Animation Media Development To Improve College Students' Higher Order Thinking Skill (Hots)

by Ariewahyuni ,dkk

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ArieWahyuni[1]*, PrihadiKurniawan[2], S. B. Waluya3, Adi Nur Cahyono[4]

[1]Universitas Ivet, INDONESIA

[2]Universitas Islam NegeriWalisongo Semarang, INDONESIA

[3]Universitas Negeri Semarang, INDONESIA

[4]Universitas Negeri Semarang, INDONESIA

Abstract -This research was aimed to create animation media to improve college students' HOTS. The product created was an animated learning media to facilitate students in improving their higher-order thinking skills. The research method used was Research and Development (R&D). There were six procedures; 1) Data collection, 2) Product design, 3) Design validation, 4) Design revision, 5) Product Testing, 6) Product Revision. Despite the time limitation, not all of the procedures were administered. The subject of the research was the second-semester students of mathematics education program atUniversitasIvet. The data collection was administered by the use of a validation questionnaire and test. The instrument used to collect learning result document was a test; meanwhile, the instrument used to find out the efficacy of the learning media was a validation questionnaire to check the learning media eligibility in improving HOTS and also questionnaire to find out the attractiveness of the learning media. The technique used in analyzing the data was descriptive quantitative to provide the quantitative data from validator scores and students' responses. The research also provided qualitative data to describe the comment, suggestion, and revision from the validator. Based on the validation of the animation learning media development to improve college students' HOTS, it was gained that; (1) The development of animation media eligibility got 3.75 (attractive) from the material expert. Meanwhile, the media expert gave 4.6 (very attractive) from the validation process. The product was considered to be eligible, (2) the attractiveness of the animation media based on the students' response scored 3.65 or categorized as good.

Keywords: Development, Animation Media, Higher Order Thinking Skill (HOTS)

Introduction

In the globalization era, the ability to master computer technology is important as it is required in many fields. The variety of technology-based learning was found to be significant in any age, gender, and social status (Livingstone &Helsper, 2007). The use of technology may stimulate creativity and lead to the achievement of the learning media. The sophisticated Information and communication media may improve students' learning performance (Wahyuni&Kurniawan, 2018). Content creation which is measured with items such as text, graphic, audio, or video consistently were lower than the anticipated content regarding what commonly youth do with the technology (Bennett &Maton, 2010).

During the learning process at UniversitasIvet, the lecturers mainly used the lecturer-cantered method as they found some difficulties in transforming the learning material to develop higher-order thinking skills. The lecturers tend to direct the students to use skills during the learning process (Hinde & Perry, 2007). The objective of the learning process was the students' comprehension of the learning material. In this case, it is better to use computer technology during the learning process.

The technology used to produce creative activities is computer applications. The application can be in form of video or material as the media. Those media can be the basic input for the students (Muslem& Abbas, 2017). Media is a tool used by the teacher for the students during the learning process (Unang, 2015). According to Flew (2018), media is a technical facility to deliver and receive a message. Meanwhile, according to Roberts (2004), media has changed auditory students into more active participants. From the citations above, the researcher

concluded that media is a technology in a form of message from the teacher or educator during the learning process which is delivered or transformed to the students.

Media is commonly used to make the material not too verbalize (Saptorini, 2004). It makes the material can be easily understood by the students. Animation is one of the media that can be used to utilize technology in the learning process.

Animation is a motion simulation created by displaying some pictures or frames sequentially (Wibowo&Nilawati, 2015). According to Mayer & Moreno (2002), animation media is a form of interesting figurative presentation. Meanwhile, Harsono (2009) states that animation is a media of interaction between teachers and students in the form of motion pictures. Therefore, it can be concluded that animation is a motion created from interesting moving pictures or frames sequentially to create interaction between teachers and students.

Animation media can be very significant for the learning process achievement. The use of animation and special effects may effectively attract students (Lee & Owens, 2004). The use of animation media during the learning process may enable the students to give more attention to the teachers or lecturer. It is in line with Kadek (2013) that the use of animation during the learning process significantly improves learning effectiveness.

College students are not only learning the concept. Instead, they are expected to be able to find the concept through a higher-order thinking process. This is the reason why college students need to improve their higher-order thinking skill (HOTS) and 21st century skills(Chonkaew, et al., 2016)such as global awareness, creativity and innovation, critical thinking and critical thinking and problem-solving skill, communicative and collaborative skill, and information literation includes media and technology literation (Partnership for 21st Century Skills, 2009).

The mastery of the skills enables the college students to analyze the correlation between the comprehension of the concept and the application in their daily life. It makes the learning process is more meaningful. How far a mathematics teacher aware of the role of HOTS in learning and implement mathematically as a problem to solve (Tajudin&Chinnappan, 2016). Higher-order thinking can be conceptualized as a complex way of thinking, which is not algorithmic, and frequently produce some solutions (Miri & Uri, 2007).

