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Development of Web-Based Learning Media as A Chemistry Learning Supplement

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ABSTRAK

Tujuan penelitian ini adalah memproduksi media pembelajaran kimia berbasis web yang bisa digunakan oleh pembelajar dan mudah diakses setiap saat oleh pebelajar. Penelitian ini merupakan riset pengembangan dengan menggunakan model ADDIE yang terdiri atas 5 fase yaitu *Analysis, Design, Development, Implementation,* dan *Evaluation*. Teknik pengumpulan data dalam penelitian ini dilakukan dengan cara pemberian kuesioner. Hasil penelitian menunjukkan bahwa media pembelajaran kimia berbasis web terkategori sangat layak digunakan dalam pembelajaran dengan persentase sebesar 86,6 persen dari ahli media, 95,8 persen dari ahli materi, dan 91,3 persen dari hasil uji kelompok kecil. Media pembelajaran Kimia berbasis web ini dapat dijadikan suplemen pembelajaran untuk mendukung media pembelajaran lainnya yang digunakan oleh pembelajar di sekolah.

ABSTRACT

The purpose of this research wasto produce web-based chemistry learning media that can be used by students and easily accessible at any time . This research is development research using the ADDIE model which consists of 5 phases, namely Analysis, Design, Development, Implementation, and Evaluation. The data collection technique in this study was by distributing a questionnaire. The research results shows that the web-based chemistry learning media is categorized as very suitable for use in learning with a percentage of 86.6 percent from media experts, 95.8 percent from material experts, and 91.3 percent from small group test results. This web-based chemistry learning media can be used as a learning supplement to support other learning media used by students in schools.

INTRODUCTION

Teachers have a primary position in creating a learning atmosphere. Basically, they must organize learning that is active, creative, efficient, and fun. Learning must allow students to carry out various activities to improve their behavior, skills, or mastery of concepts. Saputra (2019) explained that learning is a process of changing behavior in humans, which is shown in the form of increasing self-quality. The learning atmosphere is the main thing in the learning process. The aspect of success in the teaching and learning process is the learning method in delivering information in learning (Fahmi et al., 2021). Teachers must be able to produce an attractive

instruction in the classroom so that they can attract the attention and motivation of students to explore the educational process. Teachers must realize that learning is a series of activities that are deliberately created to make it easier for students to understand the material presented. Active learning is education that provides opportunities for students to build their own concepts and meanings through various activities (Darman et al., 2021). To achieve this goal, the component considered by the teacher is the learning media.

Learning media is a basic component of the learning system (Salim et al., 2020). Learning media is a tool for conveying information to be informed to students (Diana, 2021); (Putra & Kartini, 2020). Learning media can be said as a liaison to convey messages in learning. The use of learning media in the classroom can provide a more concrete description to students of the material being studied. The use of interesting and memorable learning media supported by a conducive educational atmosphere will increase students' motivation and attention to learning so that students can easily master learning content and can achieve learning objectives. The presence of media in learning can improve students' mastery of concepts, make the presentation of information/data more attractive and reliable, facilitate understanding of information, and condense data (Yanto, 2019).

One of the learning media that can provide good visualization is web-based learning media. Darussalam (2015) explained that web-based learning media makes learning more interactive and fosters student learning motivation. The advantages of web-based learning media include: (1) very simple but elegant media, (2) having a variety of materials as a learning resource for students, (3) enabling students to gain learning skills because the integrated materials are more interactive, and (4) able to generate student learning interest (Setyadi & Qohar, 2017). Fajriani et al. (2020) revealed the four potential learning media through web-based interactive multimedia, namely: (1) visualization to support descriptions; (2) education using simulations to facilitate module abilities; (3) problem-solving education equipped with automatic feedback; and (4) a combination of collaborative and independent learning. Amin & Sapir (2018) explain the advantage of using web-based learning media lies in the small file size and can be accessed anywhere. This advantage can make it easier for students to understand very complex chemistry.

Another opinion was expressed by Sari & Suswanto (2017) that the advantages of website-based learning media include: (1) the media can be accessed online so that it is more flexible; (2) the media can be accessed via a PC/laptop as well as *mobile* that have supporting software features such as *a website browser*; (3) have complete content, namely *mind maps*, modules, photos, videos, and practice questions to improve students' understanding of descriptions; (4) students can download a lot of content on the *website* for offline learning; (5) the media has 3 access rights (admin, teacher, and student) and has a dynamic nature; (6) the media has an *activity analyze*; and (7) proven to be able to improve student learning outcomes.

