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The development of the learning video for the flipped classroom model on student of open university on human skeletal system and muscles

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Abstract. The objectives of the research are to develop the learning video for the flipped classroom model for Open University's student and to know the effectiveness of the video. The development of the video used Research and Development ADDIE design (Analyses, Design, Development, Implementation, Evaluation). The sampling used purposive sampling was 28 students in Open University of Nganjuk. The techniques of data collection were the observation data to know the problems of the students, and learning facilities, the test (pre-test and post-test) to know a knowledge aspect, a questionnaire to know advisability of video learning, a structured interview to confirm their answer. The result of the expert of matter and media showed that the average product score was 3.75 of 4 or very good, the small-scale test showed that the average score was 3.60 of 4 and the large-scale test showed that the average score was 3.80 of 4, it had a very good category. The t-test with paired sample test showed that sig. (2-tailed) < 0.05. The N-gain score of pre and post test was 0.55, it had the medium category. It can be concluded that the development of the learning video for flipped classroom was effective to be implemented.

1. Introduction

The new paradigm that appears related to the learning process, it is no longer describes a meeting face to face in the classroom even though the social interaction is maintained. The internet technology makes it easy for people to interact without being bound by space and time. Discussing in the group by email, chatting and, the others internet media is the part of innovation in this post-modern [2].

The learning process in Open University always uses a module to reach out and to communicate with student and the lecturer. The module is designed in order to the student can understand and learn independently. If the student can't understand the matter from the module, the Open University provides tutorial learning by direct and online. The tutorial learning is implemented during 8 times in one semester.

The Open University is dominated by the students have 25-29 years old of Teaching and Learning Faculty who is a teacher. This condition raised limitations and problem of interaction between the student and lecturer. So that, the students don't understand the matter. To solve this problem shall implement the innovative learning concept as Flipped Classroom. According to Johnson [7], the lecturer can give a flipped classroom model minimizing the number of direct learning in the classroom. This model utilizes technology which supports the matter by online for the students. This section gives free up the time for class previously.

The flipped classroom model supports the students to get more matter not only in the classroom but outside the classroom course also. The students can access repeatedly the matter through the internet or video learning which are given by lecturer. Before the flipped classroom learning begins, the students study the topic with video which is created by lecturer and the other. The study is supported by research that has been done by Holzinger [5], the flipped classroom learning begins watching instructional videos that contain material which is accompanied by worksheet. The student must confirm with worksheet that they had been watching the video. Then, learning in the classroom is used with discussion to solve a problem relating the material.

Flipped classroom learning, the students watch the video learning in the home and they find the matter concept. In the classroom, the students had the concept of the matter so they more quick to accept the lesson. Beside it, they can do task, project, and discussion easily in the classroom. In this case, the lecturer has to plan, direct, evaluate the lesson. According to Basal [1], the level of learning is (1) the lecturer plan the learning; (2) to choose the activities which conform with the topic; (3) to integrate the assignment with activities; (4) to manage the lesson and to present all process an organized manner.

2. Research Methods

The research used the Research and Development (R&D) ADDIE Design (Analyses, Design, Development, Implementation and, Evaluation). The matter in the learning process is the human skeletal system and muscles. The research was done at the Open University. The population of the research was the Elementary Education's students in The Open University. The sampling technique was a purposive sampling. They were 28 students who are the experimental group. The techniques of data collection were the observation data to know analyses level that is the problems of the students, lecturer and learning facilities, test (pre-test and post-test) to know a knowledge aspect, a questionnaire with the Likert scale to know advisability of video learning, a structured interview to confirm their answer on the test and a questionnaire.

The validation of video was developed and done through review by expert and trial test to the students. The conversion score of validation by Suyanto[10] is:

Table 1. The Conversion Score of Validation of Video Development

Score	Category
3.26 – 4.00	Very Valid/Very Proper/Very Good
2.51 – 3.25	Valid/Proper/Good
1.76 – 2.50	Less Valid/ Less Proper / No too Good
1.00 – 1.75	No Valid/ No Proper/ Bad

Meanwhile, the effectiveness of learning video was known by the paired t-test with one group pre-test and post-test design. The difference of pre-test and post-test score used N-Gain score. The normalisation of N-Gain could be classification with: (1) if $g \geq 0.7$ so N-gain score on a high category; (2) if $0.7 > g \geq 0.3$ so N-gain score on a medium category and, (3) if $g < 0.3$ so N-gain score on low category [4].

