The analysis of instructional media in development of lightning e-module for Physics learning in Senior High School

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Abstract. Learning media make the learning activity more effective and efficient. The use of media in physics learning is hoped to make the students easier to understand the materials. The purpose of this research is to identify the characters of learning media in the E-module developing in the theme of Lightning for the physics learning in senior high school. The study adopted the descriptive survey research design. The data collection technique is using questionnaire technique and interview. The collected data is analyzed by using quantitative descriptive analysis through the average value and the percentage. The results show some indicators of the media used are still lacking with values ranging from 70 to 75, namely the suitability of the media with students, motivating quality, the variety of media used, media clarity, and media practicality. For the students' responses, 62% of students had never used the media and their interest in using the media is in the category of interest with a score of 82.6%.

1. Introduction
Physics learning for students are a less preferred lesson. The results of interviews with students of SMAN 2 Batusangkar revealed that they find it difficulties in learning physics, due difficulties in imagining the logic or the process that happened, the lack of exercise, incomplete discussion of material in the book, also feels bored and saturated. In addition, monotonous learning will be difficult for students to accept. As a result, some students are not motivated to study physics. In order for students to be motivated to learn physics, it is necessary to apply learning media that are interesting and easy to access. Learning media make the learning activity more effective and efficient. One interesting and easily accessible learning media is an interactive multimedia in the form of an electronic module (e-module).

An E-module is a form of interactive multimedia teaching materials. The E-module is one of the computing technologies that has been widely used for learning electronically or digitally. Its implementation in learning can improve understanding of the subject [2]. Usually, e-module equipped with animation, video, and images, making it easier for students to understand the teaching materials. In accordance with, the superiority of the e-module compared to the print module are its interactive nature makes it easy to navigate, enables display/loading of images, audio, video and animation and equipped formative tests/quizzes that allow automatic feedback immediately [3]. The E-module can be accessed anywhere and anytime. Moreover, e-modules equipped with interesting animations,
videos and images. It can attract students to learn. Therefore, e-module is one of the media that can be used in learning.

The facts that found in the school, First, teachers have not applied varied media. Various media can make students better understand teaching materials. Second, IT-based media such as power points, e-modules, and multimedia are rarely applied in schools. Most teachers only usage books that have been provided at school or printed materials. Thirdly, in physics learning, the students are entirely inactive. It can be seen in question and answer or discussion activities, that students who respond to the teacher’s questions or express opinions/ideas are certain people only.

Previous research on media analysis has been done by Sriadhi [4] and Sari [5]. Research that has been carried out states that in learning, media is still not optimally implemented. The difference in research that will be carried out is media analysis will be required to develop integrated e-modules of lightning disasters in high school physics learning. In this study, which will be analyzed is whether the learning media has been integrated lightning disasters and variations of the learning media.

The aim of this research is to describe the learning media in the development of an integrated e-module of lightning disaster in high school physics learning.

2. Method
The study adopted the descriptive survey research design. In descriptive research, researchers used quantitative strategies (for example questionnaire and observation techniques) to collect data (for example, in the form of scores) [6]. The data taken is the questionnaire of learning media with the object of physics teacher observation and the students of class XII MIPA 2 SMAN 2 Batusangkar. The data of the research were analyzed by using descriptive statistic to get the average value and percentage. Media analysis was analyzed by using a Likert scale. The teachers are given a questionnaire containing questions about media analysis, such as first, quality of content and objectives, in which consist of media accuracy used, media balance used, and conformity with learners. Second, the quality of learning, which consists of the ability to provide opportunities and helping learn, motivate, and provide impact for learners. Third, technical qualities that include readability, ease of use, and display quality. Learners are given a questionnaire containing questions about the media required by learners in physics learning. Analysis of media analysis questionnaire data is done by steps:

- Gives score for each item very good answer (4), good (3), less (2), and very less (1)
- Sums up the total score for each teacher for all indicators
- Scores of each aspect are then aggregated and made the average
- The predicate level of graduate competency is as shown in table 1.

| Interval | Category         |
|----------|------------------|
| ≤60      | Very less        |
| 60< value≤75 | Less            |
| 75< value≤90 | Good            |
| 90< value≤100 | Very good      |

3. Results and Discussion
The result of this research is the percentage data analysis of instructional media. The data obtained comes from teachers and learners.
3.1. Media analysis by teacher

Based on the results of interviews with physics teachers at SMAN 2 Batusangkar on learning media used, the results obtained that the teachers rarely use multimedia in physics learning. The teachers often use learning resources in the form of textbooks because it is easy to get. The textbooks used also have not integrated lightning disasters for class XII.

Furthermore, questionnaire analysis of learning media by teachers consists of three components, namely the quality of content and objectives, the quality of learning and the technical quality. The results of the research using the developed instrument are as follows.

3.1.1. Analysis of content quality and objectives.

Analysis of content quality and objectives include media accuracy used with learning objectives, media relevance with teaching materials with learning objectives, media used to support learning materials, and in accordance with the level of thinking of the learners. Content quality analysis and instructional media objectives are shown in Figure 1.

Figure 1.

Figure 1. Content quality analysis and instructional media objectives

Figure 1 shows that the accuracy of media and the media balance used are good with the values of 87.5 and 84.4, but the suitability of the students still needs to be improved because it is still low at 71.8.

