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# Development 3D Animated Story as Interactive Learning Media with Lectora Inspire and Plotagon on Direct and Inverse Proportion Subject

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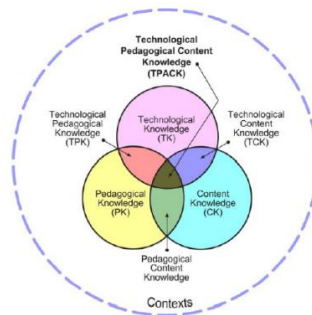
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**Abstract.** Industrial Revolution 4.0 made everything connected with technology. In this case, the use of technology on the learning process could improve TPACK skill. The aim of this research was to produce an interactive learning media in the form of 3D animated story with Lectora Inspire and Plotagon on direct and inverse proportion subject that can be accessed online on computer or android. This media was designed based on Problem Based Learning model where 3D animated story was used to illustrate the problems and explained them until the students found the direct and inverse proportion formula. This research employed Research and Development (RnD) that used ADDIE model which consist of six phases, they are analyze, design, development, implementation, and evaluation. The result showed that the interactive learning media and its user manual book were categorized very high valid category with correlation coefficient  $\alpha$  equal to 0,86 and 0,97, percentage of the students responses was 88,44% which means that the media in practical category. Based on the test result, the comprehension of the concepts was improved. This meant that the media was effective. In general, the media was rated valid, efficient, and effective. This means the media is feasible to be used in mathematics learning.

## 1. Introduction

The 21st century presents itself as a challenging time demanding a particular set of skills [1]. One of skill that should be had by the teacher is TPACK. TPACK or Technological Pedagogical Content Knowledge is a framework to integrate technology in the teaching activity. TPACK has been chosen as the basis for identifying what has been described as the desired qualities of teachers of the next generation. Expert teachers of the 21st century, are those who possess the knowledge of how ICT can be used to teach [2]. Therefore the use of technology in learning activity can improve TPACK skill on teachers. Three inspects knowledge in TPACK are technological knowledge, content knowledge, and pedagogical knowledge with interaction between them [3]. Scheme of TPACK can be seen in the Figure 1.





**Figure 1.** TPACK Scheme

In globalization era, there are some issues about the development of technology. One of them is industrial revolution 4.0. Industrial revolution 4.0 does not influence only the production itself, but also the labor market and the educational system as well [4]. Due to the fact, the use of technology in education should be developed. The aim of developing the use of technology is to improve the quality of education itself. One of the ways that can be used by the teacher to receive the industrial revolution 4.0. is using technology as a media such as the use of interactive media in the mathematics learning activity. Media information or ICT can help visualize abstract concepts and be able to engage students' active roles in learning, so it can reduce learning difficulties because mathematics is abstract materials [5].

Mathematics is one of lesson that should be understood by people. Mathematics is not only for science knowledge but it is as a tool which is used for solving the problem in daily life [6]. The use of interesting media in mathematic lesson can increase the students' desire, interest, motivation, and simulating them to learn. The application of media also makes the process of learning activity is more effective and interesting [7]. Educational technologies for the students develop a positive attitude towards mathematics, increase interest and provide benefits such as reducing a fear [8].

One of the technologies which can be used as the media is the audiovisual technology. As stated by Turan on his study, the effect of audio visual supported to learn mathematics [9]. In general, information and communication technology (ICT) has been suggested as a means to improve educational outcomes [10]. Animation story is one of the audiovisual technology which is used by the teacher as the media of learning. Akamca on his study stated that the use of cartoon in the learning process had positive impact on the students' achievement [11].

The concept of cartoon is one of the ways to expand the students' knowledge and fix misunderstanding of the students about the phenomenon of scientific. Moreover, learning math by using mathematics cartoon is more fun than conventional learning so that the process of learning activities are more effective and the students motivated to raise their achievement in mathematics learning [12]. *Software* which is used to make animation story 3D is *Plotagon* and *Lectora Inspire* is used to make 3D animated story as learning media.

One of the industrial revolution 4.0 program is IoT (Internet of Thing) or IoE (Internet of Everything) [13]. It shows that the use of internet is widely used in industrial revolution 4.0. Therefore, animation media 3D is made as online media on the website study *Schoology* so that the students can access it every time and everywhere.

