

DEVELOPMENT OF RME BASED MATHEMATICS LEARNING MEDIA TO IMPROVE CONCEPT UNDERSTANDING ABILITY OF ELEMENTARY SCHOOL STUDENTS IN GRADE IV SDN 165728 TEBINGTINGGI

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Abstract

This study aims to develop learning media software to determine the feasibility and effectiveness of learning media in improving student learning outcomes on KPK and FPB materials. Researchers use the media, namely Video Learning, to design and develop learning media. This type of research is ADDIE development research. The effectiveness of the learning video based on the learning outcomes test, namely on the completeness of the individual learning outcomes data in the class using the learning video, it is stated that all students are complete. Based on the validator's assessment results of the material experts, the feasibility reached 4.45 with a very decent category. The media expert obtained feasibility of 4.35 with a very feasible category, and the design expert obtained feasibility of 4.14 with a decent category. From the validation results, the feasibility of the KPK and FPB learning videos is feasible to use. This proves that learning videos are more effectively used and proven to improve student learning outcomes on KPK and FPB materials in Class IV SDN 165728 Tebingtinggi.

Keywords: *Realistic Mathematical Education, Concept Understanding Ability, KPK, and FPB Materials*

A. Introduction

In general, education in Indonesia plays a significant role in ensuring the survival of the state and nation. Education is an essential means to improve human resources (HR) in ensuring the progress of a nation and state. Triwiyatno (2014: 23) argues that education is an effort to attract something in humans as an effort to provide programmed learning experiences in the form of formal, non-formal, and informal education at school and outside school that lasts a lifetime aimed at optimizing individual abilities so that in the coming day can play the role of life appropriately. This is the role of the teacher significant to realize the nation's golden generation through the provision of learning systems and curriculum improvements.

It is necessary to understand the concept to understand the mathematics material being taught in learning mathematics. This is in line with Novitasari's opinion (2016: 8) that learning mathematics is learning related to many concepts. Concepts in mathematics have a relationship with one another. Understanding mathematical concepts are included in the objectives of learning mathematics at school

The learning process at the elementary school level, especially in learning mathematics, needs a mature and correct understanding of the concept. This mature understanding of the concept is necessary for elementary school students to always remember in the future or when taking secondary and even college education. Hendriana, Rohaeti, and Sumarno (2017:6) state that mathematical understanding is an essential competency in learning mathematics which includes: the ability to absorb the material remember formulas and mathematical concepts, and apply them in simple cases or, in similar cases, estimate the truth of a statement. And apply formulas and theorems in solving problems.

Thus, it can be understood that understanding mathematics is elementary in learning mathematics (Susanto, 2016:208). It can be seen in real life that there are still many students who still have low learning abilities, especially in the field of mathematics studies, especially during the covid-19 pandemic, which we often see today that many teachers use less than optimal learning media in developing teaching materials that will be taught. Explained and understood by students, so many students still cannot understand the explanations explained by the teacher because the learning media used by teachers are not optimal and have not been able to make students able to stimulate and capture explanations.

According to (Kustandi 2016:6), the development of learning media demands that teachers/teachers can use the tools provided by the school, and these tools may be following the developments and demands of the times. A teacher must be able to awaken students' ways of learning through learning media that develops and makes students more interested in repeating past lessons, through learning media that are used and owned by every teacher, every design that the teacher will carry out to students must go through designs and arrangements and tricks that do not make students These students become lazy to express opinions in the teaching and learning process. The media does not make students feel awkward and silent.

The results of the fact that low math scores in SD Negeri 165728 Kota Tebing Tinggi are obtained as follows:

Table 1. Odd Semester Final Exam 2019/2020 Grade IV Mathematics Subjects at State Elementary School 165728

KKM	SCORE	STUDENT	PRESENTATION
	< 70	15	71.4 %
70	> 70	6	33.3%

Amount	21	100%
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Based on table 1.1 above, the results of the odd semester exams for SD Negeri 165728 Tebing Tinggi students who have the Minimum Completeness Criteria for mathematics subjects are 70, students who meet the Minimum Completeness Criteria for mathematics subjects Completeness Criteria are 33.3%, namely 7 students. In contrast, 71, 4%, namely as many as 15 Orang students, have not met the criteria for Minimum Completeness.

