

## DEVELOPMENT OF DIGITAL COMIC THROUGH PROJECT-BASED LEARNING TO IMPROVE MATH CREATIVE THINKING ABILITY

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### ABSTRACT

This development research aims to determine the improvement of creative thinking skills of grade XI students of SMPN 3 Bireuen on the material of building curved side spaces with the help of digital comic media. The research method uses R &D and the Addie model which consists of steps of analysis, design, development, implementation and evaluation. Testing was carried out on 35 students by providing a System Usability Scale (SUS) questionnaire containing 10 questions. The test results showed that the usability score reached 95%, while the validity of the content had a value of 94.3% and the validity of the application was 90%. In addition, the post-test results are known to be effective in increasing students' mathematical thinking skills with an N-gain value of 0.73 in the high category. Therefore, it can be concluded that the application of the project based learning model assisted by digital comic media to improve students' mathematical creative thinking skills in grade XI SMPN 3 Bireuen. Athis application is generally declared valid and can be used as a learning medium for building curved side space material in class XI SMPN 3 Bireuen.

**KEYWORDS:** Project Based Learning, Digital Comic, Creative Thinking Ability.

### 1. INTRODUCTION

The use of media is very beneficial for learning (Aulia & Ashhar, 2022). Kartika(2020). Learning media is a tool or means as an intermediary to deliver learning materials from teachers to students (Kartika & Yunandar). So that in the teaching and learning process, media is used with the aim of helping teachers make the student learning process more effective and fun so that it can improve students' creative thinking skills, Kartika (2020). One type of learning media available is digital comics. Febriyandani & Kowiyah (2021) stated that comics contain messages provided in the form of text and illustrations that are simple and easy to understand. Learning in mathematics learning. The teaching materials used are the only source used by students. Teachers tend to apply the lecture method when carrying out learning activities with students. This indicates that learning activities are still far from the concept of student-centered learning activities. In addition, the lack of examples is also one of the problems arising from the lack of students' creative thinking skills (fluency, flexibility, originality, and elaboration). Creative thinking is essential for success in learning. Students who think creatively will be able to enhance their positive attitude without knowing discouragement in

(Mageloi et al., 2020; Rahayu et al., 2019).

Therefore, it is necessary to conduct research using learning media that can make students active and enthusiastic in learning. The method that is considered suitable is the Project Based Learning model. In the *Project Based Learning* learning model, the teacher acts as a facilitator for students. The comic media developed is a digital comic that can be accessed via mobile phones or laptops, so students can learn anywhere and anytime.

## **2. LITERATURE REVIEW AND HYPOTHESIS**

Digital *technology*, in accordance with Rokhmani's opinion (2016) has advantages 1) Can help teachers in teaching and learning activities in the classroom; 2) describe an information in the form of subject matter that is difficult to explain verbally so that this media can be a solution to help students' difficulties by describing the material more tangibly; and 3) language that is easier for students to understand and in harmony with the character of students. The selection of *e-comic* learning media is certainly also in line with Fradani & Astuti's (2020) research if students in the class learn to use learning media in the form of digital comics. Furthermore, Gumilang & Indarini's (2019) research on comic media is declared effective in showing an increase in student learning outcomes according to the results of the *Paired Samples T- Test, pretest-posttest* shows if there is a significant difference in the pretest and *posttest* learning outcomes of students. The success of the comic media is able to provide an increase in problem-solving skills that are influenced by the learning material delivered. Based on several previous studies and expert opinions, researchers conducted a study with the aim of describing the feasibility of digital comic learning media, using the Project Based Learning learning model to improve the mathematical creative thinking skills of grade X students of SMP Negeri 3 Bireuen.