According to Quelmalz (in Taghreed A. H and FakhriKhader, 2015), higher-order thinking skill includes 4 thinking skill which are analysis, comparison, inference, and evaluation. The previous survey done by the researcher about HOTS in college students, especially during integral learning, was considered as low. It was because most of the students learn by memorizing. As we know, memorizing is categorized in lower-order thinking skills (Anderson &Krathwohl, 2001). The problem motivates the researcher to improve the thinking skill into HOTS. HOTS is mainly implemented when the students experience some difficulties, uncertainty, and question (Saido, Siraj, Nordin&Al_Amedy, 2018).

Research Methodology

The research subject was the second-semester students in academic year 2018/2019 from Mathematic Education Program of UniversitasIvet. It was a Research and Development which was a set us sequence to develop a new product or the existed product (Sugiyono, 2013). The research used qualitative and quantitative research approaches. The qualitative approach was used to implement the product eligibility and the questionnaire of students' responses. Meanwhile, the quantitative approach was applied to analyze the improvement of HOTS.

1. **Analysis of product eligibility**

The interval of students' responses to the developed product and the research process is presented in table 1 as follows.

Table 1. Assessment criteria

ligibility Score	Criteria
> 4,2 s/d 5,0	Very attractive
> 3,4 s/d 4,2	Attractive
> 2,6 s/d 3,4	Adequately attractive

> 1,8 s/d 2,6	Not attractive
1,0 s/d 1,8	xtremely not attractive

2. **Analysis of Students' HOTS improvement**

The improvement of students' HOTS was analyzed using Normalized Gain (N-Gain) from the pre-test and post-test.

$$(N\text{-}Gain) = \frac{\bar{X}posttest - \bar{X}pretest}{\bar{X}\max - \bar{X}pretest}$$

3. **Analysis of students' response**

Questionnaire analysis was done by summing up the score for each aspect in the questionnaire and finding the mean value using $\bar{X} = \frac{\sum x}{n}$

Finding And Discussion

1. **Animation media product**

The product developed in this research was an animation learning media for integral material. The learning media is in the form of Compact Disk which included the summary of the material, questions, and explanation, exercises, also the preparation and instruction in using the learning media.

There were advantages of using animation learning media, for instance:

a. It was easier for the lecturer in delivering complex material.
b. The students were able to use the animation media either individually or in a group easily.
c. The implementation of the media with the picture and animation attract the students more in the learning process and avoid boredom.
d. The animation media included some easily understood questions and explanations.
e. The animation media can be used as an individual learning resource.
f. The animation media stimulated students' higher-order thinking skills.

2. **Assessment from the experts**

a. **Expert of material**

The assessment from the expert of the material was done two times, as the first assessment found that some of the product aspects did not meet the criteria of attractive. Therefore, revision of the product was done. It is represented in the following table 2.

Table 2. Assessment 1 – Expert of material

Component of the assessment	Score
Concept actuality	3
Fact accuracy	1
Easy to under stand material	2
The correlation between model and material	2
Total	**8**
Mean	**2**
Criteria	lot attractive

Table 2 showed that the mean was 2 which was categorized in the not attractive criteria (NA). it is possible since the fact was not well correlated with the given material. In addition, the explanation given in the material was still inadequate. Therefore, the revision was done, and the result is presented in table 3 below.

Table 3. Assessment 2 – Expert of Material

Assessment components	Score
Concept actuality	4
Fact accuracy	3

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Easy to understand material	4
The correlation between model and material	4
Total	**15**
Mean	**3 .75**
Criteria	**attractive**

Table 3 showed the result of the product revision with mean 3.75 and categorized as attractive. The expert of material concluded that in this stage, the developed learning media was ready to use in the learning process as the revision enable the students to comprehend the material better by using the developed media.

b. **Expert of media**

The presentation component consisted of media attractiveness, media effectiveness, character or symbol clarity, language use in the media, also the correlation between illustration and material. Assessment 1 from the expert of mediais presented in table 4 as follows.

Table4. Assessment1– Expert of Media

Assessment components	Score
Media attractiveness	3
Media effectivity	2
Character clarity	2
Language use	2
relation between illustration and material	3
Total	**12**
Mean	**2.4**
Criteria	**Not Attractive**

Table 4 showed that the learning media needed some revision as the mean value drawn from the assessment of the expert of media was 2.4 which was categorized as not attractive. There were some notes given by the expert of media such as the poor clarity of the characters in the learning media, ambiguous language use, and poor media effectiveness. The revision on the product can be seen in Table 5 as follows.