Related to this, there are still many problems that must be solved to realize the quality of mathematics learning so that it runs even better. We can see that the advancement of technology developing today is very fast and rapid in real life, which cannot be avoided. We can feel these technological advances in various fields, one of which is in education, which has undergone enormous changes.

Learning mathematics with the RME approach is a learning process following the characteristics and principles of practical learning. So the steps that must be taken in learning activities proposed by Holisin (2007) are 1) Understanding contextual problems; 2) Describe contextual issues; 3) Solve contextual problems; 4) Compare and discussing answers; 5) The teacher provides time and opportunity for students. 6) Concluding. The Realistic Approach, better known as RME, was first introduced in the Netherlands in 1970 by the Freudenthal Institute. RME uses reality and the environment that students understand to facilitate the mathematics learning process to achieve the goals of mathematics education better than in the past (Soedjadi, 2008). 2011:2). In other words, learning mathematics with RME requires students to actively build their knowledge by using the real world to develop mathematical ideas and

concepts.

RME is an approach to mathematics education developed in the Netherlands (Netherlands) by Hans Freudenthal. RME is used as a starting point for developing mathematical ideas and concepts (Hadi, 2005:19).

B. Method

This research is planned to be conducted at SDN 165728 Tebingtinggi, Rambutan District, Tanjung Marulak Village. This development research (Developmental research) is carried out from March to April of the 2020/2021 academic year in the even semester. The subjects of this study were students of class at SDN 165728 Tebingtinggi, Rambutan District, Tanjung Marulak Village. This class consists of 21 students consisting of 12 female students and 9 male students.

RME is an approach that directs students to learn that applies it in everyday life. In using this strategy, the learning process must allow students to feel the meaning and usefulness of mathematics which allows them to reconstruct mathematical ideas and concepts based on their experience of interaction with the environment.

Research Methods and Design

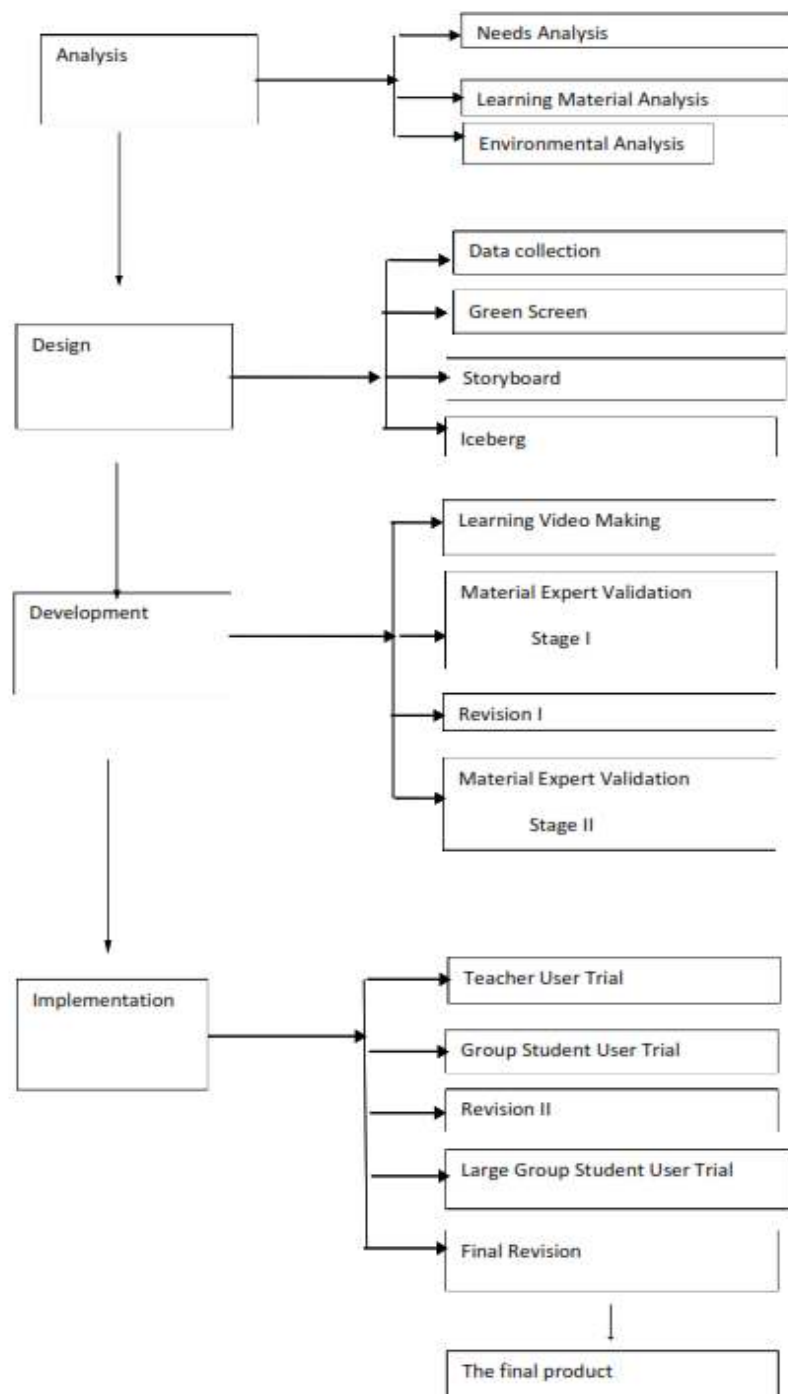
This study uses research and development methods (Research and Development), a method used to produce specific products and test their effectiveness.

