

DESIGN OF MATHEMATICS LEARNING VIDEO FOR CLASS XI STUDENTS OF SMA SARASWATI I DENPASAR

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Abstract. In accordance with the assessment of KI-3 and KI-4 on mathematics subjects still have problems in understanding the concept of student learning so that it affects the learning outcomes. With these constraints, in this study researchers combined scientific approaches with learning videos. The design used in this study uses an experimental experimental design called True experimental design, namely the Posttest Only Control Design. The material given at the time of the research action includes the material Limit Functions, Derivatives, and Integral. Through the steps of the research that has been carried out, the final test results are obtained in the experimental class 45% of students belong to a category with very good concept comprehension ability, and 2.5% of students included in the concept comprehension ability category are still lacking in Limit Function material. Then in the material the percentage derivative in the very good category is 50% and the sufficient category is 5%. In Integral material, 50% of students are in the very good category and 50% are in the good category.

Keywords : Learning Video, Scientific Approach, Experiment Method, Limit Function, Derivative, Integral.

1. INTRODUCTION

In the 2013 curriculum, especially in KI-3 and KI-4 emphasized students' understanding of knowledge and skills. In accordance with the assessment of KI-3 and KI-4 in mathematics subjects still have constraints on understanding the concept of student learning so that it affects the learning outcomes.

Based on the 2013 Curriculum, KI-3 is a competency that is knowledgeable in that students understand knowledge (factual, conceptual, and procedural) in science, technology, art, culture, and humanities with insights on religion, nationality, state and civilization related to phenomena and events. the eyes look. Then KI-4 is a skill that is a skill that students try, process, and present various things in the concrete domain (using, parsing, assembling, modifying, and making) and abstract realms (writing, reading, counting, drawing, and composing) according with what is learned at school and from various other sources in the same perspective / theory [1].

The purpose of this study was to produce Mathematics teaching materials in video learning and to find out whether effective learning videos were used as learning media in the Mathematics learning process for students of class XI Science at SMA SARASWATI 1 DENPASAR. With this aim, whether or not the use of video learning on students is effective or not is measured by understanding mathematical concepts. Video is a message delivery medium including audio-visual or media-viewing media. Audio visual media can be divided into two types, first, equipped with sound and picture equipment functions in one unit, called pure audio-visual media. [2].

The making of this learning video was made for students of class XI Science in even semester by using Adobe Premiere in Compulsory Mathematics in even semester. Adobe Premiere Pro is a program created for video editing and part of the Adobe Creative Suite, graphic design series, video editing, and web application development created by Adobe Systems. Premiere Pro supports several types of video editing and plug-in cards for process acceleration, support for additional file formats, and video / audio effects that add to the completeness of Premier Pro [3].

2. METHODS

The type of research that will be used in this research is experimental research. The design used in this study uses an experimental experimental design called True experimental design, namely the Posttest Only Control Design. In this design there are two classes of samples to be distinguished, namely the experimental class and the control class. The experimental class was treated by learning by using a scientific approach to the ability of mathematical concepts and the use of learning videos, while the control class was not treated, meaning learning using the usual method of previous teaching or conventional learning approaches. The Posttest Only Control Design used is as follows [4]:

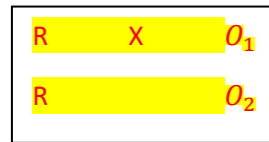


Figure 1. Post test-only Control Design

Information :

- X : treatment that is learning with using scientific and video approaches learning
- O₁ : post test in the experimental class with treatment
- O₂ : post test in the control class without treatment

RESEARCH POPULATION AND SAMPLE

Population is the whole individual who will be targeted in the form of research [5]. As for the population is all students of class XI IPA (LAB) SMA SARASWATI 1 DENPASAR in the academic year 2017/2018. The population can be seen in the following table.