The tendency of learning that is less interesting and still uses conventional procedures makes students' attention to exploring learning very low. In contrast, Rikawati & Sitinjak (2020) claimed that in chemistry learning, students must function actively, to master it physically and mentally by using the available abilities to the fullest. Chemistry learning taught with a teacher-centered approach has implications for lack of students' interest and motivation in learning Chemistry (Saputra & Salim, 2020). On the other hand, SMA Negeri 08 Bombana has good facilities and infrastructure to carry out learning by utilizing media. However, the ability of the teachers to design innovative media was still low.

Web-based learning can be used to provide learning materials to complement conventional programs and enable self-assessment (Wasim et al., 2014). Web-based learning is an appropriate and effective method for the learning process that requires practicum (Barisone et al., 2019). The findings of Motaghian, Hassanzadeh, and Moghadam (2013) provided information that web-based learning is very easy to use and has a very good quality learning system. Based on the explanation, a concrete action was essential in developing learning media at SMA Negeri 08 Bombana with the aim of producing web-based chemistry learning media that can be used by students in learning and is easily accessible at any time.

METHOD

This research is development research using the ADDIE model which consists of 5 stages: *Analysis, Design, Development, Implementation,* and *Evaluation* (Branch, 2009). The first stage was to find out the problems related to the students by conducting needs analysis, identifying problems, and doing task analysis to produce outputs in the form of student characteristics, problem gaps, identification of needs, and details of tasks that have been analyzed as needed. The design stage was to determine the form of web-based learning media product design that would be developed. The development stage was the stage of realizing the design in the form of web-based learning media products to use in learning activities. Web-based learning media products that have been verified were very feasible at the development stage and would be implemented for the students at the implementation stage. This implementation stage was intended to test the web-based learning media on the test subject. The last stage was the evaluation activity. The evaluation stage was carried out only up to the formative evaluation stage aimed at the need for revision.

The subjects of this research are three media experts, three material experts, and fifteen students. The research subjects were selected using a simple random sampling technique. This technique was chosen because basically all existing test subjects have the same potential to become test subjects. This research involves media and materials experts. Both experts are needed to provide input regarding the developed web-based learning media. Competence from experts is primary to produce learning media that suit the needs of students. The method of collecting information in this research was by observation and distributing questionnaires. The information obtained through the evaluation questionnaire was analyzed using quantitative descriptive analysis methods described in the distribution of percentage scores on the type of the determined evaluation scale.

The information analysis method using the quantitative descriptive analysis method was to describe the results of the product development in the form of web-based learning media, the results of the product feasibility level test to be implemented in the Chemistry subject of class X SMA Negeri 08 Bombana. The media validity standards in this study are described in Table 1.

Table 1. Eligibility Criteria for Learning Media

Percentage (%)	Information Validity	Conclusion
25.00-40.00	Invalid	cannot be used
41.00-55.00	Less valid	cannot be used
56.00-70.00	Sufficiently valid	May be used after major revision
71.00-85.00	Valid	May be used after minor revision
86.00-100	Very valid	Very good to use

(Adopted from Akbar (2016))

RESULTS

The results section will describe the concrete steps of the research and the outputs obtained at each stage according to the ADDIE model. The detailed explanation is as follows:

Analysis

The analysis stage found a gap between the conditions in the field and the theory. Furthermore, the mapping of learning objectives and materials to be published in this learning media was carried out.

The results of interviews with the students provided the following information: (1) there were problems related to the diverse abilities of students, so varied and interactive learning media were vital to meet all learning styles of the students; (2) the content or material used was still

monotonous, namely in the form of textbooks for the teachers and students; and (3) the teachers understood the use of website-based interactive learning media.

The initial observation questionnaire revealed the following things: (1) the students assumed that the content or material used at the time did not attract attention, causing students' learning motivation low; (2) the ability of students to master chemical concepts was categorized low and there were many students who had not achieved the minimum completeness criteria (KKM); (3) the teachers expected interesting teaching materials that could be used at any time; and (4) the students expected that there was a video element in the learning media to make it easier to understand absolute and high complexity chemistry material.

Design

The design stage produces an output in the form of a design in the form of a flowchart and the features to be used.

