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Need Analysis of Interactive Multimedia Based on Scientific Literacy in Physics Learning at SMAN City of Padang

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ABSTRACT

The 21st century requires the world of education to adjust the development of science and technology in improving the quality of education. However, there are several factors that occur in the field. First factor, the use of technology is not optimal as a medium for learning physics. The second factor, physics learning has not been implemented as needed. The third factor, the low scientific literacy of students. Following up on this, technology-based learning media such as interactive multimedia containing scientific literacy are needed. The first step in creating the media is a needs analysis. The purpose of this study was to obtain information on interactive multimedia needs analysis containing scientific literacy in physics subjects at Padang City Public High School. This type of research is descriptive research. The population of this research is all Padang City Public High School. The sampling technique is stratified random sampling and lottery techniques. So that the samples were obtained from three Padang public high schools. Data collection techniques using learning style instruments and instruments for student and teacher needs. This study uses descriptive statistical analysis techniques. The results showed that the student's learning style was 81%, the category was very high. The student's need for interactive multimedia containing scientific literacy is 97% very high category and the teacher's need for interactive multimedia containing scientific literacy is 100% very high category. The conclusion of this study is the need to develop interactive multimedia based on scientific literacy in physics subjects at Padang public high school.

Keywords: Needs Analysis, Interactive Multimedia, Scientific Literacy

I. INTRODUCTION

In the 21st century, the improvement of science and technology is increasingly more fast which of direction has its very own demanding situations and can't be avoided in the global of education and society. The global generation calls for the world of education to constantly adapt to technological tendencies in improving the quality of education [1]. One of the government's efforts to enhance the quality of education is to establish eight national education standards. National education standards function as basic guidelines for the implementation of education to realize a quality education system. One of them is through process standards. The application of process standards in educational units is expected to achieve graduate competency standards which in turn can improve the quality of education [2]. Implementation of gaining knowledge of according with process standards, particularly learning that is interactive, inspiring, hard, amusing, and may encourage students to participate actively, and can provide sufficient area. One attempt that can be carried out to build the learning manner is thru the use of learning media. Physics learning can't be separated from the usage of learning media, especially the use of technology-based learning media that could perform learning according with process standards [3].

Another effort made by way of the government to enhance the quality of education is converting the curriculum from the 2006 curriculum to the 2013 curriculum. This is stated in the vision of the 2013 curriculum, that's to create science-literate students via science learning [4]. However, efforts to enhance the quality of education there are several factors that occur in the field as follows.

The first factor is the reality that in the field, Padang City Public High School students have low learning motivation. This is because of the constraints of teachers in combining technology as a learning medium, with a

percentage of less than 35%. So, the use of technology is not optimal as a medium for learning physics. The second factor is the number of students who're lazy to study, spend time studying physics in useless and feel bored inside the learning process. This is because learning is not interesting and it is difficult to understand abstract physics concepts [5]. So, physics learning has not been applied as needed. The third factor is the low scientific literacy of Indonesian students. It is proven based on the results of the 2018 Program for International Student Assessment (PISA) study which was released on Tuesday, December 3, 2019. Where, Indonesia's reading score is ranked 72 out of 77 countries, mathematics scores are ranked 72 out of 78 countries and science scores are ranked 70th out of 78 countries. This proves that scientific literacy in Indonesia is very low when compared to other countries [6].

Following up on some of the problems above, the teacher as the spearhead of educational success, especially in physics subjects, it's time to renew the current pattern of Physics learning, by creating a learning atmosphere that can increase student learning motivation, planning physics learning as attractive as possible to be able to visualize abstract concepts and it is time for teachers to create learning that implements scientific literacy in the physics learning process, in order to improve students' scientific literacy. This of course can be done with the help of technology-based learning media such as interactive multimedia containing scientific literacy.

The usage of interactive multimedia primarily based on scientific literacy is an critical component that needs to be developed as a learning resource to improve students' scientific literacy abilities [7]. Using interactive multimedia could make it easier for students to understand abstract physics principles and be able to process knowledge information, especially in learning physics [8]. To be able to innovate to create interactive multimedia containing scientific literacy, a needs analysis is needed.

Needs analysis is a way of gathering information as a basis for developing something that can meet the expected needs with existing conditions [9]. In more detail, a needs analysis is carried out as a first step to obtain information about the gaps that occur in the field, especially in the world of education in order to meet the expected needs. Needs analysis is an important thing to do in order to know the need for learning media that really suits the needs of students and educators [10]. Based on the explanation above, researchers are motivated to analyze the needs of interactive multimedia containing scientific literacy in physics subjects at Padang City Public High School. This needs analysis aims to obtain information regarding the analysis of interactive multimedia needs containing scientific literacy.