"The results of development research are not only the development of an existing product but also to find knowledge or answers to practical problems. Research and development methods are also defined as a research method used to produce specific products and test the effectiveness of these products (Sugiyono, 2011:297).

In this study, the researchers produced a product in the form of a learning video intended for fourth-grade students of SD/MI on KPK and FPB material. This is done to assist teachers in delivering subject matter to students, and researchers hope that students can more easily understand certain materials data collection techniques using interviews, tests and documentation. Data were analyzed using product validity level analysis and trial data analysis using data collection techniques.

Research and development procedures

Researchers must make a research design and development model in carrying out research. According to Suharsimi Arikunto, this is the method used by researchers in collecting research data. This researcher refers to the model developed by Dick and Carrey; namely, the ADDIE model includes. 1) Analysis, 2) Design, 3) Development, 4) Implementation and 5) Evaluation.

**Figure 1** Product Development

C. Finding and Discussion

1. Result

Development implementation process The RME-Based Learning Video is carried out in stages as follows:

The first step

The questionnaire contains a reference to the definition of RME-based learning video media on the theme of the beauty of togetherness which aims to give respondents an idea of the statements in the questionnaire submitted. The results of the distributed questionnaire stated that teachers and students need learning media so that the learning process is more active and influential. The following data needs analysis of learning videos are shown in the following table:

No	Information Type	Answer	Teacher	Student	Total	Percentage
1.	Do you know or do not know the KPK and FPB learning videos?	Yes	2	4	11	22.22%
		No		21	21	77.78%
2.	Using or not using KPK and FPB learning videos	Yes	0	0		0%
		No	2	25	27	100%
3.	Requires or does not require KPK and FPB learning videos	Yes	2	25	27	100%
		No	0	0	0	0%

Based on the results of the questionnaire analysis of the Learning video needs that

Based on the results of the needs analysis learning video which can be concluded that the development of learning videos is needed by teachers and students in the learning process.

Second Step

Media planning and design in learning videos using the Kine master application. The topics presented are learning support materials containing learning activities with KPK and FPB materials with sub-chapters on teaching materials, consisting of video, sound, text, animation, material explanation, and picture. Each material is presented coherently with visualization applications, accompanied by musical instruments and questions to deepen the material that has been presented.

Third Step

The product development stage begins with the collection of materials (filming), material management (editing), and the last is production video learning based on the RME approach. The materials collected are learning activities as the main dish and other materials to complete the planned rubric. After the materials are collected, the editor manages the materials by selecting the materials collected and carrying out the editing process. The KPK and FPB videos were produced as many as 1 video file in which they contained Core Competencies, Basic Competencies, Learning Objectives Indicators, and explanatory matrices, how to calculate KPK and FPB, and an explanation of how to solve them.

