

# Contextual-Based 3D Animation Video With Book Creator on Set Materials

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**Abstract.** The research on the development of contextual-based 3D animation videos with a book creator is motivated by the use of school facilities such as projectors and computer laboratories that have not been used optimally. This study aims to produce a product in the form of a contextual-based 3D animation video with a book creator on the subject matter of the set. This type of research is research and development (R&D) with a 4D approach model. As for the quality of the product in terms of the aspects of validity, practicality, and effectiveness. The results of the study show that contextually based 3D animation videos with book creators achieve the validity criteria as seen from the validation results of material experts with a percentage of 91% achieving very valid criteria. The results of the media expert validation with a percentage of 80% reached the valid criteria, and the results of the post-test item content validation with a percentage of 72% reached the valid criteria. The results of the teacher response questionnaire with a percentage of 91% achieved very practical criteria and student response results with a percentage of 94% achieved very practical criteria. The results of the student's answer scores showed that there were 22 students who fulfilled the KKM with a percentage of 90.9% and 2 students did not fulfill the KKM with a percentage of 9.1%. The overall score is 1343 with a percentage of 87% indicating that contextually based 3D animation videos with book creators are effective. Based on the results of contextual-based 3D animation video research with a book creator that was developed to be valid, practical, and effective for use in learning mathematics.

## INTRODUCTION

The development of technology and science is currently overgrowing [1]. As a result of technological and scientific developments, it has made enormous changes to the field of education. Therefore, education must develop innovations through technological and scientific developments.

The existence of learning media that is in line with technological advances can have a positive impact on education [2]. Based on the results of interviews conducted by researchers at JHS 2 Rumbia with Mr. Sambiya, a class VII mathematics teacher, they stated that the learning method used was still using the lecture method. Textbooks and worksheet guide the learning process and have not used learning media. The problems in learning mathematics are the need for more learning innovation, which makes students less interested in learning mathematics. In addition, there needs to be more optimizing the use of school facilities, such as projectors and computer laboratories. The math teacher also said that one of the mathematical materials that students considered difficult to understand was set material. Therefore, we need innovative learning media and learning processes in the hope that students are more interested and easily understood [3][4].

Learning media can be used as a learning resource to broaden students' insights into mathematics subjects, such as animated video media. According to [5] video media can help students be interested in learning, help students learn independently [6], overcome space and time, and can be played repeatedly anytime and anywhere.

Through learning media in animated videos, students can learn at school and wherever they are without having to bring textbooks. The form of animated videos can be divided into two, namely 2D animated videos and 3D animated videos. 2D animation videos look simpler than 3D animated videos. 2D animation videos only have two dimensions:

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length and width. Meanwhile, 3D animation videos feel more accurate because they have three dimensions: length, width, and height. So that students can see real action from the material they are learning in the 3D animated video.

Learning media in 3D animated videos will be seen as more interesting if the learning relates to everyday life or a contextual approach [7]. Learning with a contextual approach can make students better understand the material being studied in a flexible manner that can be applied from one problem to another [8]. In addition, the presentation of the material will be more complete if it is packaged into a digital book using a book creator [9].

Book Creator is an application or tool to create a digital or attractive book to insert pictures, sound, and video [10]. Unifying 3D animated video media with a book creator makes learning more exciting and fun. Book creators can make media more varied, including several components such as images, audio, animation, and video to increase the effectiveness of conveying information or messages.

Based on the explanation above, the authors researched and developed an exciting media entitled development of contextual-based 3D animation videos with book creators on sets.

## METHOD

This research is a Research and Development (R&D) study. This study aims to produce contextually based 3D animation videos with a book creator. This research is an early stage of R&D research because researchers only develop contextual-based 3D animation videos with book creators and conduct small group trials. The development procedure in this study uses the 4D development model, which consists of design, definition, development, and dissemination.

Define is the stage of making initial observations about the condition of the school. The defining stage includes an initial-end analysis, student analysis, concept analysis, task analysis, and specification of learning objectives. The second stage is the design (design). At this design stage, the researcher designed the initial product to be developed following the information obtained at the define stage. At this stage, it is a contextual-based 3D animation video design with a book creator. The next stage is development which is the stage for producing media in the form of contextually-based 3D animated videos with a book creator. At this stage, the researcher also tested the validity of the media, which was developed for three validators, namely material experts, media experts, and content experts, for the post-test questions. The dissemination stage is the implementation stage of research results and media developed on a broader scale.