II. METHOD

This kind of research is descriptive research. The population of this research is all Padang City Public High School. The sampling technique was Stratified Random Sampling and lottery technique so that the samples obtained were Padang Public High School 2, Padang Public High School 8 and Padang Public High School 16. Data collection techniques used student learning style instruments and analysis instruments for student and teacher needs. This study uses descriptive analysis techniques. The class of interactive multimedia needs analysis containing scientific literacy is received through the following equation

$$P = \frac{\sum x}{\sum xi}\ x\ 100\% \qquad (1)$$

Description:
P = Percentage
x = of scores obtained on each indicator
xi = Many respondents [11]

The categories of needs analysis for every factor are supplied in Table 1.

Table 1. Categories of Needs Analysis

Percentage (%)	Category
0 – 20	Very Low
21 - 40	Low
41 – 60	Fairly High
61 – 80	High
81 – 100	Very High

(Source: Ref [12]

Based on the table above, each indicator of needs analysis can be described using these categories. If the percentage of indicators is in the category of high enough to very high then the indicator is said to be needed. Meanwhile, if the indicator is in the very low to low category, then the indicator is not needed

III. RESULTS AND DISCUSSION

The analysis of the need for interactive multimedia containing scientific literacy in physics subjects at Padang City Public High School aims to obtain information and describe how the needs for interactive multimedia containing scientific literacy are in physics subjects at Padang City Public High School and this needs analysis is also the first step that must be done in creating a product under research and development. The needs analysis in this study discusses the analysis in terms of the analysis of student learning styles and the analysis of the needs of students and teachers for interactive multimedia containing scientific literacy. The information obtained was obtained through a questionnaire distributed to respondents. The following discusses the analysis of interactive multimedia needs containing scientific literacy.

A. Analysis of Student Learning Styles

Learning style is a steady manner that is performed through a student in capturing stimulus or data, the way to do not forget, think, and clear up issues [13]. The learning styles developed by Fleming consist of four kinds, particularly, visual, auditory, read/write and kinaesthetic which is commonly abbreviated as VARK [14]. Based at the three school samples, it can be seen that the overall graph of student learning styles at Padang City Public High School is shown in figure 1.

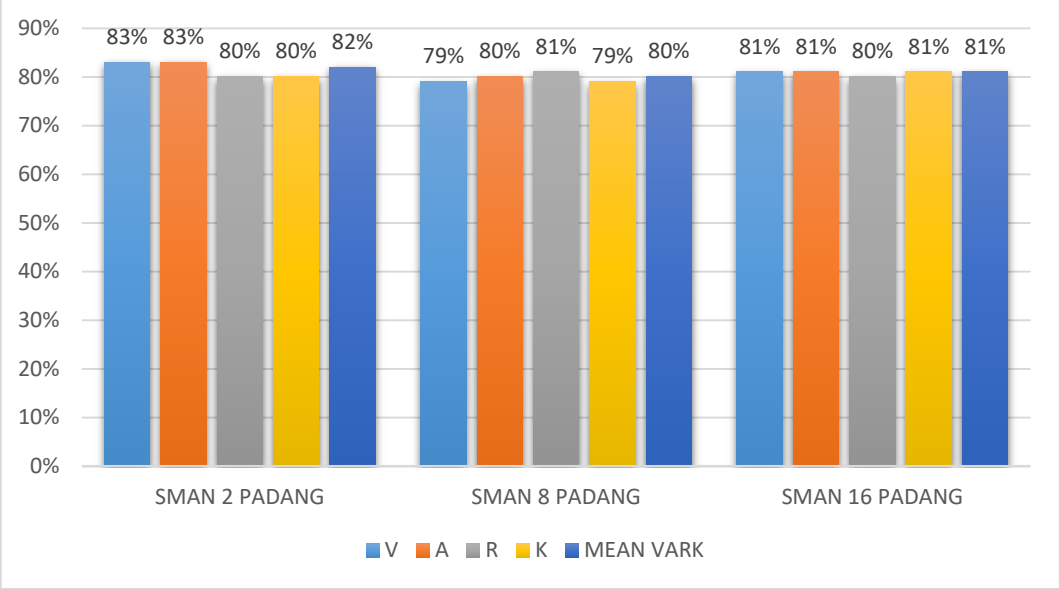

Figure 1. Graph of Student Learning Style Analysis at Padang City Public High School

Based on the learning style data obtained, the VARK of class X Padang City Public High School students was obtained with a percentage of 81%, with a very high category. Of the four types of learning styles, all of them have a percentage that is not much different. This indicates that the tenth grade students of Padang City Public High School apply the four components of the learning style developed by Fleming.

