

The Development of Teaching Materials: Stoichiometric Integrated Multimedia Easy Sketch

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Abstract— The most important factor to achieve learning success is the use of learning media as teaching materials. The learning media used must be interesting so that students will be more motivated and active in following the learning process. One effort to do is by developing the teaching materials integrated of Easy Sketch multimedia. This study aims to analyze teaching materials developed by using the Easy Sketch program on stoichiometric material. Research method using Development Research by stages Analysis, Design, Development, Implementation and Evaluation (ADDIE). The research instruments are questionnaire and objective test. The feasibility of using chemical learning media is analyzed based on the standard data of content, appearance, materials and programming. Data were obtained by using validation sheets that have been validated by a team of experts. The first step in development is the analysis of teaching materials available in Senior High School State Pangkatan, Labuhanbatu regency (SMA Negeri 1 Pangkatan, Labuhanbatu regency). The result of learning media X analysis as a whole is feasible and the learning media Y is quite feasible but still needs to be revised and developed.

Keywords—*development, learning media of chemistry, stoichiometry, easy sketch*

I. INTRODUCTION

Chemistry learning is built through an emphasis on giving students a direct learning experience through the use and development of process skills and scientific attitudes. Students are expected to find facts, build concepts, theories and scientific attitudes. The high level of difficulty in understanding chemistry is because the chemical material contained in the chemistry subject covers abstract, memorized and calculated things so that it is difficult for students to understand, most students find it difficult to understand and apply a lot of formulas during chemistry learning [1,2,3].

The existing chemistry learning process needs to be improved and designed in such a way with learning conditions that have attraction and fun so that students are more excited, passionate, motivated to learn chemistry. If students have felt their interest in chemistry, then one day they can improve the quality of logical, critical, analytical and cognitive thinking. By improving these qualities, the next generation of dedicated,

superior, reliable, responsible, and outstanding people will emerge.

In the era of globalization, students must have the ability to read, write, describe, and understand the symptoms and natural phenomena that are around. Student literacy is needed in the world of education. In addition, literacy can help students in the learning process so that learning material can be applied with the natural phenomena around them. Literacy is the ability to read and write in carrying out tasks related to the world of work and life outside of school [4]. To be able to construct students' knowledge well, the task of a teacher is not only to deliver class material, but a teacher must be able to design effective learning, evaluate the learning that has been done, and create the necessary learning instruments.

Learning activities there are several components including: goals, learning materials, assessment, methods and tools or media. These components become the main components that must be fulfilled in the teaching and learning process. In the learning process, teaching materials chosen and developed by teachers are important components to support student success in learning. Teaching materials are all forms of material or a set of materials that are arranged systematically, used to assist teachers and students in carrying out learning activities [5].

The application of modules in learning is one of the efforts to overcome the problem of limited printed teaching materials [6]. Innovative chemistry learning modules are very effective in improving student learning outcomes in teaching reaction rates. The facilities contained in the innovative module enhance chemical learning activities efficiently so that teaching and learning activities become student-centered to achieve competencies in accordance with the 2013 curriculum demands so as to improve student learning achievement. This is because the development module presents adequate exercises for cognitive development [7,8].

The results of the study show that the learning modules developed have positive effects for teachers and improve learning outcomes and learning activities for students. [9,10,11,12]. This is because the development results module has complete content that suits the needs of students so that it can be presented as material for students' independent learning. In line with what was stated by Ozdilek and Chen that the learning outcomes of high school students in Turkey taught by using instructional materials arranged according to the level of

students' thinking were far better than using the commonly used teaching materials [13,14]. Learning by using the module has been proven effective in various fields, the field of nursing revealed by Anonson the development results module is very effective to be used in fostering the ability of nursing graduates in carrying out field practices [15]. The field of science is expressed by Yuliawati and Izzati the results of the analysis of learning outcomes of students achieving 100% minimum completeness of criteria value (KKM) shows that the development module is very effective in learning [16,17].

Based on the results of the analysis and observations conducted by researchers, it is necessary to develop instructional materials that are integrated in multimedia based on information technology. According to Muhson the use of Information Technology (IT) as a learning medium is already a demand. Although designing IT-based media requires special expertise, it does not mean that the media is avoided and abandoned. IT-based learning media can be in the form of internet, intranet, mobile phone, and CD Room / Flash Disk. The main components include Learning Management System (LMS), and Learning Content (LC) [18].

Media as teaching material in the learning process must be able to create an atmosphere of joy because the atmosphere of joy will affect the way the brain processes, creates and informs. Media that are familiar with students for example, computers, cellphones and other electronic equipment. Therefore the teaching process at this time is very different. Teaching them will be easier and more interesting if the teaching media presented by the teacher uses technological tools [19].

According to Arsyad, explaining the results of research on learning through word stimulus and word stimulus, visual and verbal concludes that visual stimulus results in better learning outcomes for tasks such as remembering, recognizing, recalling, connecting facts and concepts [20]. Learning using multiple senses, seeing and listening will provide benefits for students. According to Hidayatullah humans can absorb a material as much as 70% of what they do, 50% of what is heard and seen (audio visual), whereas from what they see only 30% of what they hear is only 20%, and what read only 10% [21]. Based on the research, experiential learning must be prioritized. therefore, props are needed, one of which is learning to use interactive animation. By using animation media that involves the senses of sight and hearing, it is hoped that you will get better learning outcomes.

Learning media have special benefits that we can make into consideration as research subjects, including: (1) the delivery of material can be uniformed, (2) the learning process becomes more interesting, (3) the learning process of students, students are more interactive, (4) the amount of study time teaching can be reduced, (5) the quality of student learning, students can be improved, (6) The learning process can occur anywhere and anytime, and (7) the role of the teacher, the lecturer can change towards a more positive and productive.