Table 1. Research Population

No	Class	Gender		amount
		Man	Woman	
1	XI IPA 1	17	27	44
2	XI IPA 2	22	19	40
3	XI IPA 3	18	27	45
amount		57	73	129

Source: Administration of SMA SARASWATI 1 DENPASAR

The sampling technique in this study is cluster random sampling (area sampling) technique which is a random sampling technique in determining the experimental class and control class [6]. The classes that were sampled were class XI IPA 2 as an experimental class using a scientific approach and utilization of learning videos, and class XI IPA 3 as a control class in mathematics learning the subject of Limit Functions, Derivatives, and Integral.

PROCESS OF MAKING VIDEO LEARNING

Learning videos are systematically designed by referring to the applicable curriculum and in developing it applying the principles of learning so that the program allows students to make the learning material easier and more interesting. Physically learning videos are learning programs that are packaged in videotapes and presented using VTR or VCD player equipment and TV monitors [7].

The process of making mathematics learning videos in this study is using the Adobe Pemiere Pro cc software 2017. The following are the stages of making the learning video:

1. Prepare the video file that will be edited.
2. Open the Adobe Premiere Pro cc 2017 program, then the Welcome Screen will appear as shown below.

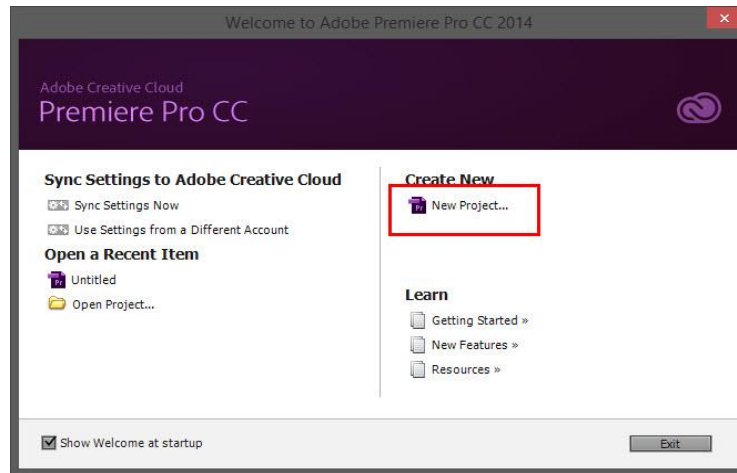


Figure 2. Step 2 video creation

3. Then specify the editing title and also the file storage location for editing to easily find when you want to continue the next video editing.