However, based on the three schools that were sampled. Students of each school certainly have a tendency to different learning styles. Padang Public High School 2 has a tendency of visual learning style with a percentage of 83%, very high category. Padang Public High School 8 has a tendency to read/write learning styles with a percentage of 81% in the very high category. Meanwhile, Padang Public High School 16 has a tendency for visual learning styles with a percentage of 81%, in the very high category.

The teacher as one who plays an important role in the learning process must recognize student learning styles, so that later the teacher can prepare suitable strategies to support the learning process, especially in making learning media in physics subjects, so that student learning outcomes are maximized. If the learning media that has been developed is in accordance with the student's learning style, then students will easily obtain information from the media. This is because the suitability of learning styles with the selected media can determine the interests, motivation and ease of learning of students [15].

Knowing student learning styles is very important in order to collect data about student learning tendencies, especially in designing learning systems in general. In addition, understanding one's own learning style will create awareness for students. This awareness provides better opportunities for students to gain knowledge and are also more motivated to learn. Learning styles not only create awareness for students but can also be used to inform them of their strengths and weaknesses. By realizing their strengths and weaknesses in learning triggers them to become more motivated to learn.

B. Analysis of Student Needs for Interactive Multimedia Containing Scientific Literacy

Analysis of student needs is one technique to attain facts about the needs of interactive multimedia containing scientific literacy. Analysis of student needs is important so that the improvement of media inside the learning process is according with the expected needs of students. So that it can make it simpler for students to apply the developed media, make it easier for students to apprehend the difficulty matter and can increase student interest and motivation. Information regarding the analysis of student needs is obtained through the distribution of needs questionnaires related to interactive multimedia needs containing scientific literacy. The results of the detailed analysis of student needs may be visible in Table 2.

Table 2. Results of Analysis of Student Needs for Interactive Multimedia with Scientific Literacy

No	Question	Result Percentage
1	Has your teacher ever used media in explaining learning?	Ever (97,4%) Never (2,6%)
2	What learning media are often used in learning?	Printed Book (82%) Student Worksheet (LKS) (30%) Modules (22%) Power Point (23%) Student Worksheet (LKPD) (44%) Media ICT (4%)
3	Are the existing learning media sufficient for you to understand learning?	Yes (24%) No (76%)
4	Does the physics book you use make you interested and enthusiastic about learning?	Yes (29%) No (71%)
5	Is it necessary to develop new learning media?	Yes (94%) No (6%)
6	What kind of new learning media do you want?	Printed Media (29%) Non Print (ICT) (71%)
7	Does your school have a computer laboratory that you can use for studying?	Yes (98%) No (2%)
8	Can you operate a computer?	Yes (94%)

		No (6%)
9	Do you find it difficult to understand the concept of physics if it is only presented in the form of printed learning media?	Yes (73%) No (27%)
10	Has your teacher ever used interactive multimedia in explaining learning?	Ever (33%) Never (67%)
11	Does interactive multimedia make it easier for you to understand physics material?	Yes (92%) No (8%)
12	Is interactive multimedia an interesting learning media if it is applied?	Yes (95%) No (5%)
13	Does interactive multimedia need to be applied in physics learning	Necessary (96%) No Need (4%)
14	The learning media that I use do not link the learning materials with the facts of everyday life	Yes (73%) No (27%)
15	The learning media that I have used so far have made me not interested in thinking activities	Yes (71%) No (29%)
16	I don't get a lot of information outside of the context of the subject matter like science-related issues from my physics book	Yes (76%) No (24%)
17	Learning media that explains material based on experimental simulations makes it easier for me to understand physics material	Yes (92%) No (8%)
18	Has your teacher used interactive multimedia containing scientific literacy in learning?	Yes (27%) No (73%)
19	Is it through video, audio, text, images and animations that make it easier for you to understand physics material?	Yes (93%) No (7%)
20	Is interactive multimedia containing scientific literacy needed in physics learning?	Yes (97%) No (3%)

Primarily based at the results of the analysis of student needs for interactive multimedia containing scientific literature. It is known that, in the physics learning process, students still predominantly use printed books as learning media with a percentage of 82% in the high category and the use of ICT media with a percentage of 4% in the very low category. However, the prevailing learning media are not enough for students to understand the physics learning. That is evidenced through the students' answers with a percentage of 76% inside the high category and physics books used in the learning process make students not interested in the learning process. This is in accordance with the students' answers with a percentage of 71% in the high category, so that students need new non-print-primarily based learning media (ICT), with the percentage of answers in the high category of 71%.

