary school.

ADDIE is a development model in this research which consists of four stages: analysis, design, development and implementation. The last stage of ADDIE, i.e. evaluation is not done because of the limitations of time, cost and energy owned by researcher.

The test subjects in this study are a lecturer in banking management and a teacher of banking as the competent persons in the field of banking, a lecturer of educational technology as a competent person in the field of media, and 20 students in the fourth-grade of Public Primary School 028227 of South Binjai for a limited trial. Small group trials can be given to 20-30 people to represent the target population [16].

This study uses the instrument in the form of review and validation sheet for material experts and media experts, and questionnaire of student response.

The review sheet will be analyzed descriptively qualitatively and summarized as a suggestion to revise the product. Quantitative descriptive analysis is done on the validation sheet of material experts, media experts and student responses with percentage and categorization techniques. For the purposes of quantitative analysis, scoring was administered by using a Linkert scale, while scoring for student response questionnaires was Guttman scale.

### **2.2 Development Model**

The ADDIE development model was developed by Dick and Carry (1996). The ADDIE development procedure consists of five stages [17], namely:

**Table 2**

No.	Development stage	Description
1	Analysis	This stage is the process of defining what will be learned by learners. In this stage, some activities are carried out; among them are conducting needs analysis, identifying problems, and task analysis. The results to be obtained are the characteristics of prospective learners, gap identification, and needs identification.
2	Design	This stage is known as the design stage. Like the building, then before construction carried out the design drawing on paper must exist first. There are several stages in the design: First formulate the learning objectives. Next prepare a test, where the test should be based on the learning objectives that have been formulated. Then determine the right learning strategy to achieve the goal.
3	Development	This is the process of realizing the design into reality. One important step in the development stage is the trial before it is implemented. Everything must be prepared in this stage.
4	Implementation	A real step to apply what we have made. That is, at this stage all that has been developed in order to be implemented. For example, if it requires certain software then the software must already be installed. If the arrangement of the environment must be certain, then the environment must be made in accordance with the wishes or designs.
5	Evaluation	The process to see if what we have made is successful and appropriate or not with initial expectations. Evaluation is done at each of the four stages above. Evaluations occurring at each of the above stages are called formative, because they are intended for revision purposes.

## 2.2 Data Analysis Technique

### a. Summative Evaluation

The evaluation is used to measure or assess the extent to which the learners attainment of the lesson material that has been taught, and then to determine the increase level or graduation of the students concerned.

### b. Formative Evaluation

Formative evaluation consists of various forms. According to Martin Tessmer (1996), in the theory and practice

of evaluating the counseling and guidance programs [9], formative evaluation can be done as follows:

1) Expert review

This is evaluation where the expert reviews the service program with or without the presence of the evaluator. The expert can be a material expert, technical expert, designer, or instructor. This evaluation is carried out on a service-based program that is still rough or still in the design to know its advantages and disadvantages.

2) One-to-one evaluation

This evaluation is done by individual interviews by evaluators of some students where one by one the students are asked to comment on the service program being developed. In addition students are also usually asked to complete pre-test and post-test to measure the effectiveness of the service program.

### **3. Results**

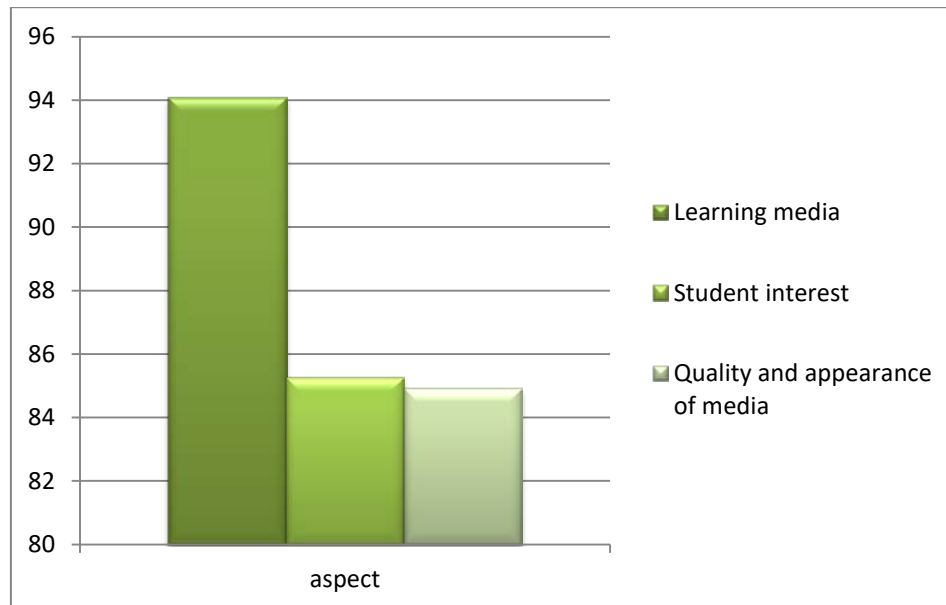
Research on this development is using the ADDIE model with four stages of analysis, design, development, and implementation. The evaluation stage is not implemented because of the limitations of the researcher himself. The analysis phase starts from performance analysis, needs analysis and continued with problem formulation. In the performance analysis of how the students' performance in following the enrichment in the development of snake-ladder game as a learning medium is analyzed. This can be seen from the activities that occur during the teaching and learning process in the classroom [2]. They do more ineffective lessons in learning, where they often talk with their friends during the learning process. So that enrichment activities and less effective learning and learning is not maximal. This is exacerbated by the availability of media in schools that are limited to textbooks, PowerPoint and problems of exercise provided by teachers. So the attention and interest of students in following the learning process is less that causes students to have a low understanding in learning.