Development

The development stage was to carry out the production process of the web-based learning media adapted to the design presented in the previous stage. Website-based learning media produces media with a menu in the form of Material, Evaluation, Reference, and Biodata. In addition, the *header* contains the words SMA 08 Bombana Kimia Class X. The bottom part of the *header* reads Welcome to Media Learning Chemistry Class X at SMA Negeri 08 Bombana, Kabaena Tengah District, Bombana Regency. At the bottom of the main page is a Footer that reads Copyright © 2020 SMAN 08 Bombana. A detailed display of web-based learning media is as shown in Figure 1.

The web-based learning media were tested on media experts, material experts, and small group trials. Media experts were three lecturers of Information Technology Education at the University of Muhammadiyah Kendari. Media experts considered the suitability of presentation aspects with the demands of learner-oriented learning, word sorting, language, display, presentation, animation, and audio. Not only by the media experts but the web-based learning media were also tested by material experts. Material experts were three Chemistry teachers of SMA 08 Bombana. They shared evaluations on aspects of module presentation, the accuracy of the module, and assessment. The results of the evaluation of media experts and module experts are in Figure 2. The results of the assessment of media experts and material experts were within the very feasible criteria, so the product was then tested at the small group test stage with fifteen students of class X SMA 08 Bombana. The findings in the small group test obtained an average of 91.3% with very feasible criteria for use in learning.

Figure 1. Interface Page Display

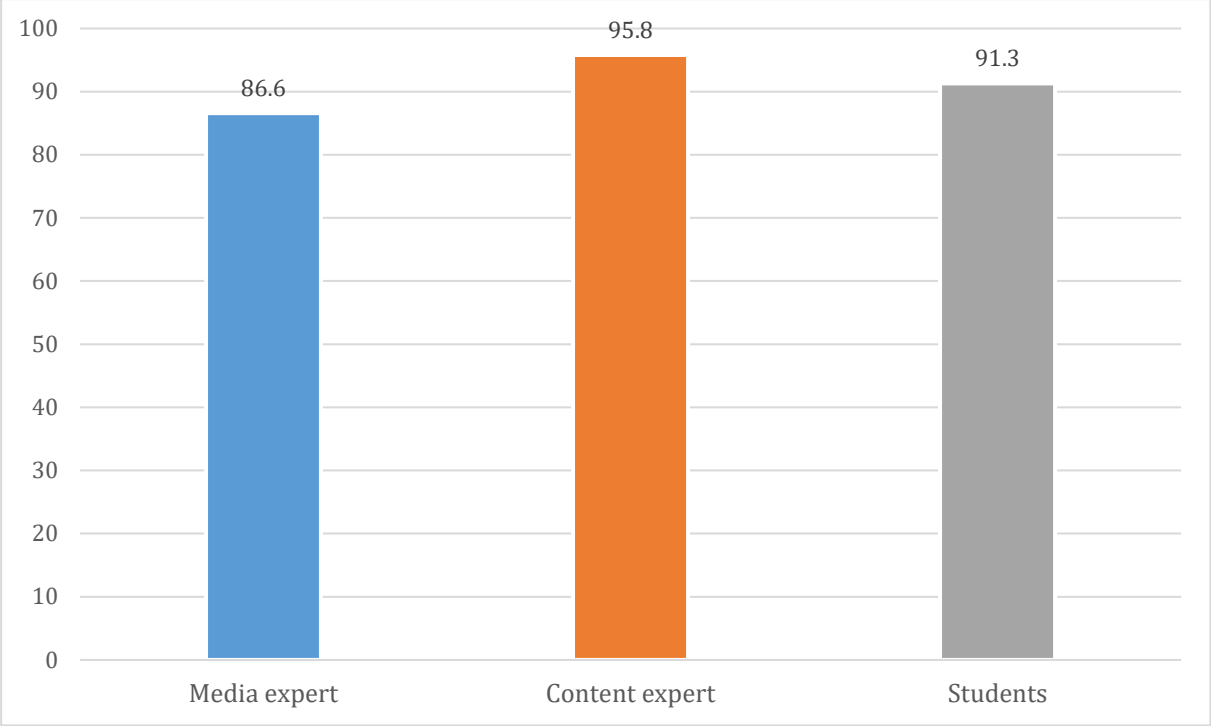

Figure 2. Results of Assessment of Media Experts and Material Experts on Web-Based Learning Media

Implementation

Web-based learning media products that have been declared very feasible at the development stage would then be implemented in class X SMA 08 Bombana.

Evaluation

The last stage was formative evaluation. Based on the results of this research, the experts claimed that the developed web-based learning media had a number of shortcomings to be corrected, such as choosing the right combination of writing and the background, presenting images that are unnclear, and the need for more attractive animation development. Learners responded positively to the web-based learning media produced because it was very helpful and made it easier for them to learn the material presented, especially when coupled with the material in the form of videos and animations.