The use of print media in physics learning is difficult to visualize material related to motion, the exposure of the material is only in one direction so it is difficult to provide feedback to students which makes students not interested and difficult to understand the material in the learning process [16]. Learning with the help of ICT-based media is expected to be able to visualize something abstract and be able to explain complex material so that it is easier to understand.

Judging from the aspect of school facilities as supporting ICT-based totally learning media (information and communication technology), the school already has a computer laboratory that can be used within the learning process with a percent of 98% student answers within the very high category. Based on the aspect of interactive multimedia needs, students find it difficult to understand the concept of physics if it is only presented in the form of printed learning media with the percentage of student answers in the high category 73% and the use of interactive multimedia in the physics learning process is still low with a percentage of 33% in the low category, even though if viewed based on students' answers interactive multimedia can make it easier for students to understand physics material with a percentage of 92% very high category. So that students need the application of interactive multimedia in the learning process with the percentage of answers 96% very high category.

Interactive multimedia is a learning media that can increase students' learning motivation and train independent students in acquiring knowledge and make it easier for students to learn interactively. The use of interactive multimedia can increase students' mastery of concepts and thinking skills when compared to the use of conventional learning media [17].

When viewed from the aspect of students needs for scientific literacy, there is still a lack of use of media or learning resources that apply scientific literacy in the physics learning process. Whereas scientific literacy is one of the skills needed in the 21st century. Scientific literacy is also one of the visions of the 2013 curriculum, which is to create scientifically literate students through science learning [4]. Seeing how important scientific literacy is in the learning process, Padang City Public High School students need a learning process that is able to facilitate scientific literacy, one of which is through computer-based learning media. In the 21st century, students need scientific literacy skills that can be developed, one of which is through the use of computer-based learning media [18].

Based on the information obtained on the needs of interactive multimedia containing scientific literacy. The use of interactive multimedia containing scientific literacy in physics learning is still relatively low. Even though seen in the explanation above, interactive multimedia containing scientific literacy is a learning media that can increase students' learning motivation, facilitate students' understanding and be able to improve students' thinking skills. Based on this, Padang City Public High School students need interactive multimedia containing scientific literacy as a medium for learning physics with a percentage of student answers 97% very high category.

C. Analysis of teacher needs for interactive multimedia containing scientific literacy

Analysis of teacher needs is one approach to achieve information approximately the needs of interactive multimedia containing scientific literacy. It's far important to analyze the needs of teachers in order that the development of media inside the learning procedure is according with the needs predicted through the teacher and is ready to overcome the issues that arise within the learning process. Because the teacher has an important role this is very influential within the learning process, in particular learning physics. Information regarding teacher needs analysis was obtained through the distribution of needs questionnaires related to interactive multimedia needs containing scientific literacy. The results of the specific analysis of teacher needs can be seen in Table 3.

Table 3. Results of Teacher Needs Analysis of Interactive Multimedia Containing Scientific Literacy

No	Questions	Result Percentage
1	Have you ever used media in explaining learning?	Ever (100%) Never (0%)
2	What learning media do you often use in learning?	Printed Book (100%) Student Worksheet (LKS) (67%) Modules (100%) Power Point (33%) Student Worksheet (LKPD) (100%) Media ICT (0%)
3	Are the existing learning media sufficient for you to explain the lesson?	Yes (0%) No (100%)
4	Does the physics book that you use make students interested and enthusiastic in learning?	Yes (33%) No (67%)
5	Is it necessary to develop new learning media in learning?	Yes (100%) No (0%)
6	What kind of new learning media do you want?	Printed Media (0%) Non Printed (ICT) (100%)
7	Does your school have a computer laboratory that can be used for studying?	Yes (100%) No (0%)
8	Can you operate a computer?	Yes (100%) No (0%)
9	Do students find it difficult to understand the concept of physics if it is only presented in the form of printed learning media?	Yes (100%) No (0%)
10	Have you ever used interactive multimedia in explaining learning materials?	Ever (0%) Never (100%)

