

The Development of Teaching Materials Gamification-Based Problem Solving on the Material in Terms of Four

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ABSTRACT

This study aims to develop teaching materials gamification-based problem solving on the material in terms of four. To view the judging of the validator against the feasibility of teaching materials gamification-based problem solving on the material terms of four and see the response of students to the attractiveness of the teaching materials gamification-based problem solving on the material in terms of four. This research use type research of research and development with a research model ADDIE (Analysis, Design, Development, Implementation and Evaluation. Stage of development (development) involving 9 validator (three validator matter experts, three media experts and three language experts) to assess the feasibility of the material, the media and the Indonesian language good and right. Stage of Implementation (field trials) involving 80 students (20 students trial of small group and 60 students test a large group). The assessment of the attractiveness of the teaching materials gamification-based problem solving on the material in terms of four using the questionnaire i.e. a questionnaire the validator and questionnaires of learners. Data analysis using descriptive analysis using Microsoft Office Excel 2010. The results of the validation matter experts from the 3 validator shows that the overall product to obtain an average value of 3.7 and the Results of the validation media experts obtained an average value of 3.3 while the results of the validation of language experts to obtain an average value of 3.4. While the results of the trials of a small group of 10 students of MTs N 1 Bandar Lampung obtained the results of the attractiveness of the teaching materials with an average value of 3.4. while the test is a large group that was conducted in SMP 30 Bandar Lampung to obtain an average value of 3.5. Thus, it can be concluded that the development of teaching materials gamification-based problem solving on the criteria of very worthy and interesting.

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1. INTRODUCTION.

Education is a conscious effort by humans to improve themselves by fostering the potential of private owned, namely spiritual and temporal. This is in accordance with the Legislation of the Republic of Indonesia Number 20 year 2003 on National Education System explained:

The national education serves to develop skills and form the character and civilization of dignity in the context of the intellectual life of the nation, aimed at developing the potential of learners in order to become a man of faith and piety to God Almighty, noble, healthy, knowledgeable skilled, creative, independent, and become citizens of a democratic and responsible.

The education expected to make a good quality human in front of God or his fellow man. Man who has the knowledge will have higher degrees in front of Him compared to people who do not have science. As the word of God for those who believe and have knowledge in QS. Al-Mujadilah verse 11 which reads:

Meaning:

“O you who have believed, when you are told: “be Patient-lapanglah in the assemblies”, then make space; Allah will make space for you. And when it is said: “Arise,” then arise; Allah

يَا أَيُّهَا الَّذِينَ آمَنُوا إِذَا قِيلَ لَكُمْ تَسَبَّحُوا فِي الْمَجَالِسِ فَاسْبَحُوا
يَسْبَحِ اللَّهُ لَكُمْ وَإِذَا قِيلَ ادْعُوا فَادْعُوا يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا
وَمِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ ﴿١١﴾

will raise (in degree) those who have believed among you and those who were given knowledge, by degrees. And Allah is Knowing of what ye do”. Q. S Al-Mujadilah:11).

The paragraph explains that Science is essential for human life such as the commands of Allah, is not only useful in the life of God had already promised that the people who have knowledge will be uplifted. Therefore every human being is obliged to seek knowledge, master the various kinds of knowledge through the educational process. The process of education will always be a concern and continue to be developed in order to advance the life from one generation to the next.

Therefore, in order that education can educate from one generation to the next generation to become the desired person (what it can become) required educational program or curriculum as a vehicle for change so that responsive to the demands of perkembangan life in an age of global and digital with attention to the potential of each child.

Curriculum as learning materials is an overview of the curriculum of most basic describes a curriculum as a combination of which form the framework of content of material being taught. The implementation of the 2013 curriculum, the current has been applied, but the teaching materials that are available and the method used is not in accordance with the 2013 curriculum, both at the Level of Elementary School (SD), junior high School (SMP), and senior high School (SMA). One of the subjects on the Curriculum Unit Level Education require a teaching materials that are attractive, innovative, and creative in accordance with the 2013 curriculum, specialized teaching materials gamification approach to problem solving is mathematics.

Mathematics is the science about the regularities, the knowledge about the structure of organized, ranging from elements that are not defined to the axioms and postulates and finally to the evidence. Johnson and Myklebust defines that mathematics is a symbolic language that functions practically to express the relations of quantitative and spatial while the function of care is to facilitate thinking.