DISCUSSION

This section will discuss the criticisms and suggestions that are the findings of experts and students along with the supporting literature that supports their opinions. The learning process in the digital era requires a variety of teaching materials and technology used, for example, teaching materials developed must have the ability to connect with other learning resources that can be accessed freely (Surahman et al., 2020). Web-based learning media is a website considered to be used more optimally in supporting the learning process because students can learn and analyze the teaching modules themselves whenever and wherever they are without having to wait for the arrival of the teacher to explain it (Divayana et al., 2016).

In this study, web-based learning media begins with an assessment by learning media experts. Based on the results of the media expert assessment, the average percentage was 86.6%, with the criteria very feasible to be used in learning. There are several suggestions submitted by media experts, including: (1) the combination of writing and the background used was inappropriate, (2) the animated videos contained in the learning media should be videos made by the developer themselves, (3) the presentation of the material in the form of the text must be more thorough so that there are no typing errors, and (4) the presentation of the material in the form of images was still unclear.

The use of video in learning can be maximized by adjusting the modality and content (Brame, 2016). Learning videos can make students attracted because the learning process is carried out in an interesting and not monotonous way (Putri & Dewi, 2020). Good visualization will be separate energy for students, a means for increasing students' imagination and making it easier to understand the material presented (Armansyah et al., 2019; Maulana et al., 2020). In addition, videos can provide detailed information and overcome the limitations of space and time, and make the learning atmosphere more dynamic (Rafika & Amboro, 2018; Pratama et al., 2020).

Learning video is one of the media that has audio (sound) and motion visual factors (moving photos). The task of the video in learning is to function as an introduction to data from the learner to the learner. Video has the expertise to present data, describe processes, explain complex concepts, direct expertise, and influence behavior (Yuanta, 2020). The ease of repeating videos and methods of presenting data in a structured manner make video one of the media that can improve students' skills in mastering a concept (Hadi, 2017). A similar opinion was conveyed by Kurniawan et al. (2018) that learning video media is needed to make it easier for students to understand the material being taught.

Validation continued on the learning material experts. Based on the results of the expert assessment of the material obtained an average of 95.8% with very feasible criteria for use in learning. The validator provides suggestions, including: (1) it was necessary to simplify the way the material is presented, and (2) there were illustrations that were unclear and disproportionate. This is in line with the explanation of Saputra & Salim (2019) that environmental content must be prepared in simple language so that it is easy for students to understand. Meanwhile, Prasetyo & Dhaniawaty (2020) describes a simpler but more attractive visual display will make illustrations lighter and more enjoyable. Context suitability and a good description will influence the process and mindset of students (Gilang et al., 2017).

Validation continued in small group trials. Based on the results of the small group trial, the average percentage of 91.3% was obtained with very feasible criteria for use in learning. A positive response was given by the students by stating that the web-based learning media made it easy for them to understand the materials presented. In addition, the help of video and animation media further increases the motivation of students to learn. The presence of this media is very helpful for students to be able to learn at any time, even when they are at home. This statement is in line with the opinion of Widiyaningtyas & Widiatmoko (2014) that web-based learning media are dynamic, making it easier for students to understand chemistry due to interactive text, images, and simulations.

When referring to all test results, it was found that the web-based learning media was very suitable for learning. The findings of this study are in accordance with research conducted by Allo (2011) that the information technology-based learning model is categorized as valid and practical to use in learning. Another finding revealed by Manggopa et al. (2019) that web-based learning can support learning and be effective in improving the quality of learning. Web-based learning media can improve scientific attitudes and learning achievement (Ekaputra, 2020; Januarisman & Ghufron, 2016).

CONCLUSION

Based on the results and reviews, it can be concluded that the web-based chemistry learning media was categorized as very feasible with a percentage of 86.6% from media experts, 95.8% from material experts, and 91.3% from small group trials. Therefore, it can be used in learning. For the sake of the perfection of this media development, it is necessary to do further research tailored to the learning needs. This learning media is still limited to class X chemistry subjects, so it needs to be re-elaborated on chemistry subjects for classes XI and XII or other subjects. In addition, this study has not yet arrived at the assessment of the improvement of the student's learning outcomes after using web-based learning media. The developed web-based chemistry learning media can be used as a learning supplement to support other learning media used by students in other schools.

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