11	Does interactive multimedia make it easier for you to explain physics material?	Yes (100%)
		No (0%)
12	Is interactive multimedia an interesting learning media if it is applied?	Yes (100%)
		No (0%)
13	Does interactive multimedia need to be applied in the learning process	Necessary (100%)
		No Need (0%)
14	Do the learning media that you use relate the learning materials to the facts of everyday life?	Yes (33%)
		No (67%)
15	Does the learning media that you use make students interested in thinking activities?	Yes (33%)
		No (67%)
16	Do students get a lot of information outside the context of the subject matter such as issues around science from the physics book that you use?	Yes (0%)
		No (100%)
17	Learning media that explains material based on experimental simulations makes it easier for students to understand physics material	Yes (100%)
		No (0%)
18	Have you used interactive multimedia containing scientific literacy in learning?	Yes (0%)
		No (100%)
19	Does it make it easier for students to understand physics material through video, audio, text, images and animation?	Yes (100%)
		No (0%)
20	Is interactive multimedia containing scientific literacy needed in physics learning?	Yes (100%)
		No (0%)

Table 3 presents the results of the analysis of teacher needs for interactive multimedia containing scientific literacy. The results describe that, in explaining physics learning, teachers still often use media in the form of printed books. This is evidenced by the teacher's answer with a percentage of 100% in the very high category. Meanwhile, the use of ICT media has not yet been applied in physics learning with a percentage of 0% in a very low category. This is certainly not in line with the use of technology today. Conventional learning processes such as printed books certainly do not convey abstract physics material, because many illustrations, images and symbols, and equations are used [19].

Furthermore, the existing learning media in schools are not sufficient for teachers to assist in explaining the concepts of physics material, according to the teacher's answer with a percentage of 100% in the very high category. Physics books used by teachers in the learning process make students less interested in the learning process, according to the teacher's answer with a percentage of 67% in the high category. This makes teachers need new learning media such as non-print learning media (ICT media) with a 100% answer percentage in the very high category.

Based on the aspect of the availability of supporting learning facilities and media, Padang City Public High School already has facilities to support the application of interactive multimedia containing scientific literacy in the learning process. This is evidenced by the teacher's answers, 100% of schools already have computer laboratories that can be used in the learning process and 100% of teachers are also able to operate computers.

Based on the teacher's need for interactive multimedia. The teacher has never used interactive multimedia in the physics learning process. This is based on the teacher's answer with a percentage of 100% in a very high category, even though using printed books in the learning process the teacher finds it difficult to explain the concept of physics. This is in accordance with the teacher's answer with a percentage of 100% in the very high category. Therefore, teachers need the application of interactive multimedia in the learning process. This is in accordance with the teacher's answer with a percentage of 100% in the very high category.

Interactive multimedia in the learning process makes it easier for teachers to convey material to students and students also find it easy to accept the learning materials provided. Furthermore, the learning process that applies interactive multimedia is able to illustrate abstract material that can increase students' learning motivation [20].

Judging from the teacher's need for scientific literacy, there is still a lack of use of media or learning resources that apply scientific literacy in the physics learning process. Whereas scientific literacy is one of the skills needed in the 21st century [21]. Seeing how important scientific literacy is in the learning process, Padang City Public High School students need a learning process that is able to facilitate scientific literacy, one of which is through computer-based learning media.

Analysis Of teacher needs for interactive multimedia containing scientific literacy. There is still a lack of teachers using interactive multimedia containing scientific literacy in physics learning. This is evidenced by the teacher's answer with a percentage of 0% in the very low category. Learning through video, audio, text, images and animations makes it easier for students to understand physics material. This result is in accordance with the teacher's answer with a percentage of 100% in the very high category. Padang City Senior High School teachers need interactive multimedia containing scientific literacy in physics learning. This is evidenced by the teacher's answer with a percentage of 100% with a very high category. Based on the questionnaire analysis of teacher needs, it describes that Padang City Senior High School teachers need interactive multimedia containing scientific literacy as a medium for learning physics.

IV. CONCLUSION

Based on the results of the research and discussion that have been defined, it may be concluded that the analysis of students' VARK learning styles has a percentage of 81% very high category, analysis of student needs for interactive multimedia containing scientific literacy has a percentage of 97.4% very high category and analysis of teacher needs for multimedia interactive scientific literacy content has a percentage of 100% very high category. This proves that interactive multimedia containing scientific literacy is needed as a medium for learning physics for class X at Padang City Public High School.

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