Fourth Step

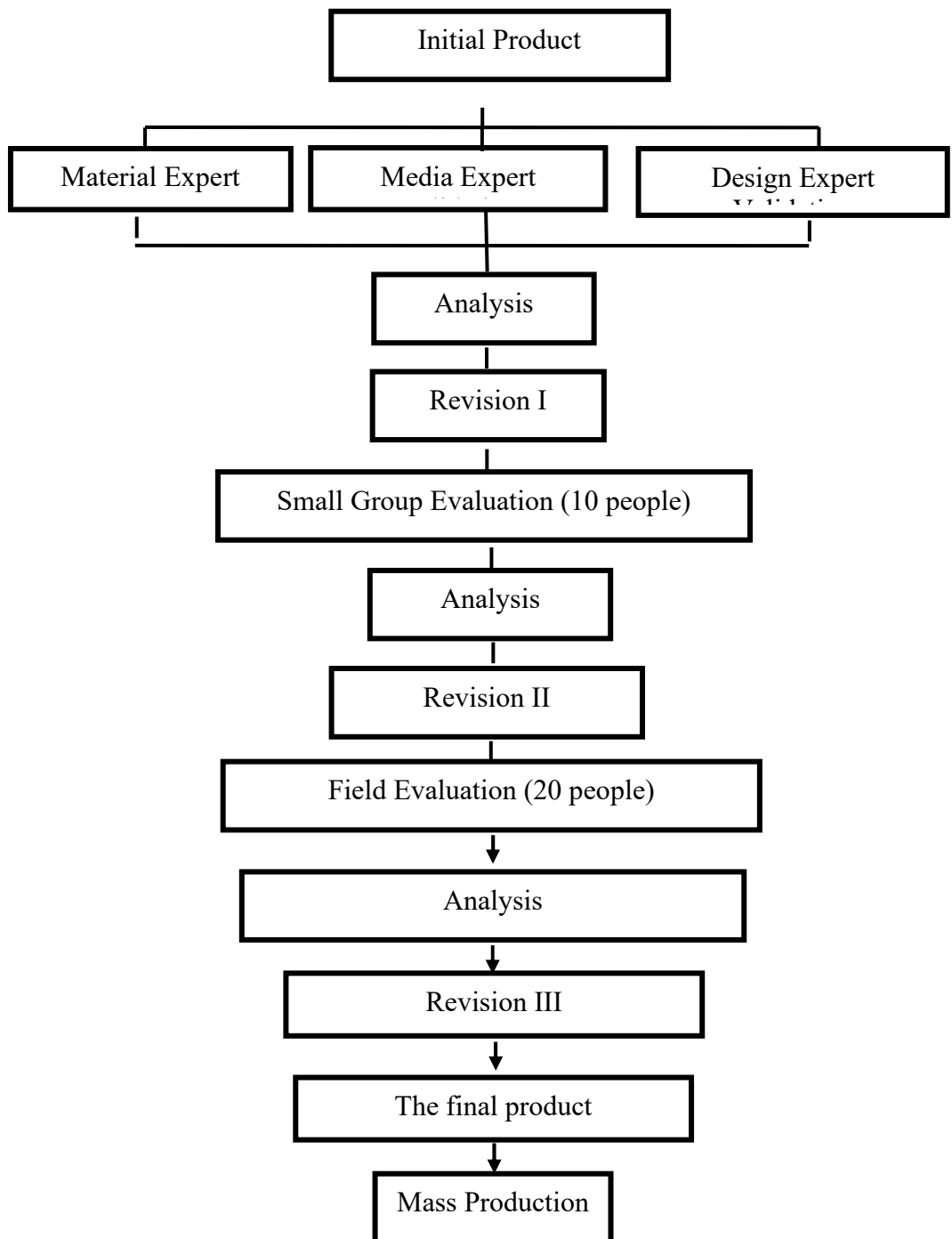


Figure 2. Stages of Product Trial of KPK and FPB Learning Video Development

Field Trial Results Data

Student response questionnaires were given to students to find out students' opinions about the level of practicality of KPK and FPB learning videos, and 22 students filled out student response questionnaires at the end of the trial. In summary, the results of the practicality sheet on student response questionnaires after using learning videos can be seen in the following table:

