



## Development of game based learning media on class VII classification of living creatures material at SMP Negeri 5 Bitung

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### Abstract

This research aims to produce and determine the validity, effectiveness and practicality of game-based learning media on the classification of living creatures on the learning outcomes of class VII students at SMP Negeri 5 Bitung. The research subjects were class VII students at SMP Negeri 5 Bitung, five experts consisting of science lecturers at Manado State University and three science teachers at SMP Negeri 5 Bitung. This type of research is research and development with the ADDIE (Analysis, Design, Development, Implementation and Evaluation) development model. Data collection was carried out by observation, interviews, questionnaires and tests (post-test). The resulting data is: (1) producing a science learning media design based on game-based learning on the material of classification of living creatures at SMP Negeri 5 Bitung which is very valid with the average assessment result of media expert validators and material experts being 4.33. (2) produce a science learning media design based on game-based learning on living creature classification material at SMP Negeri 5 Bitung which is effective because it has fulfilled the research hypothesis of effectiveness testing through post-test learning outcomes and Independent Sample T-test statistical data. (3) produce a science learning media design based on game based learning on the material of classification of living things at SMP Negeri 5 Bitung which is very practical with a percentage of teacher and student responses reaching 88.43%. (4) Science learning media based on game based learning on the material for the classification of living things at SMP Negeri 5 Bitung can be used as a science learning media in class VII on the material for the classification of living things because it can improve student learning outcomes and is proven to be effective and efficient in its use.

**Keywords:** Learning media, game based learning, classification of living things

### Introduction

Education is the basic foundation that needs to be developed in the stages of improving the quality of a country's resources. The future of a country can be seen from the quality of that country's education. Based on PP Number 57 of 2021 concerning National Education Standards: "Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble morals, and skills needed by himself, society, nation and state". This shows the government's hope in increasing the potential of human resources through the education process. It has become a tradition in our classes that our teachers, in designing the learning process, have not been able to create learning conditions that allow students' potential to develop optimally. What happens in classes is nothing more than scholastic exercises, such as recognizing, comparing, practicing and memorizing, namely very elementary cognitive abilities, at the lowest level (Surakhmad, *et al.*, 2003:3).

The main problem with learning conditions like those above is the lack of innovation implemented by educators in the classroom. Education in the current technological era requires teachers to be able to operate computers/laptops and innovate in order to provide a new atmosphere in the learning environment. Education must truly be used as a foundation so that the use of technology can be applied effectively by teachers as distributors of education, because education is the gateway for anyone to receive knowledge in order to improve human resources to be of higher quality

(Haryanto, 2015:22) <sup>[5]</sup>. In the current digital era, information and communication technology (ICT) has become a very influential factor in the world of education. The use of ICT in learning can increase the effectiveness and efficiency of the learning process. One form of using ICT in learning is by using game based learning. The use of this method is of course expected not only to utilize ICT in the learning process but also to provide a pleasant atmosphere so that it can increase students' interest in learning which of course ultimately has an impact on learning outcomes.

Game based learning is a learning method that uses games as a learning medium. This method has the potential to increase students' motivation and interest in learning, and can improve students' cognitive and social skills. However, the development of game-based learning media is still limited and not widely used in Indonesia. The application of this method has many stages that can be tested in order to improve the overall quality of learning. With the Game Based Learning learning method, students are expected to experience a learning atmosphere that is fun and not boring. So that subconsciously, while playing, students also understand the material presented by the teacher.

In PP no. 57 of 2021 in article 12 paragraph (1) also explains the stages of planning, implementation and assessment of the learning process which is held in an interactive, inspiring, fun, challenging learning atmosphere, motivating students to participate actively and providing sufficient space for initiative, creativity, independence according to the students' talents, interests and physical and psychological development. This of course applies to the

entire learning process, including learning Natural Sciences (IPA) subjects at the junior high school (SMP) level. Science is a basic science subject, so changes to the existing curriculum are usually also based on this subject. Science is a branch of science that aims to study and understand natural events or phenomena that occur in the surrounding environment (Yulianti, 2010:21). With the hope of achieving satisfactory learning outcomes with an increasingly advanced education system and also supported by technological developments in this modern era, the use of technology is certainly very necessary. One of them is interactive multimedia game-based learning, which is a media that is suitable as a solution to problems that occur so that students can observe the processes that occur even though they are only illustrations (Darmawan in Lamada, *et al.*, 2021: 59)<sup>[7]</sup>.