Based on the result of testing of learning media product through the development of snake-ladder game in mathematics learning by the material expert is said to be valid and can be tested to assess its feasibility in the learning process. This learning media can be said to be valid because from the test result turns out 95.12% belong to category of very good. Through the data obtained can be interpreted that media reviewers say that from the aspect of learning media, snake-ladder game belong to category of very good with percentage 94.09%. From the student's interest aspect, it appears that 85.27% belong to category of good. While from third aspect, that is about quality and appearance, learning media is stated as very good with percentage 84.93%. The result is based on the reference range of the category of products belonging to the category of good and is said to be sufficient to be subject to the feasibility test in the learning process. From some of the above descriptions it can be concluded that the development of snake-ladder game on the spatial structures material is said to be very good in terms of media quality. Snake-ladder games can build the creativity and activity of students in learning. This aspect of the development of the game media of the snake-ladder is stated as good and the aspect of effectiveness is also stated as good. Thus the learning media of spatial structures have been declared feasible to be applied in the process of learning. The above statement is reinforced by the description of questionnaire analysis on aspects of the completeness of some media that get a score of 85.27% with good category.

**Table 1:** Aspects of the Program in the Development of Snake-Ladder Game as a Learning Media

No.	Aspect	Score (%)
1	Learning media	94.09%
2	Student interest	85.27%
3	Quality and appearance of media	84.93%

Briefly, it can be presented in the following diagram form:



**Figure 1:** The Learning Media

Based on the test results of the students before and after using the game of snake-ladder in the process of learning mathematics it appears that the average difference of scores of pre-test and post-test is 14.19 with squared deviation of 6910 with total sample of 20 students. The result shows that  $t = 13.5$  while for  $\alpha = 5\%$  with degree of freedom  $(df) = 20 - 1 = 19$ ,  $t\text{-table} = 2.086$  is obtained. Thus  $t\text{-counted} = 5.15 \geq t\text{-table} = 2.086$ . Because values of  $t\text{-counted} \geq t\text{-table}$  then the hypothesis  $H_0$  is accepted. Then it can be concluded that the average ability of students to understand the material of spatial structures is lowest 75. Based on the above data and description it was concluded that the development of snake-ladder game for learning media in the subject of spatial structures was effective, because after using the new media the learning outcomes and the activity of the students in learning mathematics increased.

#### 4. Discussion

The journal that can be used as a material of discussion and comparison with this present study is a reference [19] entitled "Improving the Intelligence of Math Logic through Snake-Ladder Game in Group B1 of Public Kindergarten of Padang Ulak Tanding, Rejang Lebong Regency, Bengkulu Province". In previous studies the developed learning media needs to be slightly revised in order to be judged as appropriate for use in the field.

Based on qualitative data analysis in the form of suggestions, there are some sections that require revision and review so that further research is more effective. Based on data obtained from material experts, the overall media of mathematics learning using snake-ladder media in fractional material for students, a score of 75% is obtained by category of eligible. The revisions are on language, appearance, and image on the media.

Based on the results of development can be seen that the learning media products for the subject of spatial structures developed is in accordance with the Analyze, Design, Development, Implementation, Evaluation (ADDIE) model. The process of learning media is through several stages of development and validation of the experts so that the product of learning media that fall into the eligible category is obtained. The process of developing this snake-ladder game is through several validation stages which, among other things, are: the validation of learning media program and the effectiveness of such media.

Described in [4] that play is fun, doing something with pleasure and fun yourself. In play there is no element of compulsion, personnel do it voluntarily. Playing according to Rusli Lutan, 2001: 31 [9] is a free and voluntary activity. Triharso also explained that playing is an activity that is done with or without using tools, which produce understanding and provide information, give pleasure and develop children's imagination. This is in line with the findings of a study entitled "Improving Counting Skills with Snake-Ladder Games in Children of Group B in Junior Kindergarten of Surabaya" that a learning model using game techniques will help to make it easier for children to learn something without feeling they are learning. It was later described in the study [14] that through a game of snake-ladder applied to children can improve the quality of learning and teaching in elementary school, training children to concentrate, and with games can make children think learning is fun.