Learning math during this does not work increase the understanding of mathematics on learners, but managed to cultivate a feeling of fear, the perception of mathematics as a science that is difficult to master, not meaningful, boring, causing stress on the self-learners. While the goal of mathematics learning is to train learners to think systematically, logically, critically and creatively communicates an idea or solving a problem. For it is the process of learning mathematics requires adjustment between the methods and media of learning so that the learning process in particular and the education process in general can take place effectively and efficiently.

One of the learning media is teaching material. Teaching materials are a set of learning tools, tools, methods, boundaries, and ways of evaluating systematically and interestingly designed in order to achieve the expected goals, namely achieving competence with all its compositions. One of the teaching materials that can be developed is problem solving based gamification teaching material.

Gamification according to Meyhart Rise Sitorus is the use of the elements-game elements and game design techniques in the context of non game. The elements of the game such as points, badges, levels, narrative and so on, but as the development of the core of gamification today is how to build motivation and interest of learners in learning.

Teaching materials gamification-based problem solving display problems that the modification to the image-an interesting image to support the ability of reasoning, problem solving and mathematical communication students. The development of teaching materials gamification-based problem solving aims to train students to think systematically, logically, critically and creatively in communicating ideas or solving problems, expanding knowledge of mathematics and facilitate the students in understanding the material in terms of four that exist in the teaching materials. The availability of teaching materials in accordance with the level of development of learners is important for the learners are also educators in the learning process at school.

Some of the research that has been done including research conducted by Isnanto Adi Prasetyo, Senie Destya and Rizky in the research elements of gamification are suitable for motivating, engaging and entertaining the user to learn alqu'ran, with the content that is produced can overcome the lack tertarik interest in learning the qur'an. Research conducted the gamification applied to attract interest in learning the qur'an. Researchers will be different

doing research gamification are applied in the teaching material for the interest of learning mathematics.

Research According to Joseph with the conclusion that the process of learning by using gamification, providing an alternative to make the learning process more interesting, fun and effective. The research has implemented gamification in the learning process. The researcher will be different from conducting research using gamification as a teaching material in the learning of mathematics.

Further research Anugerah Bagus Wijaya, M. Suyanto, and Sukoco with the conclusions of the data the results of the research: that has produced the implementation of gamification on the lessons of history by using the method scott is able to affect the value of the indicator of competence or can be used to help students in the achievement of indicators of competence. Researchers will undertake the development of teaching materials gamification with subjects with different learning methods different as well, namely problem solving.

Based on pemaparan above and some previous research. The research aims to produce teaching materials gamification-based problem solving on the material in terms of four.

2. RESEARCH METHOD

The research method is a procedure used by researchers to collect the necessary data in his research. This research uses research methods ADDIE. Model ADDIE is one of the model learning system design that shows the stages of the basic learning system that is simple and easy to learn, consisting of 5 phases, namely Analysis (Analysis), planning (Design), development (Development or Production), implementation (implementation or Delivery) and evaluation (Evaluation).



Figure 1. The procedure of the Development Model of ADDIE

The first stage conducted by the researcher in the research development of the teaching materials this includes the analysis of the educators and learners that is with menganalisis the characteristics of learners (learning, knowledge, skills, and attitudes), the competence of which is addressed to the learners, the material according to the guidance of the competence, and the teaching materials and learning methods used pedidik, after the stage of analysis completed prior to the next step in evaluation (evaluation) in advance. The second stage is the planning before beginning the researcher to step the development of the teaching materials that the researchers conducted the selection of teaching materials interesting for the material that will be delivered by adjusting the appropriate learning methods, after the design stage is completed before the next stage in the evaluation (evaluation) in advance. The results of the initial data than analyzing and planning early researchers, used to help facilitate researchers in conducting

the third step, namely the development of. In the step of development, researchers will perform the manufacture of learning media. After pembuatan media that will be developed is finished made, the researchers should conduct media validation, to determine the accuracy of the content of the learning media. After doing further validation researchers should revise the learning media which has been done validation testing. By continuing the trials of learning media, and concludes with a revision after trial.

Researchers concluded using the model ADDIE with the five stages but in the context of product development, the stage of implementation carried out by means of the socialization of learning resources or teaching materials through the distribution of a limited trial. The distribution is intended to obtain responses, feedback to the learning resources or teaching materials that have been developed. The type of data used in the implementation of this research using quantitative data and qualitative data. Data analysis techniques in this research using qualitative descriptive analysis technique which presents the results of product development in the form of teaching materials gamification-based problem solving on the material in terms of four.