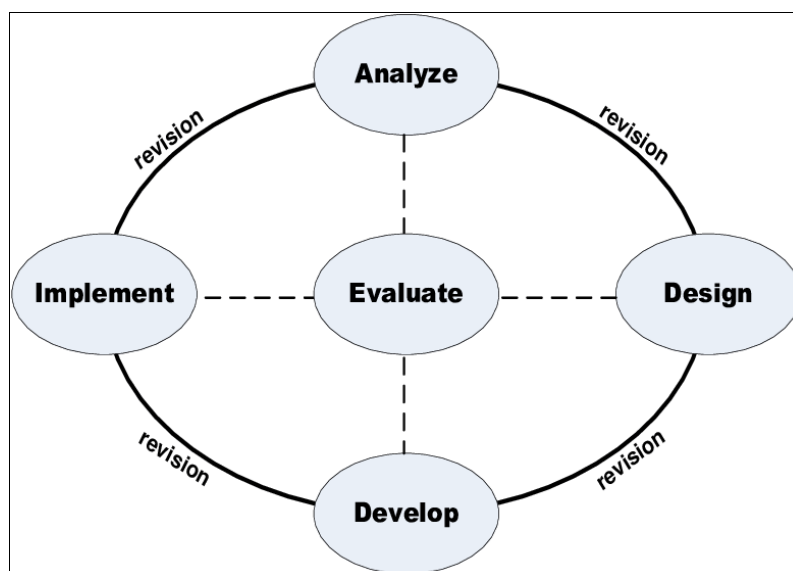
At SMP Negeri 5 Bitung, most of the implementation of science learning in class still uses lecture, question and answer and assignment methods where the learning process tends to convey theory, provide examples and provide practice questions. This is still happening even though in practice teachers have used ICT-based learning media. By using this learning method, the teacher plays a dominant role and students are not fully involved in learning. Students are rarely given the opportunity to discover for themselves

the natural problems around them that will be studied. This results in low motivation in learning, students are passive, bored, and find it difficult to understand lessons.

The use of learning media that supports the learning process is of course very necessary based on these circumstances. It is hoped that Game Based Learning-based learning media can be an alternative in an effort to improve learning outcomes in the Classification of Living Creatures material for class VII students at SMP Negeri 5 Bitung. This development research aims to produce appropriate, effective and efficient game-based learning media to improve learning outcomes related to material on the classification of living creatures for class VII students at SMP Negeri 5 Bitung.

**Method**

The research method used in this research refers to the Research and Development Model with the ADDIE model developed by Dick and Carry (1996:47). The ADDIE model consists of five stages, namely analysis, design, development, implementation, and evaluation. The research stages with the ADDIE research model in Figure 1 by Gustafson (2002:43) show the process needed to prepare, implement and even evaluate products with the ADDIE research model.



**Fig 1:** Development of the ADDIE Model

The stages that must be carried out in research in the ADDIE model are as follows: (1) Analysis stage, the main activity is analyzing the need to develop new learning models or methods and analyzing the feasibility and requirements for developing new learning media. (2) The design stage is a systematic process that starts from setting learning objectives, designing scenarios or teaching and learning activities, designing learning tools, designing learning materials and tools for evaluating learning outcomes in the form of. (3) The development stage in the ADDIE model contains product design realization activities. In the design stage, a conceptual framework has been prepared. (4) Implementation stage, the model design or method that has been developed is applied to actual conditions. The material presented is in accordance with the new product being developed. (5) The evaluation stage will be carried out after the product that has been developed has

been implemented in the classroom. Evaluation is carried out to find out whether the product that has been created and developed meets the criteria of being valid, practical and effective, as well as seeing whether the product provides benefits for students and teachers.

The test subjects in this research were students in class VII-1 at SMP Negeri 5 Bitung. Before being delivered to students during the learning stages, the teaching materials and learning media were validated by two lecturers, each of whom is an expert in Biology learning materials and learning media.

**Data collection techniques and instruments are as follows**

**1. Eligibility**

The instrument used to collect data was a questionnaire. Questionnaires are used to measure the quality of the

learning media developed. The questionnaire instrument in this Research and Development study was used to obtain data from students, media experts and material experts, teachers and school principals as material for evaluating the learning media being developed. The questionnaire assessment of the suitability of learning media uses a Likert scale with 5 alternative answers (Sugiyono, 2014: 94) [17]. Observation is a tool used for pre-surveys carried out in Class VII of SMP Negeri 5 Bitung. Observations were carried out to collect information related to needs analysis and learning conditions both in terms of facilities and infrastructure to support the operation of the product being developed.

## 2. Effectiveness

Apart from using questionnaires, tests are also needed to determine the significance of media use on learning outcomes. The test was carried out twice, namely before the learning process using interactive teaching materials in the form of Pre-test questions and after the learning process using interactive teaching materials in the form of Post-test questions. The data collection technique is in the form of statistical tests of learning outcomes in the experimental class and the control class.