Based on the data obtained in the process of making the learning media that is the development of the game snake-ladder, it can be seen that the product of learning media is stated can be subject to the feasibility test in the process of learning mathematics with the material of spatial structures in the fourth-grade students of Public Primary School 028228 of Binjai. This can be seen from data obtained during the content validation process by material experts and media experts. The results show that this development is in accordance with the theory of learning known as green theory or theory related to the development of learners proposed by Piaget.

## **5. Conclusions**

From the results of research conducted then it can be concluded as follows:

- a. The development carried out in the snake-ladder game for instructional media in students of primary school is using Research and Development (R & D) method with the ADDIE development model. Stages of the model begins with the analysis of initial analysis, user analysis, material or curriculum analysis, program analysis, analysis of instruments or media used in development through observation as well as interviews with teachers and students.
- b. After doing the analysis, the material to be developed is about spatial structures. Through the data obtained can be interpreted that media reviewers say that from the aspect of learning media, what is developed belong to the category of very good i.e. 94.09%. From the aspect of student interest in



learning with the media was 85.27% belong to category of good. While the third aspect that is about the quality and appearance of media, what is developed is stated as very good, i.e. 824.93%.

## **6. Suggestions**

Based on the description of the above conclusions, the suggestions that can be submitted in the development of this snake-ladder game are as follows: (1) The development research with the ADDIE model is not up to the evaluation stage. This is due to the limited time and cost of the researcher. It is therefore recommended that the next researcher be able to complete it until the evaluation stage. (2) The expert who is the reviewer and the validator of the material and media in this research is the same person. It is suggested that the next researcher, can choose different people so that their assessment is more objective. (3) To find out the effectiveness of this game of snake-ladder media, further research can be done in the form of experimental research, thus complementing the development outcomes that are feasible to use and also effective to apply.

## **References**

- [1] Arief S. Sadiman, dkk. (2011). Media Pendidikan dan Proses Belajar Mengajar. Jakarta: PT Raja Grafindo Persada
- [2] Arsyad, Azhar. 2011. Media Pembelajaran. Jakarta: Rajawali Grafindo Persada
- [3] Badrujaman, A. 2009. Teori dan Praktek Evaluasi Program Bimbingan dan Konseling. Jakarta: PT. Indeks.
- [4] Borgen, D. 2009. Play as The Learning Medium for Future Scientists Mathematician and Engineers. American Journal, 1-16
- [5] Cecep Kustandi dan Bambang Sutjipto. 2011. Media Pembelajaran Manual dan Digital. Bogor: Ghalia Indonesia.
- [6] Daryanto. 2010. Media Pembelajaran. Jakarta: Rajawali Grafindo Persada.
- [7] Fajar Wahyudi. 2014. Buku Paten Matematika SD Kelas 4,5,6. Jakarta: Laksana
- [8] Hartati, Sasmita Christina Yuli, dkk. 2012. Permainan Kecil (Cara Efektif Mengembangkan Fisik, Motorik, Keterampilan Sosial dan Emosional). Malang: Wineka Media
- [9] Hartati, Sofia. 2005. Perkembangan Belajar pada Anak Usia Dini. Jakarta: Depdiknas.
- [10] Ika Wulandari. 2013. Memahami Kesebangunan Bangun Datar. Klaten: PT Citre Aji Parama.
- [12] Muhsetyo, dkk. 2008. Pembelajaran Matematika SD. Jakarta : Universitas Terbuka.

- [13] Newby, T. J., Stepich, D. A., Lehman, J. D., & Russel J. D. 2006. Educational Technology for Teaching and Learning. Upper Saddle River, NJ : Pearson Merrill Prentice Hall.
- [14] Rahina Nugrahani. 2007. Media Pembelajaran Berbasis Visual Berbentuk Permainan Ular Tangga untuk Meningkatkan Kualitas Belajar Mengajar di Sekolah Dasar. Jurnal Kependidikan jilid 36, No. 1
- [15] Sudono Anggani. 2000. Sumber Belajar dan Alat Permainan. Jakarta: PT Grasindo.
- [16] Sugiyono. 2015. Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif dan R&D). Bandung: Alfabeta.
- [17] Suryani, Arda & Rusdi Noor Rosa. 2014. Using a board game “snake and ladder” in the teaching speaking at junior high school. Jelt Vol.2 No.2
- [18] Tilong, Adi D. 2014. Lebih dari 40 Aktivitas Perangsang Otak Kanan dan Kiri Anak Bisa Lebih Canggih. Jogjakarta: Divapress
- [19] Zubaidah, Betty. 2012. Meningkatkan Kecerdasan Logika Matematika Melalui Permainan Ular Tangga Pada Kelompok B1 Tk Negeri Pembina Padang UlakTanding Kabupaten Rejang Lebong. Bengkulu: Universitas Bengkulu
- [20] Zuhdi, Ulhaq., dkk. 2010. Pengembangan Perangkat Media Pembelajaran Ular Tangga Digital Untuk Meningkatkan Penguasaan Kosakata Bahasa Inggris (Vocabulary) pada Mahasiswa S-1 PGSD. Jurnal Pendidikan Wacana Pendidikan Sekolah Dasar. Vol:06. Hal:188-201.