One of the mathematics materials which is tough as difficult materials by the students is direct and diverse proportion subject. According to Raharjati, the students are difficult in differentiate direct and inverse proportion subject [14]. Therefore, it needed mathematics learning media which emphasize on how to differentiate direct and inverse proportion subject.

Based on the discussion above, the researcher wanted to do a research about developing 3D animated story as interactive learning media using *Lectora Inspire* dan *Plotagon* on direct and inverse

proportion subject, valid, practice, and effective in teaching and learning activities, that can be accessed by the students by online using computer or gadget

## 2. Methods

This kind of this research was Research and Development (RnD). This research includes qualitative research that conducted at MTS 1 Negeri Jember and the participants were 15 students from VII F. The aim of this research was to develop an interactive media with 3D animated story in Direct and Inverse proportion subject that valid, effective, and efficient. The development follow ADDIE style, they are Analysis, Design, Development, Implementation, and Evaluation [15]. In analysis phase, collected some data from analyzed curriculum, the character of the students, and the materials. These data were used as a base to design what the media looks like. In Design phase consist of determined the media, the strategy of explaining the materials, also made story board of media before create the media with Lectora Inspire software. In this phase also made an instrument of validation sheet for validation process. In development phase consist of constructed the media with Lectora Inspire and Plotagon software according to storyboard, and evaluated the media by validators. In this research developer used Lectora Inspire 16 and Plotagon 1.22. The media was validated by three people who from Mathematics Education University of Jember and MTS 1 Negeri Jember. At this phase would be determined the media in valid category or not. If the media in valid category, the step will continue to the implementation phase. In this phase also published the media by uploading on the website Schoology so the students could access it online with computer or android. In Implementation phase consist of tried the media and collected students' response data and did the test of learning achievement. In evaluation phase, analyzed the data which was gained from the questionnaire and the test result. At this phase would be determined the media in effective and efficient category or not.

According to Fanani, a good media should fulfill the aspects of quality, they are (1) validity; (2) the effectiveness; (3) efficiency [16]. Therefore in this research used three research instruments for each category, they are validation sheet that was used to measure the validity of learning media, questionnaire response that was used to know the response from the students after they applied the media to measure the efficient of media, and the test of learning achievement which was used to know the accomplishment of the aim teaching and learning activity and the effectiveness of the media. The validation sheet and the questionnaire used Likert scale and the question of test was taken from mathematics national book. The media is valid if the correlation of coefficient ( $\alpha$ ) include high or very high category is  $0,60 \leq \alpha$ . The media is effective if 80% subject fulfill the learning exhaustiveness in tryout. This research used standard value from MTS Negeri 1 Jember which is 75. Media is efficient if the average score of the questionnaire from the participants  $P \geq 80\%$ .

## 3. Results and Discussion

### 3.1. Learning media

This research used animation story as learning media that was made as interactive media by using software Plotagon dan Lectora Inspire. This could be accessed online by using computer or gadget. Hopefully the use of animation story could help the students in understanding direct and inverse proportion subject.

There are four menus in the beginning of media, they are materials, exercises, author and competence. The explanation of the materials and the exercises can be found on the menu of materials while the tasks are available on the menu of rehearsal. The menu of author consist of the profile of the author and the menu of competence consist of main competence and basic competence based on curriculum 2013. The figure of the media can be seen in figure 2 until figure 5.