## 3. Practicality

Testing the practicality of learning media was made using a questionnaire for students and teachers. The questionnaire provided contained an evaluation of the use of learning materials and learning media in the learning stages by researchers based on the perspectives of the teachers and students who were respondents. In the final stage of the ADDIE model, the activities carried out are evaluating learning programs and evaluating learning outcomes. At this stage, the evaluation stage is a stage to measure the practicality of the product being developed. The data collection technique is in the form of giving questionnaires to teachers and students which will later be used as practical test results.

The data analysis techniques in this research are questionnaire assessment analysis techniques (feasibility), test assessment analysis techniques (effectiveness), and product results analysis techniques (practicality). Data obtained from material experts, media experts, and feasibility trials based on questionnaires were analyzed using descriptive analysis techniques. Descriptive analysis techniques are carried out using descriptive statistics. Analysis of pretest and posttest results is carried out by providing concept understanding test questions and measuring learning outcomes to see the level of effectiveness of the product. The practicality of Game Based Learning-based learning media design is determined from the results of response questionnaires by teachers and students. The assessment results and responses obtained will be scored and presented based on their aspects.

## Results and Discussion

### A. Results

#### 1. Feasibility test

The initial stage of this research process is analysis. The main thing that needs to be analyzed is the needs and condition of the education unit/school. Based on the results of interviews conducted with several teachers at SMP Negeri 5 Bitung, there is some information regarding the

main needs required by teachers and students to support the learning process. (1) learning orientation tends to be unidirectional because there is no interaction between teachers and students. (2) students tend to participate less actively in the learning process because there is no such interaction.

The number of learning support books is not proportional to the number of students so not all students can use learning support books personally. Apart from that, the majority of students at SMP Negeri 5 Bitung already have personal electronic devices but are often hampered by limited internet access and unsupportive internet networks so the learning process requires additional supporting learning media. In determining the media used, there are several external web-based applications that are options to support the preparation and use of learning media such as Canva and Bing Image Creator. Meanwhile, to fulfill the learning process in class, the Microsoft Powerpoint application is used with the help of media in the form of a projector and laptop to support access for all students in one class.

The next stage is designing or designing learning support materials and media. The learning carried out in this research requires a learning design in the form of a teaching module consisting of lesson plans and student worksheets which are divided into 2 meetings for the Classification of Living Creatures material. The learning activities for meeting 1 used a discovery learning learning model supported by Student Worksheets as the main means for students to understand the basic concepts of the Classification of Living Creatures. Meanwhile, at meeting 2, learning activities used the game-based learning model as a medium to increase interest, interaction, and learning outcomes by students with the teacher as game director and students as game participants.

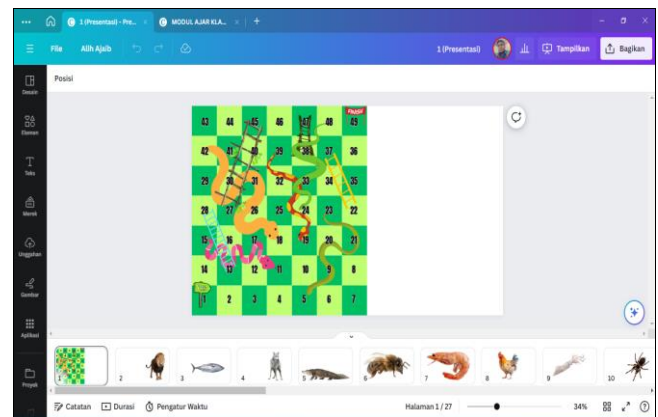


Fig 2: Learning media design process using Canva

The learning media design stage that is carried out includes several essential stages, namely selecting design templates, animations, transitions, along with hyperlinks/action clicks. The display selection was chosen based on a color palette/scheme with a pastel theme, which showed cheerful colors to the students. The animation used is taken from the Graphics and Video search column provided by Canva, after which finishing is done by adding transitions along with click actions on all slides. Next, the media design results in Canva are integrated into a format that can be opened in Microsoft Powerpoint to be used in the learning process stages.