The Data obtained through the instrument of the test were analyzed by using descriptive statistics qualitative. This analysis is meant to describe the characteristics of the data in the data analysis validation experts and analysis of the trial data of the product. Data analysis validation experts associated in terms of materials, the suitability of the material with the Basic Competence, Competence Standard, Indicators of the linkages between the content of the material of Mathematics with problem solving approach. While the analysis of the trial data products, namely the results of the assessment scores from each of the learners is then sought an average and converted into questions to determine the attractiveness. Calculate the assessment score total can be found by using the following formula:

$$\bar{x} = \frac{\sum_{i=1}^n \bar{x}_i}{n}$$

$$\bar{x}_i = \frac{\text{total score}}{\text{max score}} \times 4$$

Description:

\bar{x} = average end

\bar{x}_i = the value of the operational test of the questionnaire each participant learners

n = number of students who fill out the questionnaire

Table 4. Criteria to Test the Attractiveness of (modified)[36]

The Quality Score	The Question Of The Quality Aspects Of The Attractiveness Of The
$3,26 < \bar{x} \leq 4,00$	Very interesting
$2,51 < \bar{x} \leq 3,26$	Interesting
$1,76 < \bar{x} \leq 2,51$	Less interesting
$1,00 < \bar{x} \leq 1,76$	Not very interesting

Questionnaire validation experts associated in terms of materials, the suitability of the material with the Basic Competence, Competence Standard, the Indicators of Achievement of Competencies, learning objectives, completeness of the materials

nuanced gamification, the relationship between the content of Mathematics with the material nuances of gamification as well as the accuracy of the minimum standards applied in the preparation of the module nuanced gamification approach to problem solving has 4 choice of answers according to question content. Each is still the choice of answers having a score different which defines the level of validation the module.

Assessment scores of each answer choice can be seen in Table 1.

Table 1. Score Assessment Validation Experts (modified)[35]

Score	Answer Options Feasibility
4	Very good
3	Better
2	Less good
1	Very less good

The results of the assessment score of each validator matter experts, expert material of the Islamic religion, and media experts such then, find the average and convert to the questions to determine the validity and feasibility of the module nuanced islam with a Guided Inquiry approach.

The following eligibility criteria analysis of the average shown in Table 2.

Table 2. Validation criteria Expert(modified)[35]

The Quality Score	Eligibility Criteria	Description
$3,26 < \bar{x} \leq 4,00$	Valid	No revision
$2,51 < \bar{x} \leq 3,26$	Quite valid	The revision of the part
$1,76 < \bar{x} \leq 2,51$	Less valid	The revision of the part and review the material
$1,00 < \bar{x} \leq 1,76$	Not valid	Revision total

Questionnaire responses the attractiveness of the student to the use of the product has 4 choice of answers according to question content. Each answer choice has a score different which defines the level of suitability of the product for the user. Assessment scores of each answer choice can be seen in Table 3.

Table 3. Score Assessment Test (modified)[36]

Scorer	Answer Options Attractiveness
4	Very good
3	Better
2	Less good
1	Very less good

The results of the assessment scores from each student are then sought an average and converted into questions to determine the response of the attractiveness. Penkonversian the score to question this assessment can be seen in Table 4.

3. RESULT AND DISCUSSION

Stage of the Analysis is the initial stage in a research. This stage includes three 3 steps as follows:

1. The analysis of the characteristics of learners about the

learning capacity, knowledge, appearance, attitude which has been owned by the learners as well as other aspects related. This stage aims to determine how familiar learners are with the material the wake daar who have been taught to educators. The difference in character there is on the learners is a natural thing and of course need to be considered in learning. Teaching materials and methods used in learning should be developed in accordance with the character of the learners. With the analysis of the characteristics, researchers aim to adjust the content of teaching materials gamification-based problem solving in accordance with the characteristics of the learners.

2. Analysis of the competency that is addressed to the learners. Analysis of the competency that is addressed to learners aims to determine the competence of learners so that researchers can find out what is needed by the learners in the development of teaching materials in the form of teaching materials gamification-based problem solving.
3. The analysis of the material in accordance with the demands of competence. Teaching materials is one component of the learning system plays an important role in helping learners reach the standard competence and basic competence then we recommend a teaching material prepared in accordance with the methods of learning, the subject material, sub-sub part of the subject matter, the child sub-part, and other.