Table 2. Results of Field Test Student Response Questionnaire Analysis

No	Rated aspect	Practicality (%)
1.	Learning media has an attractive appearance	84%
2.	Language in learning media is easy to understand	88%
3.	The use of writing, colors, and images in learning media makes it easier for me to understand the lesson	84%
4.	The media has clear instructions for the use	84%
5.	I am interested in learning to use media	92%
6.	Learning Media helps me in understanding the material on the theme of the beauty of togetherness	88%
7.	Learning media makes me active during the learning process	92%
8.	Worksheets on learning media make it easier for me to discuss with friends	84%
9.	The pictures in the learning media increase my curiosity, so I am interested in learning	92%
10.	The worksheets in the learning media make me excited to work on them	88%
11.	By using this learning media, learning is not boring	84%
12.	I am so happy to learn after using learning media	92%
Average Percentage of Overall Practicality		96.76%
		(Very Practical)

Based on table 4.10, it can be seen that every aspect of the statement that describes practicality shows a practicality value that is in the range of 85.14% - 97.30%, which is included in the efficient category. Thus the average percentage of practicality from the results of student [902]

response questionnaires is 96.76%. It can be concluded that learning videos are categorized as very good.

Product Effectiveness Trial Results

Control Class Test Results

Table 3. Student Learning Outcomes in the Control Class

Value (x)	Pretest			Value (x)	Posttest		
	Freque ncy (f)	(xf)	Percent age		Freque ncy (f)	(xf)	Percent tage
30	2	60	9.10	65	4	260	18.18
35	1	35	4.54	70	4	280	18.18
40	3	120	13.63	75	5	375	22.72
45	4	180	18.18	80	5	400	22.72
50	4	200	18.18	85	2	170	9.10
55	2	110	9.10	90	2	190	9.10
60	3	180	13.63	-	-	-	-
65	2	130	9.10	-	-	-	-
70	1	70	4.54	-	-	-	-
Jlh	22	1085	100	Jlh	22	1675	100
Average		49.32		Average		75.68	

Based on the table above, as in the experimental class, a pretest was also carried out on the control class before learning began. From the study results, it was obtained that the control class value data at the time of doing the pretest obtained an average value of 49.32 with the "Less" category, meaning that the score achieved by students needed to be increased again. After all the learning process is complete, a post-test is carried out. The study results showed that the average student learning outcomes when doing the post-test in the control class obtained an average value of 75.68 with the "Good" category, meaning that the student's score was better than before.

Based on the test results, it can be concluded that the increase in

student learning test results KPK and FPB learning videos from the control class trial increased by 0.60 in the range of $0.3 \leq g < 0.7$ which can be classified in the "Medium" category.

To see an increase in student learning test results in the KPK and FPB learning videos in the control class, they are as follows:

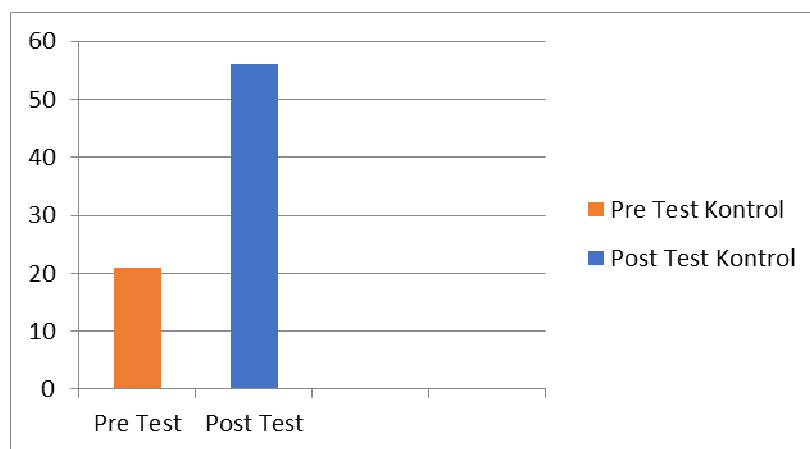


Figure 3. Diagram of the Improvement of Control Class Learning Outcomes

Experiment Class Test Results

Table 4. Student Learning Outcomes in Experiment Class

Value (x)	Pretest			Value (x)	Posttest		
	Frequency (f)	(xf)	Percentage		Frequency (f)	(xf)	Percentage
30	2	60	8.7	75	1	75	4.34
35	1	35	4.34	80	4	320	17.40
40	2	80	8.7	85	4	340	17.40
45	3	135	13.04	90	6	540	26.08
50	2	100	8.67	95	5	475	21.73
55	1	55	4.34	100	2	300	13.05
60	3	180	13.04	-	-	-	-
65	3	195	13.04	-	-	-	-
70	2	140	8.67	-	-	-	-
75	3	300	17.40	-	-	-	-

Jlh	22	1205	100	Jlh	22	1950	100
Average		54.77		Average		88.64	

Before teaching and learning activities, the experimental class carried out a *pretest*. Pretest was conducted to determine the extent of student mastery of the material to be taught and as initial sample data. From the study results, it was obtained that the average learning outcomes of the experimental class were 54.77 with the "Enough" category, meaning that the scores achieved by students needed to be increased again. After all the learning process is complete, a post-test is carried out. A post-test was conducted to determine the final condition after treatment. The study results obtained that the average learning outcome was 88.64 with the "Good" category, meaning that the student's score was much better than before. This shows that the average value of student learning outcomes increased after implementing the KPK and FPB learning videos.

Based on the test results, it can be concluded that the increase in student learning test results KPK and FPB learning videos from the experimental class trial's increase of 0.77 is in the g. range ≥ 0.7 , which can be classified in the "High" category.

To see an increase in student learning test results in the KPK and FPB learning videos in the experimental class, they are as follows:

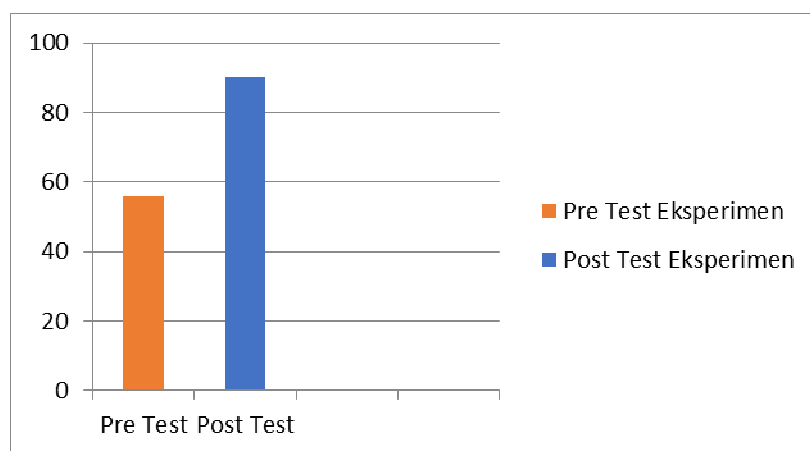


Figure 4. Experimental Class Learning Outcome Test Improvement Diagram

2. Discussion

Media learning, especially to attract students' interest in learning, eliminates student boredom in participating in-class lessons on KPK and FPB material. Video learning was chosen as an alternative method in developing learning videos so that with the media, student learning outcomes will be higher than student learning outcomes taught in conventional ways. This learning video allows students to learn in class because it is equipped with colors, music, videos, and animations and easily contains competency standards, basic competencies, and indicators.

Students can interact directly with learning media, and students can also repeat material that they have not understood. The product can be used flexibly according to students' wishes and is equipped with learning exercises/evaluations. This learning video is efficient because it can be brought by students and can be studied at home because this learning video can be used on the parents' cellphones. This learning video is also accompanied by exercises in the form of multiple-choice tests that [906]

have the correct answer key so that students can find out the mistakes that have been made in working on the practice questions. The learning process tends to be boring without these videos because learning becomes one-way; active teachers and passive students accept and follow what the teacher says.