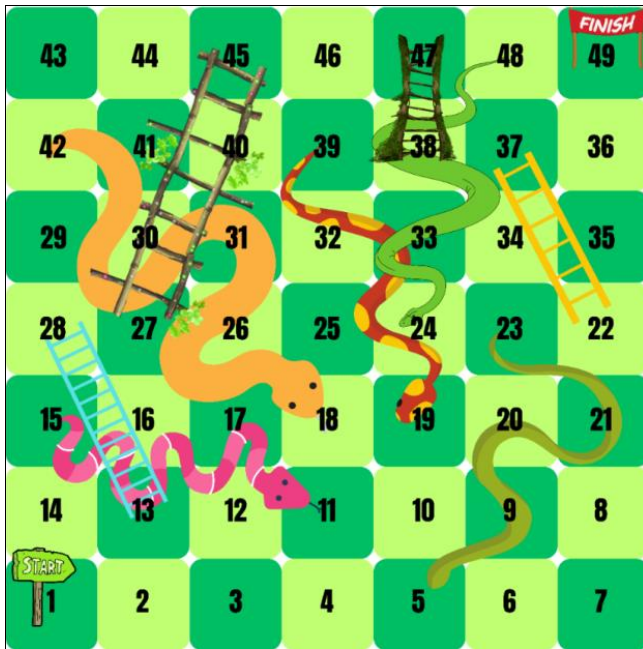


Fig 2: Initial design of snakes and ladders learning media

The third stage in the ADDIE procedure is development. At this stage, development of the design results that have been designed is carried out. After designing the design, a validity test of the design was carried out by media experts and material experts as well as a small group test to determine the validity of the game-based learning media design that had been created.

Validation of this learning design was carried out by media experts and material experts. This validation is carried out by material experts consisting of two validators with a value range for expert assessment scores of 1-5. Because the score reached the very good category, the learning design was declared valid. This validation is carried out by media experts consisting of one validator with a value range for expert assessment scores of 1-5. Because the score reached the very good category, the learning design was declared valid. The total average of the validity questionnaire results conducted by material and media expert validators with a total average score of 4.33. Because the score reached the very good category, the learning media design was declared valid and can be used.

Initial product revisions aim to improve products that have been designed in accordance with the validator's directions. After revision, the product will be tested on a small group. At this stage, based on the validation results from material and media experts, the product can be used by making revisions. The revisions made are as follows: (1) The cover is visually improved; (2) Adjusting the size of writing on teaching materials; (3) Inclusion of pawns in snake and ladder media; and (4) The reference image used for living creatures shows the body of the living creature as a whole. A trial to discuss the suitability of this learning design was carried out on 6 Class VII students (chosen randomly) at SMP Negeri 5 Bitung. From the trial results, this learning design was declared suitable for implementation in real learning, through the feedback provided. Revision activities aim to carry out comprehensive finalization or final improvements to the product being designed. After the product has passed this stage, the product is ready to be given in class.

## 2. Effectiveness test

The implementation stage is carried out with the aim of seeing whether learning has effective results (learning outcomes). The product was implemented in the experimental class and the control class as a comparison, each with 32 students.

### 2.1 Learning outcomes test, Independent samples T-test prerequisite test

Before carrying out the Independent Samples T-Test statistical test, there are several conditions that must be met as follows: The Independent Samples T-Test uses two groups that are independent of each other, so that there is no connection between one group and another group. The determination of these two independent groups can be done before the data collection process, or after the product is ready for testing.

The normality test of the post-test data for the experimental group and the control group was tested using IBM SPSS Statistics 25. Data on the post-test results of the control group and experimental group students were normally distributed. The normality test is a prerequisite test using the Shapiro-Wilk test which is more suitable for analyzing statistical data below 50 to proceed to the T-test as an effectiveness test. The results obtained by both groups were normally distributed data, with significance values from the control class  $0.413 > 0.05$ , and from the experimental class  $0.160 > 0.05$ .

The homogeneity test can be carried out if the data group is in a normal distribution. Data is said to be homogeneous if the significance value is  $> 0.05$ . The homogeneity test of the post-test data for the experimental group and the control group was tested using IBM SPSS Statistics 25. The post-test data can be said to be homogeneous seen from the mean significance value, namely  $0.383 > 0.05$ .

### 2.2 Learning results test, Independent sample T-test

The function of the Independent Samples T-test statistical test is to compare the averages of two groups that are not related to each other (two independent samples), so that it can be seen whether the two samples have the same average, or not.

The amount of learning outcome data for the control class and experimental class each amounted to 32 respondents. The average value (mean) for the control class was 54.69, while the experimental class was 74.38. Thus, descriptive statistics can be concluded that there is a difference in the average learning outcomes of class students who use game-based learning media products and those who do not use them.

The two-way significance value is  $0.000002 < 0.05$ , so as the basis for decision making, the independent samples t-test concludes that  $H_0$  is rejected and  $H_a$  is accepted. Thus, there is a significant difference between the average learning outcomes of class students who use game-based learning media products and those who do not use these products.