Table4. Assessment1– Expert of Media

Assessment components	Score
Media attractiveness	5
effectivity	4
Charac ter clarity	5
Language use	4
Correlation between illustration and material	5
Total	**23**

Mean	4.6
Criteria	Very Attractive

Table 5 showed that the mean value from the expert of media was 4.6 and categorized as very attractive so that the learning media can be implemented in the learning process.

3. **The finding on students' HOTS improvement**
   The students' HOTS improvement could be seen from the Gain value which was the mean value of pre-test and post-test results. The improvement can be seen in the following table.

Table 6. The finding on students' HOTS improvement

Class	The mean of the HOTS		Gain
	Pre-test	Posttest	
Experiment	44.55	75.85	20416

From the result, it can be concluded that the HOTS improvement was categorized as medium.

4. **The finding on students' responses**
   The researcher calculated the data about students' responses obtained from the students' responses questionnaire. The result is presented in table 7 below.

Table 7. Students' response

Aspect	Mean value	Category
Students' response	3.65	Good

From table 7 above, it can be concluded that students' response toward the use of animation media during the learning process was good.

5. **Product revision**
   The product revision consisted of advice or suggestion from the validator which wasan expert on material and expert of media. The product revision can be seen in Table 8 below.

Table 8. Product revision from the expert

No	Validator	Product revision
1	Expert of material	1. Low conceptual material
		...tences are difficult to understand
		...aracters used in the product was unclear
		...ive sentences which lead to confusion
		...ces included
		...xercise and problem explanation
2	Expert of media	...ture used was irrelevant to the material

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		presentation should be revised
		ration for the learning media needs to be considered
		perative sentences were unclear
		lore models and explanation

Conclusion And Suggestion

1. Conclusion

From the research, it could be concluded that the expert of material gave 3.75 and can be categorized as attractive. Meanwhile, the expert of media gave 4.6 which was categorized as very attractive. For the students' HOTS improvement was categorized as medium, and the student's response was considered as good.

2. Suggestion

Based on the research, it is suggested that:

a. Animation learning media for an integral learning process can be used to improve the students' HOTS contextually.

b. This animation media can be used by either lecturer or students as the reference in learning as the media has been validated by an expert on material and media.

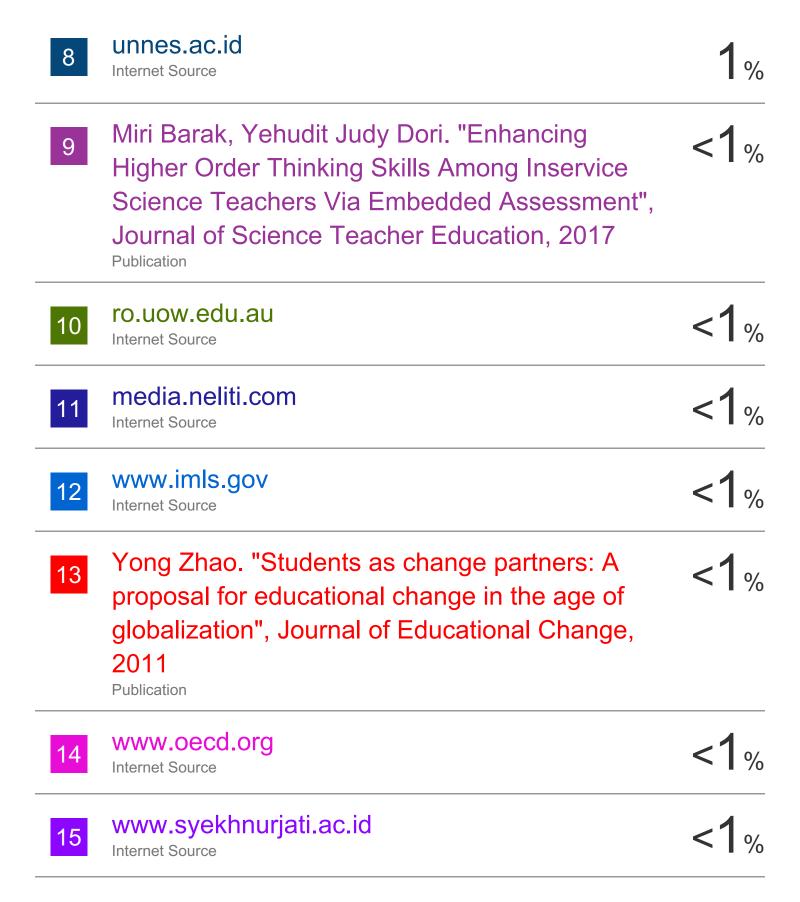c. Students can use the animation learning media for their learning process.

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