## **3. RESEARCH AND METHOD**

This research uses the RnD method with the ADDIE approach. ADDIE development model which includes the stages of Analysis, Design, Development, Implementation, and Evaluation (Rizki et al., 2021). This research was conducted at SMP Negeri 3 Bireuen, with the subject of the study being grade X.2 students with a total of 35 students. The instrument of this study applied 1) interview guidelines; 2) questionnaire sheets for the study and validation of three experts, namely material experts, media 3) pretest and posttest sheets. The data analysis techniques used are 1) expert review sheets using qualitative descriptive; 2) expert validation sheet with Likert Scale; and students were given a questionnaire measuring the effectiveness of

digital comic media using a *usability scale* (SUS) system containing 10 questions.3) measuring the level of students' creative thinking ability with learning outcomes tests (pretest and posttest) using the N-Gain test. The results of this calculation are then converted into criteria for increasing creative thinking ability based on the provisions, namely with a g value of > 0.7 with a high category, a value of 0.3 g 0.7 with a medium category, and a g value of < 0.3 with a low category.

#### 4. RESULT AND DISCUSSION

The initial feasibility test of the application was conducted by expert validators and showed a final grade percentage of 90.5% and was classified as "Very Good". The validation results can be seen in Table 2 and Table 3.

**Table 1.** Data analysis of codular application due diligence results by material expert validators

Assessment Aspect	Number of Indicators	Validation Value
Material Suitability	4	80
Media Illustration Suitability	5	90
Grammar	1	95
Media Benefits	2	92
Final grade percentage 94.3		

Table 1 shows that the level of media validity, especially in the suitability of the material and illustrations used in the developed media has shown good value. From the validation, digital comics were declared valid with a score of 94.3% which was included in the very valid category. (Sugiharni, 2018) states that scores above 80 for the value of the validity of the content of a media are classified into the very high category, so that the media can already be used for learning. Content validation is very important to do in learning media development research. Nazar (2020) . It is very important for media users to prevent misconceptions and ensure that the media is aligned with the material contained in it. The results of media expert validation also showed scores in the good category with a score of 83% as shown in Table 3.

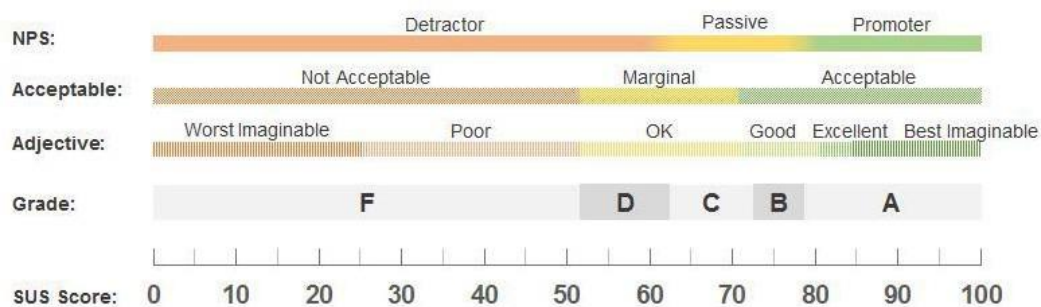
**Table 2.** Media expert validation results

Assessment Aspect	Number of Indicators	Validation Score (%)
Visual Display	6	87
Software Engineering	4	80
Grammar	1	82
Media Benefits	1	82
Final Grade Percentage		
		83

Table 2 displays the validation scores performed by media experts with a score of 90 and is included in the very good category. Expert validation is done once as there is no advice



Table 4 shows the average value of digital comic reusability obtained from 35 respondents of 82.07% with very good category (Sauro, 2018). An application or web page is categorized into several levels of *usability* based on the usability value measured using SUS, Values of 50 and below are considered as failed products, while a value of >80 is the best reusability, more complete criteria can be seen in Figure 2.



**Figure 1.** Interpretation of usability criteria (Sauro, 2018)

The use of SUS as an evaluation instrument for a system both based on *personal computer* (PC) and *mobile* is very widespread among *developers* because SUS provides more reliable results compared to other instruments. SUS instruments provide more accurate and quality test results.

## 5. CONCLUSION

The use of digital comics using the *Project Based Learning* learning model in the mathematics learning process can improve students' mathematical creative thinking skills, this can be seen from the statistical results that have been obtained. Teachers are advised to use varied learning media because it can help students speed up information and understand the material sothat learning objectives can be achieved.

## 6. ACKNOWLEDGEMENT

Thank you to the schools who became partners and gave permission to carry out research

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