To strengthen the statistical data, the t value was calculated, namely  $t_{count}$  of 5.206. So, decision making for the independent samples t-test through a comparison between the  $t_{count}$  and  $t_{table}$  values can be continued. To find the  $t_{table}$  value, refer to the formula  $\alpha/2; (df)$ ,  $\alpha$  is the significance level, in this study it is 0.05, while  $df$  is the degrees of freedom in this study, namely  $64-2=62$ . So  $t_{table}$  is seen in

the table distribution 0.025;62 which is 1.999,  $t_{\text{table}} = 1.999$ . Thus  $t_{\text{count}} 5.206 > t_{\text{table}} 1.999$ , then based on the basis of decision making through a comparison of  $t_{\text{count}}$  and  $t_{\text{table}}$  values, it can be concluded that  $H_0$  is rejected and  $H_a$  is accepted, which means there is a difference in the average student learning outcomes between the control group and the experimental group.

### Practicality test

The evaluation stage is the final stage in the ADDIE model. The Evaluation stage is used to analyze the practicality of products that have been designed, developed and implemented. The practicality test was obtained from a questionnaire of teacher and student responses to the product being developed.

The results of the practicality analysis based on the practicality questionnaire given to teachers regarding game-based learning media products show that teacher respondents gave an average score in the Very Good category with a percentage of 40.71%, the Good category with a percentage of 55.95%, the Fairly Good category with a percentage of 3.33% and no teacher gave a grade of Not Good or Very Bad so the percentage in that category was 0%.

The results of the analysis of teachers' positive responses to game-based learning media products show that the average positive response given by respondent teachers was 87.48% in the Very Positive category. The results of the practicality analysis based on the practicality questionnaire given to students regarding game-based learning media products show that student respondents gave an average score in the Very Good category with a percentage of 53.91%, the Good category with a percentage of 44.53%, the Fairly Good category with a percentage of 1.56% and There were no students who gave a score of Not Good or Very Bad so the percentage in that category was 0%.

The results of the analysis of students' positive responses to game-based learning media products show that the average positive response given by student respondents has a percentage of 89.74% in the Very Positive category. The results of data analysis on the practicality of products based on game based learning media based on the results of the practicality questionnaire given to teachers and students can conclude that the use of game based learning media is very practical with an average total response of 88.43%.

### Discussion

Improving the quality of education is a shared desire as a nation related to the duties and functions of teachers and educators in their daily role at the learning stages, both directly and indirectly. Teachers have made various efforts to improve the quality of education. The use of learning media that makes it easier for students to follow the learning stages is an important thing to understand. Tafonao (2018:104) <sup>[21]</sup> revealed that learning media is anything that can be used to channel the sender's message to the recipient, so that it can stimulate students' thoughts, feelings, attention and interest in learning.

Therefore, teachers are required to provide motivation to students through the use of media that is not only in the classroom, but also outside the classroom, if this is utilized then the learning objectives will be achieved. So what happens if there are no learning media? What happens is first, they experience difficulties in teaching, the material

becomes monotonous and students feel bored with what the teacher teaches. Second, students find it difficult to understand and understand the learning material. Third, students find it difficult to understand explanations from lecturers/teachers. Fourth, students feel bored with the material. Fifth, students have difficulty thinking.

Developing learning media with the aim of creating a pleasant atmosphere but still centered on understanding the material which has an impact on improving learning outcomes is something that needs to be done by educators, in this case researchers. The process of creating learning media products that meet the criteria of validity, effectiveness and efficiency requires various tests to ensure the quality of the product that can be used in the learning process meets expectations.

Based on the test results on learning media products with product validation from media experts and material experts worth 4.33 or very valid, the product effectiveness from the effectiveness test using the independent sample t-test stated that the product was effective in use as well as the practicality of the product from the positive response questionnaire by teachers and students with percentage 88.43%. The development of game-based learning media on the classification of living things in terms of valid, practical and effective criteria provides positive and beneficial effects for students and teachers in the learning process at school, especially at SMP Negeri 5 Bitung.

### Conclusion

This research is research and development with the title of developing Game Based Learning based learning media on the Classification of Living Creatures material on the learning outcomes of class VII students at SMP Negeri 5 Bitung. After this research was carried out, it can be concluded that:

1. The product in the form of game-based learning media on the classification of living things is proven to be valid based on the assessment of material experts and media experts with a validator value of 4.33.
2. The product in the form of game-based learning media on the classification of living things has been proven to be effective for use in the learning stages because it has been tested using the independent sample t-test method.
3. The product in the form of game-based learning media on the classification of living things is proven to be practical based on teacher and student responses which reached a percentage of 88.43%.

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