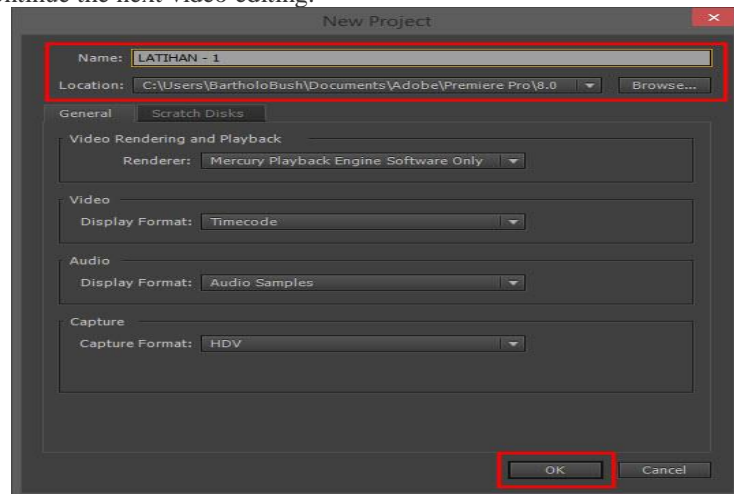


Figure 3. Step 3 video creation

4. Then the Adobe Premiere Pro display will appear as shown below.

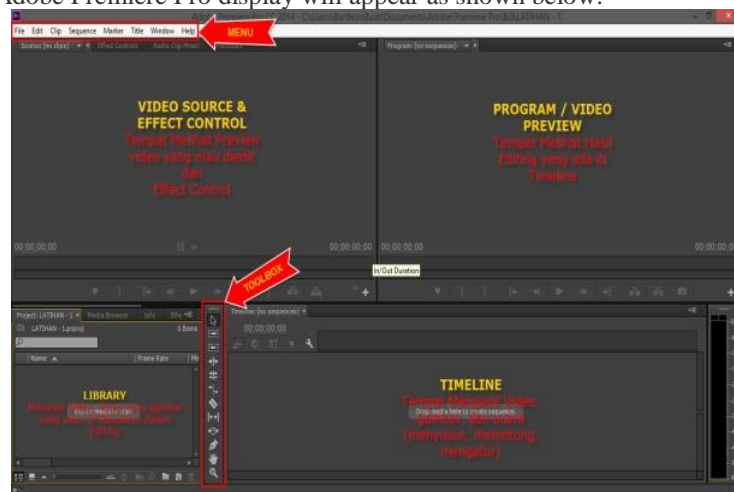


Figure 4. Step 4 video creation

5. Enter the Video File that will be edited by clicking the File> Import> search menu and selecting the File that was prepared earlier.