This is because of each indicator of learning media is still not suitable with the level students’ thinking, has not led to the excitement of students learn, has not allowed a more direct interaction between students with the environment and reality, and has not enabled students to study separately ability and interest. Therefore, it is needed to improve the indicator of the suitability of learning media with students so that the students can understand the teaching materials. Media selected by the teacher and used in the learning is adapted to the ability of teachers and learners, suitable with the learning patterns of the students, and can attract the students’ attention [7].

3.1.2. Quality of learning media analysis.

The quality of the media used in the learning process can provide help in learning, it can motivate and enable the learners to use more than one sense in learning activities, as well as the media used by learners and stimulate learners to think and conduct analysis, giving a similar perception to the subject matter and increase the active participation of the learners. The media quality analysis used in the learning is shown in Figure 2.
Figure 2 shows that the media used are included in both categories to provide learning assistance and impacts for the learners, with values of 87.5 and 82.5. However, the quality of motivating the students in learning, the media used is categorized less well with a value of 75 and this means to motivate students to needed an increase in the media used.

3.1.3. Technical quality analysis.
The quality of media techniques used is the variety of media used, the clarity of the media used and the learning media used is simple and practical. The analysis of the medium technique's quality used in learning is shown in Figure 3.

Figure 3 shows that the quality of media used for three indicators, namely the variation of media, media clarity, and the practicality of the media categorized less with a value of 75. Conversely, for the media indicator used is simple which categorized good with value 87.5.

Based on Figure 3 it can be concluded that for technical quality, teachers are expected to use varied media in learning and the media used should be clear and practical. Therefore, it can facilitate the learners in understanding the teaching materials.

3.2. Media analysis by the learners
Based on the observations that have been done, it was found that 69% of students of class XII MIPA 2 SMAN 2 Batusangkar have never used learning media in form of interactive multimedia. This is
because the teachers rarely use multimedia in physics learning. Accordingly, with research has been done that the use of ICT-based media in biology learning in SMPN Kecamatan Medan City is still in the category of less [8].

In conventional learning as usual, learners are only presented material from the thick package of books and full with writings and formulas. Therefore, the learner’s activity in physics lesson is still less. It can be seen from the observation, that there are only 31% of active learners, the rest is in the less active category. Furthermore, for the interest of learners using multimedia, it is obtained the result that 82.6% of students enjoy learning by using multimedia, such as video, simulation, pictures, etc. Therefore, it is necessary to develop a teaching material in the form of multimedia. One of the multimedia that can be used is e-module.

4. Conclusion
Based on observations, obtained the results of teacher responses about the learning media used in school is good enough. However, there are indicators that are still lacking, namely Media suitability with students is still lacking with a score of 71.8; The quality of media motivation is still lacking with a value of 75; Variety of media used has not varied with a value of 75; Media clarity includes less with a value of 75; Media practicality is still lacking with a value of 75. The results of the students' responses on learning media, obtained the result that 69% of they have never used the media in learning. Consequently, the learning process is less active. The Students’ activity only 31%. Furthermore, the interest of the students in using multimedia in learning is 82.6%. Based on the responses of the teachers and students, it is necessary to develop the learning media that can make students easily understand the teaching material and in suitable with the media needed by students. One of the media that can be used is e-module. Because e-module is an interactive multimedia learning material that contains animation, images and videos. Moreover, e-modules are easily accessible anywhere and anytime.

References
[1] Perdana, Fengky Adi dkk. 2017. Development of e-module combining science process skills and dynamics motion material to increasing critical thinking skills and improve student learning motivation senior high school. International Journal of Science and Applied Science: Conference Series. Vol 1 No 1
[2] Hashim, Mohamad Hisyam Mohd. 2015. Using Technology and Instructional E-Material among Technical Teacher and Student into Teaching and Learning: A Qualitative Case Study. International Education Studies. Vol 8 No 3. Canadian Center of Science and Education
[3] Suarsana, IM. 2013. Pengembangan E-Modul Berorientasi Pemecahan Masalah Untuk Meningkatkan Keterampilan Berpikir Kritis Mahasiswa. Jurnal Pendidikan Indonesia. Vol 2 No 2. Universitas Pendidikan Ganesha
[4] Sriadhi. 2015. Analisis Karakteristik Media Pembelajaran Dan Motivasi Berdasarkan Gaya Belajar Siswa Sekolah Menengah Kejuruan. Educandum. Vol 8 No 2.
[5] Sari, Novita dkk. 2017. Analisis Penggunaan Media Pembelajaran Untuk Meningkatkan Motivasi Peserta Didik Terhadap Pembelajaran Fisika Kelas XI MI PA 1 SMA Titian Teras Muaro Jambi. Jurnal Pendidikan Fisika dan Keilmuan (JPFK). Vol 3 No 2. Universitas Jambi
[6] Setyosari, Punaji. 2013. Metode Penelitian Pendidikan dan Pengembangan. Jakarta : Kencana
[7] Prastya, Agus. 2016. Strategi Pemilihan Media Pembelajaran Bagi Seorang Guru. Prosiding Temu Ilmiah Nasional Guru (TING) VIII. Universitas Terbuka
[8] Ritonga, Nurhakima. 2017. Analisis Penggunaan Media Berbasis Teknologi Informasi Dan Komunikasi Dalam Proses Pembelajaran Biologi Di SMP Negeri Se-Kec. Medan Kota. Cahaya Pendidikan. Vol 3 No 1.