3. The Result And Discussion

3.1. The Result of Analysing Level

At this level, the needs analysis to the students was done through the observation. The analysing was gotten which included all of the problems of the students, lecturer and learning facilities. The observation data showed that the number of the Open University's students was 406.027 students until 2015 years. 291.641 students had working be the teacher in the school, 31.975 students have not worked yet. The students have 25-29 years old as many as 96.561 and the under of 25 years old have

91.393 people. After that, the researcher was done the interview. It has 75.55% students that find the difficulties to do the assignment and 65.80% students that find the difficulties about the understanding of the matter.The limited in the classroom caused the difficulties of the lesson. Beside it, the students who be the teacher has more the task in the school and their college distance was large from their home, so they didn't understand the matter clearly. The solution of this problem is the researcher make a video. This video consists of the explaining of the lecturer about the human skeletal system and muscles. Rebowo [10] stated that the development of an instructional video to improve learning outcomes. So, the ability of students to listen and analyse is well done, they can observe their problem about the human skeletal system and muscles in daily life and find its solution.

3.2. The Result of Design Level

Design level of learning video was to determine the video format to create a storyboard that was adapted to syllabus and lesson plans. The video was also equipped with the worksheet. The formats of video that was applied in the flipped classroom model were: (1) the title of the matter; (2) making the synopsis; (3) making the storyboard; (4) taking the picture by storyboard; (5) the editing process; (6) the multiplication and dissemination. There were two video titles which were The Human Skeletal System and Muscles. This matter consisted of the parts of the human skeletal and muscles, characteristic, function and the assignment. The making procedures of the video were: (1) to determine the technology was used; (2) to determined how to publish video on the students; (3) to make a video; (4) to create a rule that they really watch the videos.

Implementation of the flipped classroom learning model by Jamaludin et al [6] included three core activities: (1) the students had to watch the video before coming to the classroom; (2) when learning process, the student had to discuss; (3) after that, the students had to do the consolidation and prepare the next matter.

3.3. The Result of Development Level

The development of video has two main matters. They are The Human Skeletal and Muscles. The video of The Human Skeletal contains (1) bone structures; (2) shape and structure of bone; (3) the relationships between bones; (4) the disorders of the joints. The video of The Human Muscles contains (1) type of muscles; (2) type of muscles movement; (3) how the muscles work. The examples of the videos like figure 1 an figure 2.
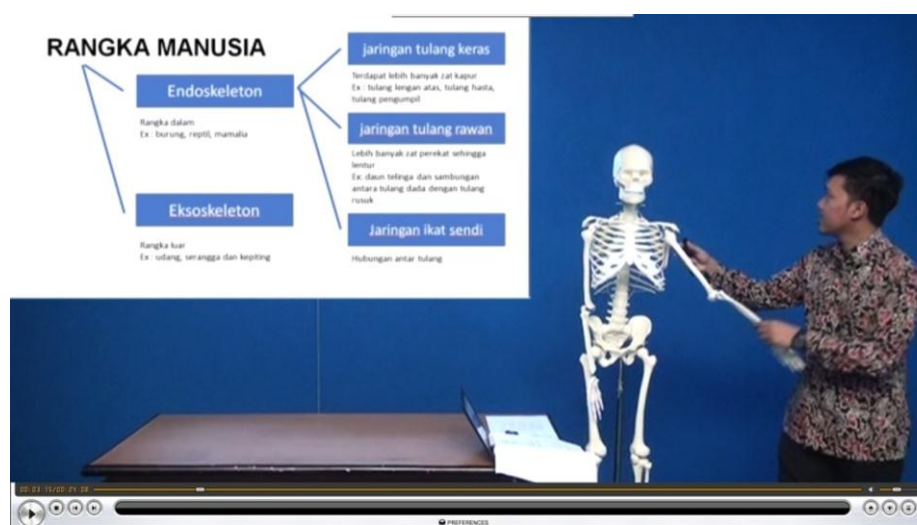

Figure 1. The Print Screen of Content Display on Human Skeletal System

Figure 2. The Print Screen of Content Display on Human Muscles

At this level, the expert judgment, the result of the small-scale test, the result of the large-scale test suggested that the video clarifies the voice of the actors, brighter lighting, zoom in the object of the human skeletal and muscles, the actor use shorter and clearer language, adding the instrumental music.