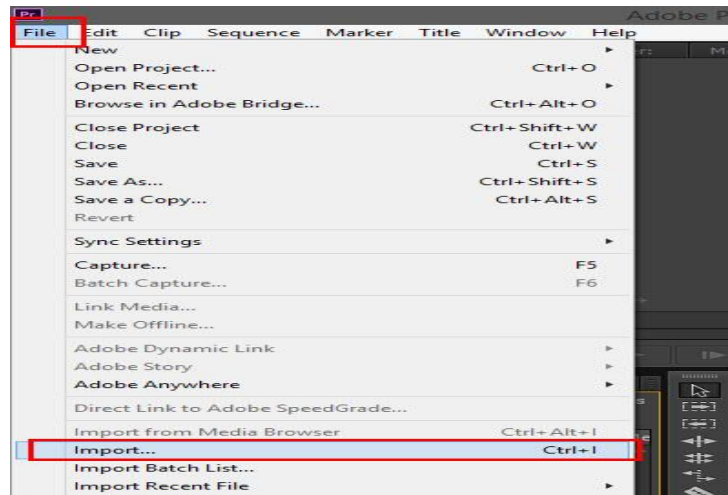


Figure 5. Step 5 video creation

6. Then the video will enter the Library in the lower right corner, as shown below.

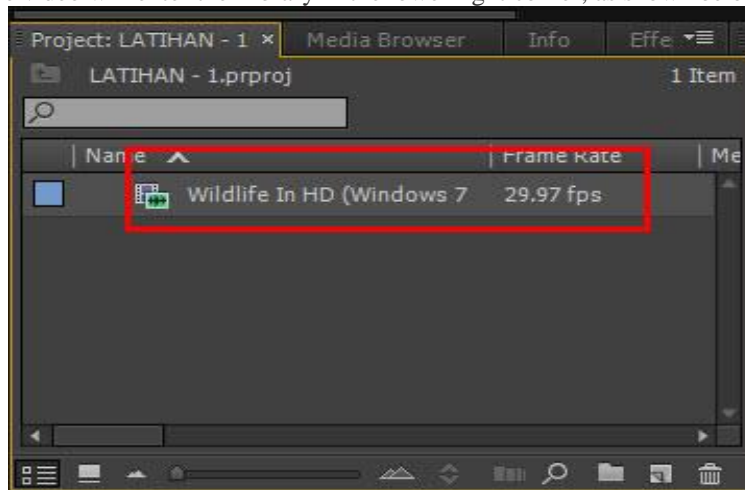


Figure 6. Step 6 video creation

7. To edit a video, we need to insert a video into the Timeline by clicking and dragging the video to the Timeline.

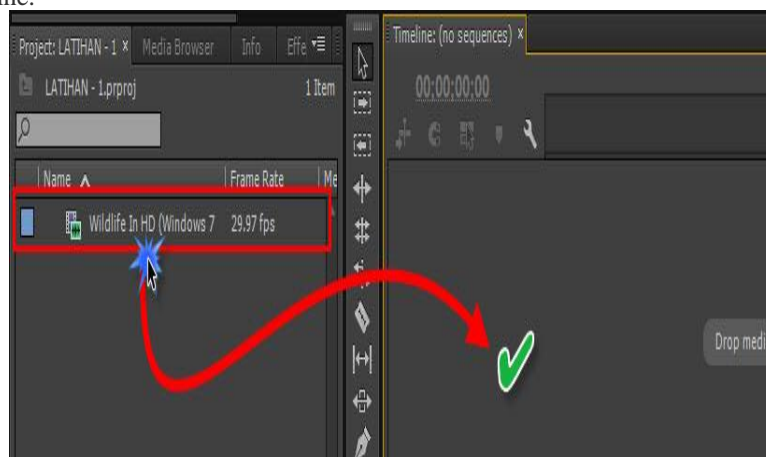


Figure 7. Step 7 video creation

8. Then later in the Timeline we can edit videos according to our wishes.

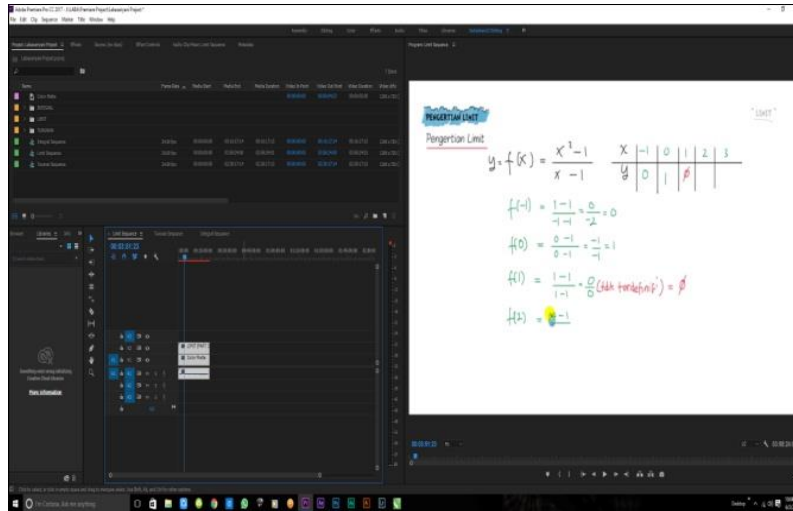


Figure 8. Step 8 video creation

9. Save the Editing results by clicking File> Save.

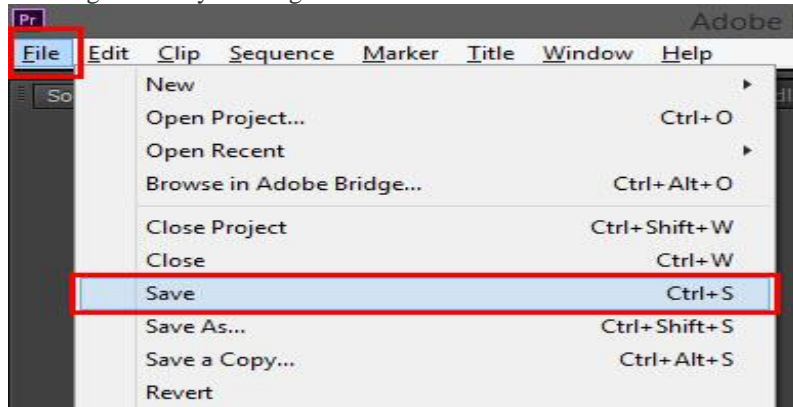


Figure 9. Step 9 video creation

10. After all videos have been edited, the next video rendering process is carried out.

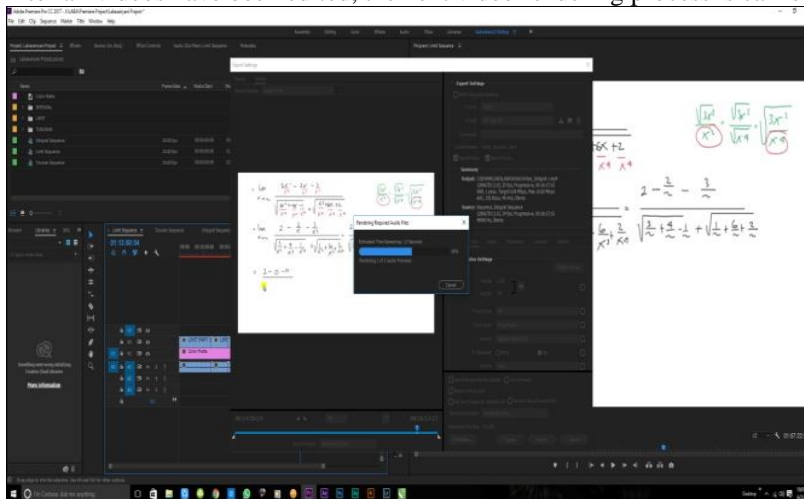


Figure 10. Step 10 video creation

3. RESULTS AND DISCUSSION

The scientific approach in learning in this study is intended through the steps of the scientific approach can lead students in understanding the concept of the material being studied in this case is the Limit Function,

Derivation, and Integral. Steps in the scientific approach by using teaching materials that have been designed in such a way as to support students in understanding concepts not just memorization.

The scientific approach consists of five steps, namely observing, asking, reasoning, trying and communicating [1]. At the observation stage at the first meeting the presentation of the Limit Function material had not used the learning video, and the discussion of the matter was still using LKS. At this first meeting, students were not used to using worksheets with the steps of a scientific approach, so that there were still many students who were confused about the stage of observing the problem in the LKS. They did not observe carefully and immediately answered the questions given. The solution for researchers to deal with the problem is to provide direction to observe problems in the worksheet carefully and not in a hurry. At the second and third meetings students are getting used to the stage of observing the problems in the LKS but there are still students who have difficulty understanding the material presented. With these constraints, researchers began to combine the scientific approach with the learning video in the fourth meeting and so on until the Limit Function material was over, then continued with Derivative and Integral material with the same action steps as in the Limit Function material.