After the stage of Analysis, the next step is design planning the development of the media. Here is the design of the development of teaching materials gamification as a medium of learning mathematics developed:

1. Make the cover attractive by using Photoshop CS3
2. Make the concept of material flat up in Microsoft Word 2010 and in accordance with the core competence and basic competence in the syllabus
3. Create a sample question based on problem solving with gamification
4. Create games in teaching materials
5. Make instructions for use of teaching materials and game rules.

Then the next stage is development (development). As for some of the things done in the development stage is as follows:

1. Validation Of The Teaching Materials Gamification
 Research and development modules have been designed, further validated the initial stage by the validator are given to 3 validator matter experts, 3 validator media experts and 3 validator linguists. As for the validation results matter experts, media experts, and language experts as follows:

1.1. Validation Of The Matter Experts

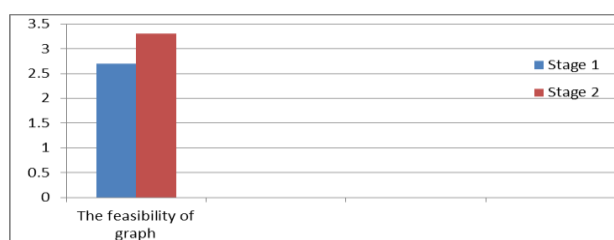
The results of the assessment validation matter experts stage 1 and stage 2 increased in the validation matter experts phase 3. As for the value for the aspect of the quality of the content in stage 1 earned an average score of 2.2 with the criteria of "Less worthy" and at stage 2 the average score of the quality of the content of 3.1 with the criteria of "Quite decent", then on the stage 3 obtained an average score of 3.8 with the criteria of "Very decent". Aspects of the feasibility of the presentation on the stage 1 earned an average score of 2.1 with the criteria of "Less Worthy" and on stage 2 aspects of the feasibility presentation the average score of 3.2 with the criteria of "Decent", then aspects of the feasibility of the presentation on the stage 3 obtained an average score of 3.7 with a

criteria of "Very Decent" While the results of the validation matter experts on aspects of the assessment of problem solving in stage 1 earned an average score of 2 with criteria "Less Worthy", in stage 2 the average language score of 3.1 with the criteria of "Decent", and the stage 3 obtained an average value of 3.7 with the criteria of "Very Decent". Can be seen in figure 2.

1.2. Validation Of Media Experts

The results of the assessment validation media experts consisting of 1 aspect, namely the aspect of feasibility kegrafikan in stage 1 has increased on the validation of media experts stage 2. As for the value for the aspect of feasibility kegrafikan in stage 1 earned an average score of 2.7 with the criteria of "Decent" and on the phase 2 average score the feasibility of kegrafikan of 3.3 with the criteria of "Very Decent". Can be seen in figure 3.

Figure 3. Graph of Average Comparison of Results of Media Expert Validation



Based on Figure 3, it can be seen from the graph of the results of the comparison validation between the validation of stage 1 and stage 2 that there is a fairly high change from the average value in the aspect of feasibility of graphics.

1.3. Validation of Linguists

Language expert validation aims to test language in problem solving based gamification teaching materials. The results of the linguistic validation assessment consisting of 1 aspect, namely the feasibility aspect of graffiti in stage 1 has increased in the validation of stage 2 media experts. The value for the feasibility aspects of graphics in stage 1 obtained an average score of 3.1 with the criteria "Worthy" and in stage 2 the average score for graphic feasibility is 3.4 with the criteria "Very Worthy". Can be seen in Figure 4.

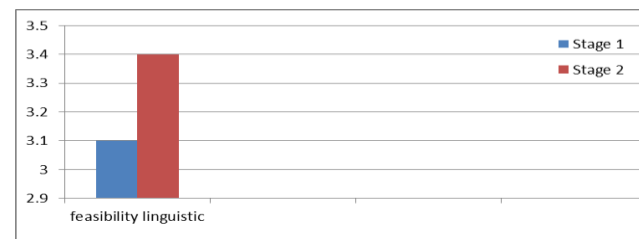
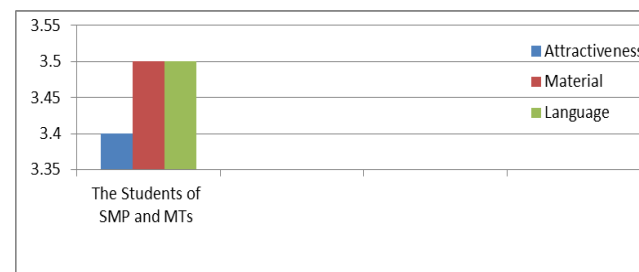


Figure 4. The chart is a Comparison of the Average Results of the Validation of Language Experts.