Data analysis in this development research was used to determine the validity of the validator, the practicality of teacher and student responses, and the effectiveness of the post-test test questions on contextually-based 3D animation video media with book creators. Validation data analysis techniques by all validators are calculated using the formula:

$$V \text{ total} = \frac{\sum x_i}{\text{max score}} \times 100\%$$

If the validation results show an achievement level of  $> 60\%$ , contextually based 3D animation videos with the developed book creator can be declared valid [11]. The practicality data analysis obtained through the teacher and student response questionnaire uses the formula:

$$\text{Practicality} = \frac{\text{total score}}{\text{max score}} \times 100\%$$

If the results show an achievement level of  $> 60\%$ , contextually based 3D animation videos with the developed book creator can be declared practical. The analysis of media effectiveness data obtained through students' answers to the post-test questions uses the formula:

$$\text{Score} = \frac{\text{sum of scores of all student answers}}{\text{maximum score}} \times 100\%$$

If the results show an achievement level of  $> 75\%$ , contextually based 3D animation videos with the developed book creator can be declared effective.

## RESULT AND DISCUSSION

The result of this initial product development is a product in the form of a contextual-based animated video with a book creator on rigid material for class VII odd semester. This research is a type of Research and Development (R&D) using the 4D development model, which includes Define, Design, Development, and Disseminate. Furthermore, validation was carried out by three validators, namely material experts, media experts, and post-test

content experts, to see the level of validity of contextually based 3D animation videos with book creators. Based on validation data by material experts, a score of 91% was obtained, which was in the range of  $80\% < x \leq 100\%$  in the very valid category. In addition, during the validation of material experts, comments and suggestions were obtained to produce 3D animation videos with even better book creators. Table 1 shows data from the material expert validation results.

**TABLE 1.** Material Expert Validation Result

No	Aspect	Value
1	Aspect of Content	27
2	Accuracy of Material	50
	Total	77
	Percentage	92%
	Qualification	Very Valid

Then based on validation data by media experts, a score of 80% was obtained, which was in the range of  $60\% < x \leq 80\%$  in the valid category. In addition, during the validation of media experts, comments and suggestions were obtained to produce even better 3D animated videos with book creators. Table 2 shows result of media expert validation data.

**TABLE 2.** Media Expert Validation Result

No	Aspect	Value
1	Media Aspect	12
2	Accuracy of Visual Media	24
3	Aspect of Media Audio	12
4	Aspect of Language	8
5	Aspect of Program Effectiveness	12
	Total	68
	Percentage	80%
	Qualification	Valid

Then based on the validation data by the post-test content expert, a score of 72% was obtained, which was in the range of  $60\% < x \leq 80\%$  in the valid category. In addition, during the post-test item content expert validation, comments, and suggestions were obtained for producing even better post-test questions. Table 3 shows result of the expert validation of the contents of the post-test questions.

**TABLE 3.** Results of Post-Test Questions

No	Aspect	Value
1	Aspect of Content	15
2	Construction	14
3	Aspect of Language	7
	Total	36
	Percentage	72%
	Qualification	Valid

After the product was declared valid, the researcher conducted a product trial on the teacher and 22 class VII students of JHS 2 Rumbia to see the practicality of contextually-based 3D animated videos with book creators. Based on the study results, the assessment of contextual-based 3D animation videos with book creators from the teacher's response questionnaire was 91%, which was  $80\% < x \leq 100\%$  in the very practical category. Table 4 shows e data from the teacher's response questionnaire.

**TABLE 4.** Teacher Response Questionnaire

No	Aspect	Value
1	Aspect of Content	26
2	Aspect of Media Learning	33
	Total	59
	Percentage	91%
	Qualification	Very Practice

Furthermore, based on student response questionnaire data as many as 22 students of JHS 2 Rumbia obtained a score of 94% which is in the range of  $80\% < x \leq 100\%$  in the very practical category. Table 5 shows data from the student response questionnaire.