The making procedure of video used Vegas Program to editing video. The Human Skeletal and Muscles were divided be 2 videos with duration 15-25 minutes. The video published with veraseptiandrini@blogspot.com. The controlling that the student watched the video was the students had to do the assignment in the worksheet so that the student had the responsibility. Sales [9] stated that the flipped classroom model try the students to respond the video and organize the learning process.

Table 2. The Result of Expert Judgment's Validation, The Small-Scale Test and,
The Large-Scale Test

Aspect	The Average of Expert's Score	The Average of The Small-Scale Test	The Average of The Large-Scale Test
The Picture			
1 The appearence of the actors.	3,58	3,78	3,72
2 Suitability of shooting location and the matter.	3,77	4,48	3,77
3 Lighting of the video and the picture	3,85	3,50	3,85
The Appeal			
1 Systematic presentation	3,55	3,55	3,66
2 Continuity of the concept	3,80	3,56	3,80
3 Suitability of visualization with the matter presented	3,78	3,58	3,78
4 Clarity the matter	3,70	3,70	3,86
5 Interesting of the content video	3,76	3,76	3,84
The Sound			
1 Clarity of the sound	3,88	3,68	3,88
2 Compatibility of the musical accompaniment	3,82	3,42	3,82
The Average Score	3.75	3.60	3.80
The Category	Very Good	Very Good	Very Good

The validation and advisability of video were done by the expert judgment. They were the expert of matter and media. The small-scale test was given to 6 students and the large-scale test to 28 students. The achievement aspect consisted of the picture clarity, the attraction and, the sound clarity. The average achievement of the expert judgment was 3.75 of 4 (very good category), the result of the small-scale test was 3.60 of 4 (very good category) and the result of the large-scale test was 3.80 of 4 (very good category).

3.4. The Result of Implementation Level

Before the learning process, the students got pre-test in the experiment class. After the learning process, they got post-test. The result like as Table 3.

Table 3. The result of Pre-Test and Post-Test

	Minimum Score	Maximum Score	The Average Score
Pre-test	55,29	84,71	68,46
Post-test	70,29	96,47	85,14

The average of pre-test show that 68.46. It means that the students had low knowledge aspect so it had to be improved. After they accepted the video and also watched it with the flipped classroom model, they had 85.14 of the average of post-test. It means that had the very good category. The effectiveness of the video was determined from the difference of pre-test and post-test like as Figure 3.
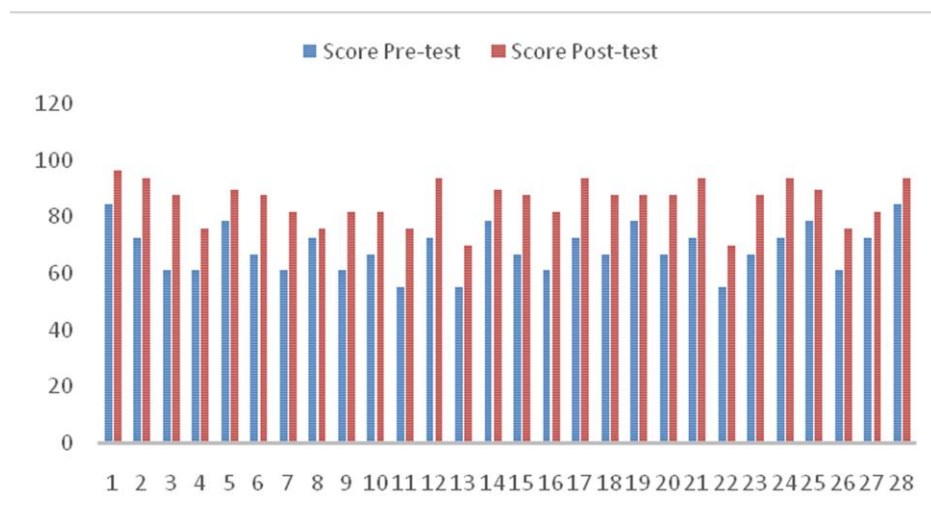

Figure 3. The Difference of Pre-test and Post-test Score.