Based on figure 4, seen from the chart the results of the validation expert language the comparison between the validation stage 1 and stage 2 changes are quite drastic from the average value on the feasibility aspects of the language. The next stage is the stage of the implementation is done once the product is validated according to the advice and input, as well as otherwise very decent by the third expert then the next product in the form of teaching materials gamification-based problem solving tested with 2 stages namely stage 1 test small groups and phase 2 trials of large groups is as follows:

1. Trial Small Group

The test was conducted with 20 learners who learn mathematics in class VII. Tests conducted to determine students' response to the attractiveness of the teaching materials gamification-based problem solving that has been developed. The recapitulation of questionnaire pilot small groups can be seen in figure 5 following:

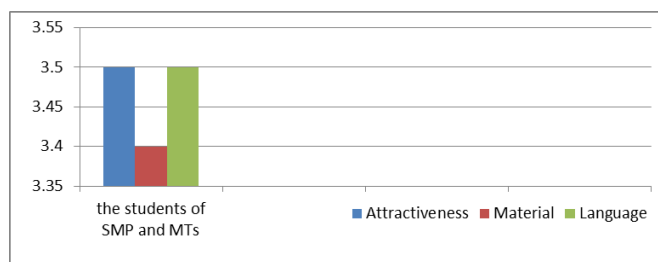


Figure 5. The chart is the Average Result of Trials Small Group

Based on the results of a trial of a small group in figure 5, it can be seen that in the aspect of the attractiveness of obtaining an average value of 3.5 with the criteria of "very interesting". Aspects of the material to obtain an average value of 3.4 with the criteria of "very interesting" and the language to obtain the average value of 3.5 with keiteria "very interesting".

2. Trials Of Large Group

After a trial small group is done, then tested again with the test large group that aims to determine the attractiveness of the product. Respondents on trial this large group of 60 students of MTs and SMP how to give a questionnaire to find out students' response to teaching materials. Results response the questionnaire of the learners in the test phase of large groups.

Based on the results of a trial of a large group in figure 6, it can be seen that in the aspect of the attractiveness of obtaining an average value of 3.4 with the criteria of "very interesting". Aspects of the material to obtain an average value of 3.5 with the criteria of "very interesting" and the language to obtain the average value of 3.5 with keiteria "very interesting".

The conclusion that can be taken researchers of the second stage of the trial products are teaching materials gamification app developed by researchers have criteria very attractive to be used as learning resources in the learning process.

The final stage, namely the stage of Evaluation or evaluation stage is the last stage of the method of ADDIE. The evaluation was done by the researcher after the design of the product validated by experts consisting of materials experts, media experts and linguists. Then the researchers conducted the test phase of products, namely in the form of a trial of a small group conducted by 20 students in MTs N and SMP. While the test group was done by 60 students in MTs N and SMP.

Based on the results of repair of the product according to the advice and criticism of some of the validator then the product tested, the test results of the product which has been repaired based on the research that has been done, the researchers obtained responses from teachers and learners which states that the product is good and very interesting, it can be concluded that the teaching materials gamification-based problem solving has been developed.

4. CONCLUSION

Based on the discussion and results of the development in the process of being developed in the research and development (Research and Development) with the method of the ADDIE stages, namely, Analysis (Analysis), Design (Planning), Development (Development), Implementation (Implementation), Evaluation (Evaluation). Then the conclusion can be drawn from the research and development is classified as follows:

1. The development of teaching materials gamification-based problem solving on the material of the flat up has been validated by experts of material to obtain an average value of 3.7 with the criteria of "very decent". Then the results of the validation by media experts included in the criteria of "very decent" with the acquisition of the average value of 3.3, and the results vadisi linguists to obtain an average value of 3.4 with the criteria of "very decent". So it can be seen from the results of the validation by some experts to teaching materials gamification-based problem solving be used as a medium of learning mathematics on the material in terms of four.
2. The response of students to the attractiveness of the teaching materials gamification-based problem solving on the material in terms of four that tested on a small group in MTs N and SMP to obtain an average value of 3.4 is included in the criteria of "very interesting". While at this stage of the trial a large group of committed against students in MTs N and SMP obtained an average value of 3.5 with criteria "very interesting."

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