This learning video uses text, images, animations, color combinations as needed to facilitate understanding, attract attention, and are fun. This learning video can be used for individuals independently or classically according to the availability of the number of computers. Alternatively, it can also be used with the help of a liquid crystal display (LCD) projector. This learning media is very effectively used to improve student learning outcomes. In the process of developing this interactive PowerPoint learning media, the researcher refers to the opinion expressed by Nieveen in his journal entitled "An Introduction to Educational Design Research," which reveals that to create an appropriate media, it must meet the following criteria:

Valid

The material expert stated that the media was valid but had notes that needed to be corrected; it needs to be clarified by adding examples, adding conclusions, and drawings must be interesting using a chart/scheme to explain something. Whereas media experts stated that the media was valid but had notes that needed to be corrected, such as in this learning video, there is no music. It should have accompaniment music, which is better if there is not only one music, each material must have a different sound background, clarify the narrator's voice, and replace interactive cartoons. In addition, in the evaluation section, media experts suggest an appreciation when students succeed in answering multiple-choice questions in the form of exciting pictures or illustrations

to feel more interested and challenged to solve the questions seriously.

The researcher took relevant pictures already available on several sites on the internet and then adjusted them by editing and taking only the relevant parts. The design expert stated that the media developed by the researcher was valid, and all the directions given had been wholly revised, such as the cover design and the size of the display. Screen, utilization of the blanks to be intriguing to look at, the writing style used to be exciting but not difficult to read, revision of color combinations on slides in video shows, revisions do not need to have much explanation.

Practical

Nieveen revealed in his journal (2013:26) that The intervention is realistically usable in the settings for which it has been designed and developed. It is said to be practical to use if the media is considered easy to operate both in terms of design and in the development process without any obstacles, both for teachers and from the results of teacher response questionnaires filled out by teachers and students, stated that the media was already in the practical category. However, if you look at the observations made by the researcher, it would be better if the media developed by the researcher was demonstrated and carried out by the teacher before the students operated the media independently. This the researcher did during the subsequent trial, for one2 Basic Competencies for one week there are 3 meetings, 2 meetings the teacher demonstrates the media in the classroom. In contrast, the last 1 meeting is used as independent learning in turns, and independent learning aims to repeat what has been learned previously and evaluate the learning that has been done. The researcher concludes from the phenomena above that this media is suitable for students to use as independent learning. This media is also suitable for demonstration by the teacher as a learning aid.

Effective

Media is effective if students understand the subject matter and student learning outcomes as expected. This can be seen from the increase in the average score obtained by 75.68% of students in the control class IV-B (without using the media) while the average value obtained is 88.64% in the experimental class IV-A (using the video learning material for KPK and FPB) This means that the use of this learning video can improve the overall learning outcomes of children.

D. Conclusion

Based on the formulation, objectives, research results, and research discussion Development The video learning of the KPK and FPB material previously stated can be concluded as follows:

1. The product in the form of a KPK and FPB learning video in class IV SD Negeri 165728 Tebing Tinggi City has the results that it is feasible to be a final product that can be disseminated and implemented to users. This is clarified by several stages, namely the validation of the learning aspect material expert getting a score of 4.45 including the "Very Eligible" category, while the evaluation aspect material expert was getting a score of 4.40 including the "Very Eligible" category. Media experts got a score of 4.50, including the "Very Eligible" category. While the design expert in the learning design aspect got a score of 4.00, including the "Eligible" category, in the information design aspect, he got a score of 4.00, including the "Fair" category in the percentage design aspect, he got a score of 4.83 including the "Very Eligible" category.
2. The learning videos for KPK and FPB materials are suitable for

increasing students' enthusiasm for learning. Products in learning videos have practical results into final products that can be disseminated and implemented to users. This is clarified by several stages, namely small group testing and field trials. This is evidenced by the small group trial getting a score of 82.30, including the "Very Practical" category, in the field group trial getting a score of 93.18, including the "convenient" category. Very Practical"

3. The research subjects were divided into two classes, one class being the experimental class and the other being the control class. The experimental class in this study is class IV-A, and the control class is class IV-B. The experimental class was given treatment, namely interactive PowerPoint media with the beauty of togetherness. Class IV-A students who received the experimental class got an average score of 88.64%, with the percentage gain score reaching 0.77 (High). While learning in the control class only takes place in one direction, where the teacher delivers the learning material in front of the class, the students listen to the material presented by the teacher. Furthermore, students work on the questions given by the teacher regarding the material that has been delivered.

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