At the questioning stage at the first to third meeting, students are given the freedom to ask the researcher directly or the questions are written on the Student Worksheet (LKS). During the first meeting up to the third there were some students who still asked not to be directed by what they observed. At this questioning stage, there is also the next step which is reasoning. The solution of the researcher to overcome this problem is by starting to use learning videos in explaining the material then giving fishing questions to students, so that students can ask them according to what they observed before.

Then the next step is to try, at this stage most students have started to get used to answering the questions in the LKS, but there are still students in the group members who do not participate to complete the steps in LKS, so that the researchers' solutions to overcome the problem is that researchers urge all groups to write the names of students who did not participate in group activities. The name that does not participate will be reduced in value. After the researchers reminded each group, at the second and third meetings most students participated in group activities. Although there are still students playing around but still participating.

The fifth stage is communicating. After students complete the activities in LKS, the next step is to communicate, the researcher asks representatives of one group to communicate the results of their activities. At the first meeting, no group dared to come to the front of the class to communicate the results of their activities. The solution of the researcher to overcome this problem is the researcher announces to the students, for the group that dares to go forward to communicate and the value of the group is good, the researcher will reward the group. So students are enthusiastic to communicate the results of their activities. At the second meeting students were very enthusiastic to communicate their activities, so the class became noisy. The solution of the researcher to overcome the problem is to announce to students, to be orderly in the activity of communicating it, for those who make chaos will be removed from the class. While at the third meeting the students had begun to order to communicate the results of their activities.