Figure 2. The Beginning Page of Media



Figure 3. Subject Discussion Page 1



Figure 4. Subject Discussion Page 2

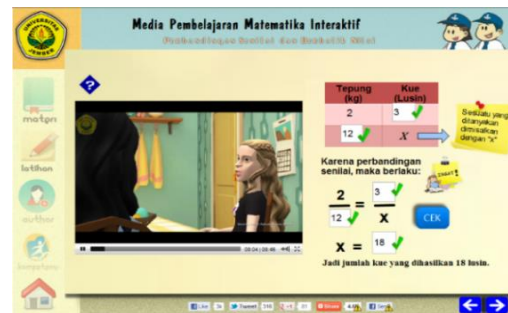


Figure 5. Exercise Page

The model used to explain the materials was Problem Based Learning where animation story had a function as visualization of the problem used. The explanation of the materials was divided into four pages. In the first page, there is an animation video that tells two friends who discuss about proportion subject. In the end of the video, there is a table that should be completed by the students. The first page can be seen on figure 3. The students could continue the discussion on the next page if they could complete all the questions on the table with right answer. In the next page, the animation video was played once again where the character in the video explained the answer on the previous page. After the video was end, there emerged next questions. It can be seen in figure 4. There are two types of exercises in each material. The exercises also were made in the form of animation video. The exercises page can be seen in figure 5.

### 3.2. Validity of learning media

There are six aspects of assessment on the attempt of properness learning media, they are the ease of use and navigation, cognitive load, knowledge space and information presentation, media integration, aesthetics, and overall functionality which were measured by the validator. The result of the validity by three validators in each aspect is explained in figure 6.

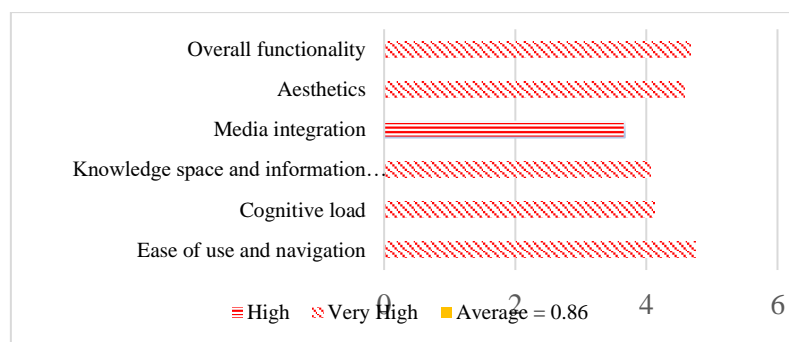
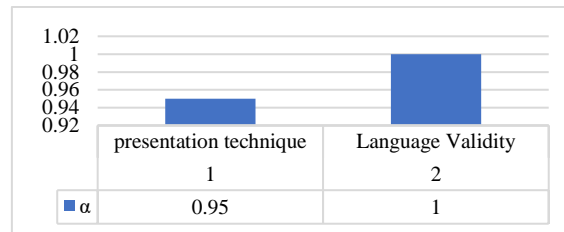


Figure 6. Validity of Learning Media

On the validity process, the researcher got the coefficient  $\alpha$  equal to 0,86. This proved that the learning media used was valid with very high category. Therefore, this media could be used in the process of teaching and learning activities. There were two aspects measured in the manual book of learning media validation instrument, they were technique presentation and language. The result of validity in each aspect by validator showed on the figure 7.

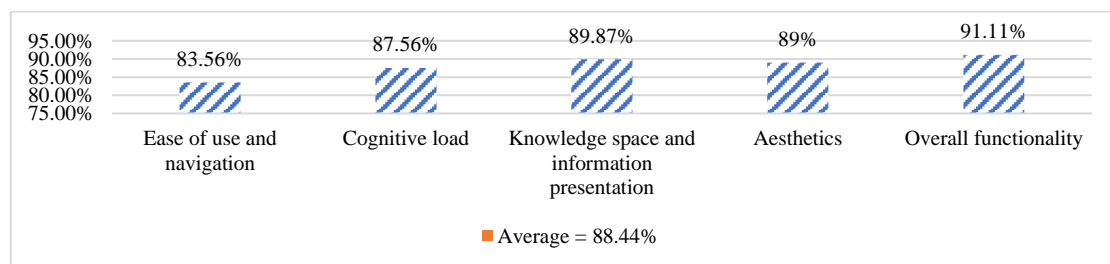


**Figure 7.** Validity of User Manual Book

Based on the result of the data validation book, the researcher got the total average value 0.97 from two aspects. It showed that the manual book of learning media had very high category in validity.

### 3.3. The efficiency of learning media

The efficiency of learning media measured based on the questionnaire which had been fulfilled by the students after applying this learning media. The result of the students' response in each aspect showed in the figure 8.