**TABLE 5.** Student Response Questionnaire

No	Aspect	Value
1	Aspect of Content	607
2	Aspect of Media Learning	736
	Total	1343
	Percentage	94%
	Qualification	Sangat Praktis

Furthermore, in addition to testing the product, the researcher also tested the post-test questions to see the level of effectiveness of contextually-based 3D animated videos with book creators. Based on data from the answers of 22 class VII students at JHS 2 Rumbia. Based on the data on the results of student answers from the post-test questions, 20 students achieved the Minimum Completeness Criteria (KKM), namely 70, with a percentage of 90.9%. Furthermore, two students still needed to reach the Minimum Completeness Criteria (KKM) with a percentage of 9.1%—based on the results of the overall student score obtained 87%, which is in the range of  $85% < x \leq 100%$  in the very effective category.

Based on the above results, this development research uses the 4D method to define, design, develop, and disseminate. The defining stage is carried out to define and define needs in the learning process. The following is an explanation of the defining stage, which includes initial-end analysis, student analysis, concept analysis, task analysis, and specification of learning objectives. In the initial analysis phase, the researcher conducted interviews and obtained information about the problems. The first problem is that in the learning process, the lecture method is always used. The teaching materials used in learning are worksheets and textbooks, so students get bored quickly. The lack of innovation in learning makes students less interested in learning mathematics. In addition, there are problems with optimizing the facilities provided by schools, such as projectors and computer labs.

Furthermore, student analysis revealed that students were not interested in learning mathematics because of a lack of innovation in the learning process. The researcher also gave preliminary research questions to determine students' abilities. Based on the results of the answers of 22 students, seven students, with a percentage of 32%, could answer the questions correctly, while with wrong answers, namely 15 students, with a percentage of 68%. Based on the student's answers, it can be concluded that many students solved the questions in their way. The original student entered the number in the question to get the answer.

Concept analysis aims to develop learning concepts that will later be used to achieve competence. Based on the K-13 curriculum, the books used are odd-semester JHS math books for class VII. Based on this, the set material is obtained with its subject matter, namely the concept of sets, set members, set presentation, Venn diagrams, empty sets, universal sets, subsets, power sets, set slices, combinations of sets of complements, set differences, and functional properties. Set. The task analysis stage of the researcher detailed the set material assignments in an outline of the Basic Competencies (KD) used in Rumbia 2 Middle School.

Furthermore, the specification of the learning objectives aims to combine the objectives of concept analysis and task analysis into a specific objective, namely developing a contextual-based 3D animation video with a book creator for seventh-grade junior high school students. The details of the learning objectives are (1) Students can state everyday problems in the form of sets and determine their members. (2) Students can determine universal, subsets, empty, and power sets and draw Venn diagrams. (3) Students can determine set operations such as intersection, union, complement, and difference of two sets. (4) Students can solve everyday problems related to set operations.

The design stage is carried out to design the product's concept so that a prototype is obtained according to the reference at the defined stage. The design stage includes preparing benchmark reference tests, media selection, format selection, and initial design.

Benchmark reference test in this development research, the researcher compiled preliminary research questions to determine the achievement of students' abilities in a rigid material. In addition to compiling preliminary research questions, the researcher also compiled post-test questions that would be given to students to find out the effectiveness of the media being developed. Furthermore, the selection of media in this development research was carried out by researchers, namely determining the suitable media for presenting material that was adjusted to task analysis, concept analysis, student characteristics, learning objectives, and facilities at JHS 2 Rumbia. Based on task analysis, concept analysis, student characteristics, learning objectives, and existing facilities, the selected media is a contextual-based 3D animated video with a book creator. Then the selection of formats in this development research was carried out by researchers, namely designing learning content adapted to the Revised K-13 curriculum and Basic competencies. Researchers also design video content by designing images to create 3D animations, designing images for book creators, and formatting and writing settings in the developed media.

Furthermore, the initial design in this development research carried out by the author is to make a design that will be presented in a contextually-based 3D animation video and in the book creator. The content of the 3D animation video begins with an introduction and a simple explanation of the material to be studied. Explanation of the material listed in the Basic Competencies and learning indicators in the book creator. The presentation of the contents of the material in the book creator begins with a word of invitation to attract students' attention, followed by a description of an everyday problem as well as its solution.