In the process of implementing learning with a good scientific approach, the material Limit Functions, Derivatives, and Integral is very difficult to know the ability to understand students' concepts one by one. Therefore, researchers provide tests to students both experimental and control classes at the end of each lesson. This is intended to be able to know the ability to understand students' concepts one by one. After the learning process is carried out in the experimental class and control class, the researcher conducts a final test (posttest) to find out the students' learning outcomes about the material that has been delivered in the class.

In this study the data collected is data about the ability to understand students' mathematical concepts with a scientific approach. The data collection of the learning process is by using the Test. The test used is Posttest. Posttest is a test conducted after the treatment is given to find out the understanding of students' mathematical concepts. The type of test that will be given is a subjective test (form of description). The test is used to determine the ability of students to understand concepts in solving problems according to indicators of understanding concepts.

The following is the final test results of each teaching material in the experimental class namely XI IPA 2:

Table 2. Final test data for each material in the experimental class (XI IPA 2)

Respondent Number	VALUE		
	LIMIT FUNCTION	DERIVATIVE	INTEGRAL
1	59	65	75
2	70	75	75
3	80	80	80
4	65	65	75
5	80	80	85
6	75	77	77
7	80	80	80
8	80	80	80
9	80	80	85
10	77	79	79
11	75	75	75
12	80	80	80
13	80	81	85
14	75	80	80
15	80	82	85
16	80	80	80
17	75	80	80
18	65	70	79
19	75	75	75
20	75	75	75
21	75	75	75
22	75	75	75
23	65	71	75
24	75	75	75
25	55	70	70
26	75	75	75
27	80	82	85
28	80	82	82
29	80	80	80
30	80	80	80
31	80	80	80
32	80	80	80
33	75	78	79
34	80	80	80
35	65	75	75
36	65	73	73
37	75	75	75
38	80	80	80
39	80	80	80
40	75	75	78

Here are the final test results from the control class, XI IPA 3:

Table 3. Final test data for each material in the control class (XI IPA 3)

RESPONDENT NUMBER	VALUE		
	LIMIT FUNCTION	DERIVATIVE	INTEGRAL
1	75	70	75
2	60	65	75
3	75	70	75
4	75	75	75
5	75	75	80
6	75	75	75
7	75	73	75
8	65	75	75
9	70	72	80
10	75	75	75
11	65	75	75
12	65	70	73
13	65	73	75
14	70	75	75
15	80	80	80
16	80	78	80
17	75	80	80
18	80	75	80
19	75	75	75
20	75	75	75
21	65	75	65
22	75	75	75
23	70	75	75
24	75	75	75
25	80	81	80
26	75	75	75
27	65	70	70
28	65	65	70
29	65	75	75
30	70	75	75
31	75	75	75
32	75	75	75
33	55	70	70
34	75	75	75
35	75	80	80
36	70	80	80
37	71	75	75
38	75	75	75
39	75	75	75

RESPONDENT NUMBER	VALUE		
	LIMIT FUNCTION	DERIVATIVE	INTEGRAL
40	70	75	75
41	70	75	75
42	65	75	75
43	60	75	75
44	65	75	75
45	70	80	79

From these data, the data obtained from the research are obtained as follows:

a. Experiment Class Data Analysis

The last test was given at the last meeting which included all the material that had been studied at each meeting. The highest value obtained for the Function Limit material is 80 while the lowest value is 59. The highest value for Derivative material is 82 and the lowest value is 65. Then for the highest value on Integral material is 85 and the lowest value is 70. From the value obtained students in this final test, then obtained the average value for the material Limit Functions, Derivatives, and Integral are 75.03, 77.0, 78.43 respectively. The frequency and percentage of students' ability to understand concept of experimental class are presented in the following table:

Table 4. Frequency data and percentage of concept ability of experimental class students (Class XI Science 2) for Limit Function material.