**Figure 8.** The Result of Questionnaire

Based on the questionnaire filled up by the students, the researcher got 88,44% the total average score from all aspects, so that the learning media developed in the category efficiency.

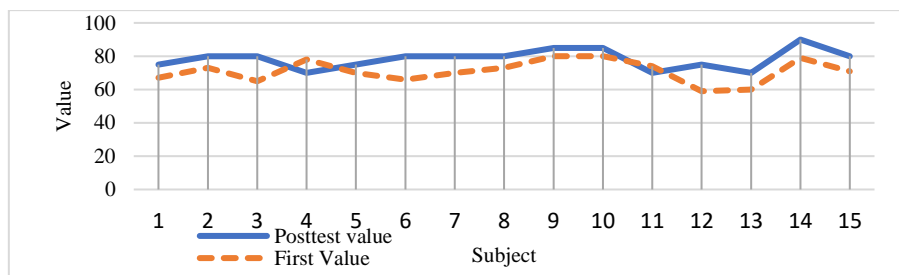
According to the questionnaire on the aspect of the ease of use and navigation, the subject assessed the media could be operated easily and the instruction was easy to be understood. The subjects who seldom to use computer felt that the media was easy to be operated. Although, there were some students who needed instruction in some pages. In the cognitive load, the subjects measured that the problem and the tasks offered on the video were easy to be understood. The materials were also easy to be understood and the questions were made based on the materials. in the aspect knowledge space and information presentation, the subject measured that the video using the language clearly, using right spelling, and explaining the materials clearly. The video also had good series in plot story. The materials in the video also explained systematically. in aesthetics aspects, the subjects measured that the video was interesting, the color used on the media was appropriate, the alphabet used could be read easily, and the video was clear enough. In overall functionality of all aspects, the subjects measured that this media could help them to understand the materials. Moreover, they felt happy and have an interest to study by using this media. This showed that this learning media could increase the students' interest for mathematics learning and made them feel happy so they did not feel bored in mathematics learning. The result of this study supported the research which was conducted by Turan that the effect of audio visual support

to study mathematics [9]. Supriadi on his study said that learning mathematics by using math cartoon is more interesting than conventional learning so the teaching and learning activities was more effective and the students motivated to increase their achievement in mathematics learning [12].

### 3.4. The effectiveness of learning media

Attempting the effectiveness of learning media which was developed by the researcher was effective. It can be seen from percentage the result of the students' posttest was 80%. It can be concluded that the learning media was effective. It is supported by the research conducted by Akamca that the use of cartoon in the atmosphere of study had positive impact on the students' achievement [11]. Therefore, interactive learning media in the form of animation story measured as a feasible media that could help the students in learning direct and inverse proportion subject.

Moreover, the measurement of the effectiveness media, the result of the students' achievement was used to see preferment of the students' value after using this learning media. This research used first score as standard of comparison score which was got from the daily test by using appropriate materials on seven days before attempting the learning media had been done. The comparison between first score and posttest score from the 15 subjects could be seen in the figure 9.



**Figure 9.** Collation of Scores

In the first score, from fifteen subjects there are seven students who did not get score which was appropriate with the standard score from the school. From the comparison between first score and the posttest score, the score was increase and appropriate with the standard score. It is supported by Akamca on his study who said that the use of cartoon or animation could give positive influence on the students [11].

## 4. Conclusion

Based on the data analysis and discussion above, it can be concluded that 3D animated story as learning media by using Problem Based Learning Model help the students in understanding the problem and also help the students to find direct and inverse proportion formula. Moreover, the learning media had high validity category with the coefficient validity 0,86 while the manual book had high validity category with coefficient validity 0.97. It proved that the media and its user manual book are proper to be used in the mathematics teaching and learning activities. In addition, the learning media had category efficient with the percentage of average score 88,84%. This proved that the students felt interesting and assisted after using this media. However, the learning media also was effective. It was proved from the percentage of posttest score, it was 80%. It can be concluded that 3D animated story as learning media helped the students in understanding the materials about direct and inverse proportion subject. The media was valid, efficient, and effective so that the media can used in the process of teaching and learning activities.

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