The prerequisites test with the normality test, its result like as Table 4 and homogeneity test in Table 5.

Table 4. The Normality Test Results

		Tests of Normality					
		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Test	Statistic	df	Sig.	Statistic	df	Sig.
Result	Pre-test	.139	28	.174	.943	28	.132
	Post-test	.209	28	.200	.917	28	.030
a. Lilliefors Significance Correction							

The normality test used Kolmogorov-Smirnov test that was obtained the significant of pre-test $0.174 > 0.05$ and post-test $0.200 > 0.05$, so the experimental group was normally distributed.

Table 5. The Homogeneity Test Result

	Test of homogeneity of variance			
		Levene Statistic	DF1	DF2	Sig.
Result Based on Mean		.506	1	54	.480
Based on Median		.706	1	54	.404
Based on median and with adjusted df		.706	1	53 994	.404
Based on the trimmed mean		.560	1	54	.458

The homogeneity test with Kolmogorov-Smirnov test was obtained a significant value of pre-test and post-test for the experimental group of 0.480 which was greater than 0.05. It could be concluded that the homogeneous data. The result of the prerequisites test showed that the normal and homogeneous data so it could be done the next test with paired sample t-test.

Table 6. The Results of The Paired Sample t-test

		Paired Samples Test							
		Paired Differences							
					95% Confidence Interval of the Difference				Sig.
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	(2-tailed)
Pair 1	Pretest-Postest	4.5589 3E1	29.88449	3.99348	53.59240	37.58617	11.416	55	.000

Based on Table 6, it was found that 0.000 of significant (2-tailed) was lower than 0.05. It was concluded that the learning video in the flipped classroom could improve the learning outcomes. Based on the N-Gain score of the improving pre-test to post-test score showed that 0.55 the medium category. It means that the development of learning video was effectively implemented in the flipped classroom model. Enfield [3] stated that the flipped classroom model was effective to help to understand the matter. it improved the ability of to solve the problem about the matter. The student could interact in the class so the students had independently learned.

3.5. The result of Evaluation Level
The product in the research was learning video about The Human Skeletal and Muscles. This product had to be evaluated that the size of the video was too much. So, the downloading process needed a long time and a good connection. The evaluation of learning process used the knowledge aspect of the pre-test, post-test and presentation. According to Zhou [13] stated that the comprehensive assessment in the flipped classroom was the understanding aspect, implementing aspect, analysing at presentation, test and self- evaluation.

The flipped classroom was supported by video can be applied anytime and anywhere. This model can improve the learning outcomes. The students can repeat the video and lesson again. Love *et al* [8]

stated that the students can more study than in the classroom. They can discuss with their group and another, present, and solve the assignment.

The result of observation showed that the students have more confidence and do not find the difficulties during has the task and discuss. Velegol *et al* [12] stated that the students have more confidence to learn and accomplish the necessary tasks when able to work with a lecturer or a friend in the class.

4. Conclusion and Suggestion

The development of video for flipped classroom model was valid and advisable to implemented. The evaluation of product is picture clarity, the appeal, the sound clarity. The result of the expert judgment of matter and media showed that the average product score was 3.75 of 4 or very good, the result of the small-scale test showed that the average score was 3.60 of 4 and the result of the large-scale test showed that the average score was 3.80 of 4 it had a very good category. The t-test with paired sample test showed that sig.(2-tailed) of 0.000 < 0.05. The N-gain score of pre-test and post-test was 0.55, it had the medium category.

Based on learning process for flipped classroom, the researcher recommends the development not only make the video but also integrating the learning device with another learning model which makes a student centre. The publishing of video can do through Youtube, Instagram, and another media social.

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