Student scores	Concept Understanding Ability Category	Frequency	Percentage
80,0 – 100,0	A	18	45%
66,0 – 79,9	B	15	37,5%
56,0 – 65,9	C	6	15%
40,0 – 55,9	D	1	2,5%
0,0 – 39,9	E	0	0%
amount		40	100%

Table 5. Frequency data and percentage of concept ability of experimental class students (Class XI Science 2) for Derivatives material.

Student scores	Concept Understanding Ability Category	Frequency	Percentage
80,0 – 100,0	A	20	50%
66,0 – 79,9	B	18	45%
56,0 – 65,9	C	2	5%
40,0 – 55,9	D	0	0%
0,0 – 39,9	E	0	0%
amount		40	100%

Table 6. Frequency data and percentage of concept ability of experimental class students (Class XI Science 2) for Integral material.

Student scores	Concept Understanding Ability Category	Frequency	Percentage
80,0 – 100,0	A	20	50%
66,0 – 79,9	B	20	50%
56,0 – 65,9	C	0	0%
40,0 – 55,9	D	0	0%
0,0 – 39,9	E	0	0%
amount		40	100%

Based on tables 4 through 6, it can be seen that after using the scientific approach and video learning in mathematics learning, it is known that 45% of students belong to a category with very good concept comprehension ability, and 2.5% of students belong to the concept comprehension category. still lacking in the Limit Function material. Then in the material the percentage derivative in the very good category is 50% and the sufficient category is 5%. In Integral material, 50% of students are in the very good category and 50% are in the good category.

b. Control Class Data Analysis

The last test was given to the control class at the last meeting. The highest value obtained for the Function Limit material is 80 while the lowest value is 55. For the highest value in the Derivative material is 81 and the lowest value is 65. Then for the highest value in Integral material is 80 and the lowest value is 65. From the value obtained students in this final test, then obtained the average value for the material Limit Functions, Derivatives, and Integral are 71.13, 74.6, 75.49 respectively. The frequency and percentage of students' ability to understand concept of control class is presented in the following table:

Table 7. Frequency data and percentage of concept ability of control class students (Class XI IPA 3) for Limit Function material.

Student scores	Concept Understanding Ability Category	Frequency	Percentage
80,0 – 100,0	A	4	8,9%
66,0 – 79,9	B	28	62,2%
56,0 – 65,9	C	12	26,7%
40,0 – 55,9	D	1	2,2%
0,0 – 39,9	E	0	0%
amount		45	100%

Table 8. Frequency data and percentage of concept ability of control class students (Class XI Science 3) for Derivatives material.

Student scores	Concept Understanding Ability Category	Frequency	Percentage
80,0 – 100,0	A	6	13,3%
66,0 – 79,9	B	37	82,2%
56,0 – 65,9	C	2	4,5%
40,0 – 55,9	D	0	0%
0,0 – 39,9	E	0	0%
amount		40	100%

Tabel 9. Data frekuensi dan persentase kemampuan konsep siswa kelas kontrol (Kelas XI IPA 3) untuk materi Integral.

Student scores	Concept Understanding Ability Category	Frequency	Percentage
80,0 – 100,0	A	9	20%
66,0 – 79,9	B	35	77,7%
56,0 – 65,9	C	1	2,3%
40,0 – 55,9	D	0	0%
0,0 – 39,9	E	0	0%
amount		40	100%

In accordance with the data from Tables 7 to 9, it is known that 8.9% of students belong to a category with very good concept comprehension abilities, and 2.2% of students in the concept comprehension category are still lacking in the Limit Function material. In the material, the percentage of very good percentage category is 13.3% and the sufficient category is 4.5%. In Integral material, 20% of students are in the very good category and 2.3% are in the sufficient category.

4. CONCLUSION

Through the final test results of each material in the experimental class and control class, it can be concluded that the use of Adobe Premiere software is able to produce mathematics teaching materials that are very effective for students in understanding mathematical concepts that can be seen from the students' learning outcomes in the experimental class.

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