The development stage in this development research was carried out by researchers, namely making products that had previously been designed and then developed. The material used is the material set for class VII odd semester. The product being developed is a contextual-based 3D animation video with a book creator on the subject of the set. 3D animation videos are designed using the Plotagon application.

Contextual-based 3D animation video media with book creators were then validated by two validators, material experts and media experts, to determine the product's validity. In addition, there is also a content validator for post-test questions. Validity assessment was carried out by filling out a validation sheet containing five scales, comments, and suggestions for improvement.

Contextual-based 3D animation video with a book creator on rigid material meets the validity criteria based on the validation results of material experts, media experts, and post-test content experts. Based on the validation of material experts, a score of 77 is obtained with a percentage of 91% which is in the range of  $80\% < x \leq 100\%$  with very valid criteria. Furthermore, for media expert validation, a score of 68 is obtained with a percentage of 80% which is in the range of  $60\% < x \leq 80\%$  with valid criteria. At the same time, the validation of the contents of the post-test questions got a score of 36 with a percentage of 72% which is in the range of  $60\% < x \leq 80\%$  with valid criteria. Based on the results of the teacher and student response questionnaire, the contextually-based 3D animation video with the book creator that was developed met the practical criteria. Based on the data from the teacher's response questionnaire, a percentage of 91% was included in the "efficient" criteria.

Meanwhile, based on the results of the questionnaire response data, 22 students got a percentage of 94% included in the "convenient" criteria. These results are relevant to research [12], stating that contextual-based mathematics learning videos for junior high school students get convenient criteria. It is also relevant to research [13], stating that digital teaching materials using book creators get convenient criteria.

Based on the results of the study, namely the assessment of the response questionnaire of the mathematics teacher and students, totaling 22 class VII students of JHS 2 Rumbia, to contextual-based 3D animation videos with book creators on set material that met the applicable criteria. The assessment results of the teacher's response questionnaire obtained a score of 59 with a percentage of 91% which was in the range of  $80\% < x \leq 100\%$  with convenient criteria. At the same time, the results of the student response questionnaire obtained a score of 1343 with a percentage of 94% which was in the range of  $80\% < x \leq 100\%$  with convenient criteria. This is relevant to previous research by [12], stating that contextual-based mathematics learning videos for junior high school students get convenient criteria. It is also relevant to [13], research explaining that digital teaching materials using book creators get convenient criteria.

Based on the study results, namely the 22 students' answer scores from the post-test questions on the set material, 20 students achieved the Minimum Completeness Criteria (KKM), namely 70, with a percentage of 90.9%. Furthermore, two students did not reach the minimum completeness criteria (KKM) with a percentage of 9.1%. The overall result of the student score was 87%, which was  $85\% < x \leq 100\%$  in the very effective category. Based on this, it can be concluded that contextually based 3D animation videos with book creators on rigid material meet the criteria of being effectively used in the learning process. Based on the results of this study it is relevant to previous research by [14], stating that mathematics learning assisted by the Plotagon animation video on social arithmetic material is relatively effective. Figure 1 shows a contextual-based 3D animation video with a book creator.



3D animation video



3D animation video



FIGURE 1. Product Results Developed

## CONCLUSION

Based on the development research conducted by the researcher, it can be concluded that the development of a contextual-based 3D animation video with a book creator was developed using the steps of a 4D development model consisting of definition, design, development, and dissemination. The products' results are seen from the aspects of validity, practicality, and effectiveness.

The contextually-based 3D animation video with the book creator that was developed met the validity criteria based on validation data from material experts, media experts, and post-test content experts. Material expert validation gets 91% with a very valid category. Media expert validation gets 80% with a valid category. Meanwhile, validating the post-test question content experts got 72% in the valid category.

Contextual-based 3D animation videos with a book creator were developed to meet the practical criteria based on the results of the teacher's and 22 student response questionnaires. The teacher's response questionnaire got 91% in the very practical category, while the 22 students' response questionnaire got 94% in the very practical category.

Contextual-based 3D animation video with a book creator that was developed meets the criteria for effectiveness based on data from the answers of 22 students. Twenty students met the minimum completeness criteria of 70, with a percentage of 90.9%, and two did not meet the KKM, with a percentage of 9.1%. So the final score is 87% with a very effective category.

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