One of the learning media that can be used by all students is a computer. The computer screen is able to present a non-secondary and nonlinear text display, and multidimensional with branching presented interactively. In addition, that computers today have a lot of network and internet added, so

that the computer seems to be a prima donna in learning activities [22].

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Based on the results of the research that has been done, there is the influence of the use of Macromedia Flash Software as a TAI type of cooperative learning media on the learning outcomes of high school students in chemistry subject matter [23]. The use of computer-based learning media can run well and correctly if: (1) the computer can deliver the material content properly and correctly according to the learning objectives; (2) the response of the users / students to the media; (3) there is feedback / feedback that can bring creativity from students / users; (4) helping students to develop their own concepts and knowledge; (5) helping students learn individually according to their abilities; (6) helping students to improve their own learning interest and motivation, and (7) guiding and training students in interacting with the surrounding environment.

II. METHOD

This research is a development of teaching material integrated by Easy Sketch program on stoichiometric material. The Research use Development Research method. Media development by Easy sketch using ADDIE (Analysis, Design, Development, Implementation and Evaluation) steps. These steps include: (1) Analysis (analyzing the need for new development, analyzing the feasibility and requirements of developing new media), (2) Design (designing and preparing initial product or product design), (3) Development (realizing product design), (4) Implementation (use of new learning media that has been developed in real situations in the classroom), (5) Evaluation (measuring the final competence of instructional media). The research instruments used to collect data are questionnaires and objective tests. Stages of development of learning media chemistry by using Easy Sketch is illustrated in Figure 1.

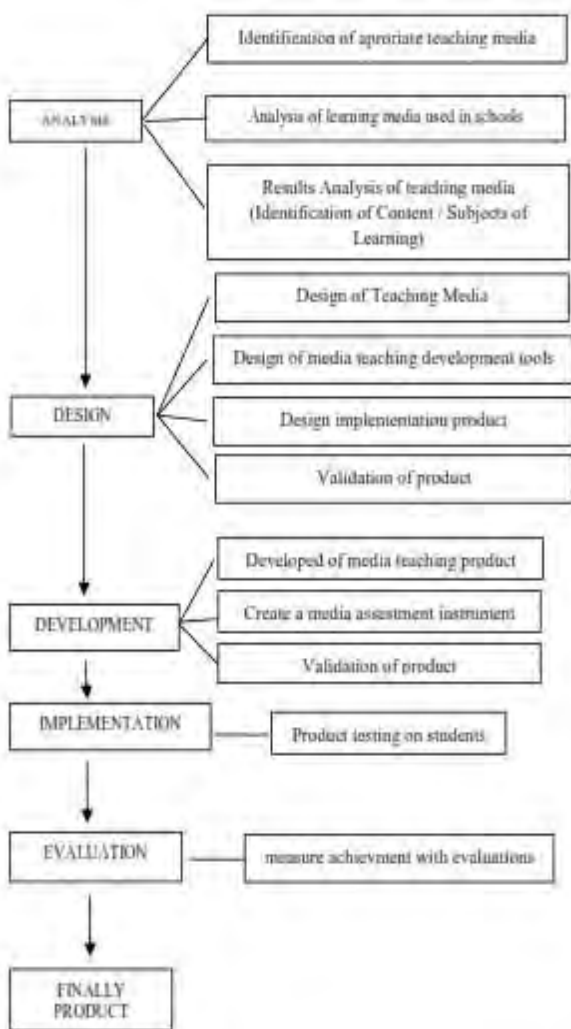


Fig 1. Stages of development of chemistry learning media using Easy Sketch program

III. RESULT

Implementation of ADDIE model in designing and developing a learning media to create an effective and efficient classroom learning activity. The Steps in applying this development model need to be done gradually and carefully in order to achieve the desired goals. Before doing the development of instructional media, firstly done analysis to media of learning of chemistry using program of power point which used in the school. Assessment standards for the analysis of available learning media (X and Y learning media) use modified assessment standards from relevant journals that have been validated by expert teams. This analysis aims to get a learning media quality and feasible to use. The standard component of assessment in analyzing the available instructional media is currently summarized in Table 1 and the eligibility criteria of instructional media in Table 2.

TABLE 1. Standard Components of Assessment of Learning Media Analysis

Aspect	Indicators
View	(1) Background of each media page, (2) Fonts and font size used in each media page, (3) Use and suitability of color proportions on each media page, (4) Display of images on each media page, (5) Display (6) The overall design of the media and its design conformity with the learning materials, (7) the cover design and the main menu, (8) the appearance of the media animation, (9) the supporting/supporting view of the media
Relevance to the matter	(1) Conformity of material content to media with KI, KD, indicators and learning objectives, (2) Conformity of the content of the concept / theory to the media with the content of the concept / theory proposed by chemists / chemists, (3) Conformity of questions on the evaluation menu with learning materials, (4) Coverage of material content, (5) examples in the presentation of the material, (6) The ability of the media to improve the character of learners, (7) The ability of media for tools to understand and remember information, (8) Benefits of the delivery of material content using the media in the practice of teaching and learning, (9) Quality presentation of the material
Programming	(1) Ease of programming aspect, (2) Quality of navigation key, (3) Quality of navigation structure, (4) Use in running animation on media (simulation) to operate, (5) Access of operating system, (6) Capacity of program files

TABLE 2. Eligibility Criteria of Learning Media

No	Percentage	Criteria
1	80,00 – 100	Feasible
2	60,00 – 79,99	Quite Feasible
3	50,00 – 59,99	Less Worthy
4	0 – 49,99	Not feasible

A. Analysis of Learning Media X

The result of analysis of learning media X by using assessment standard can be seen in Figure 2.

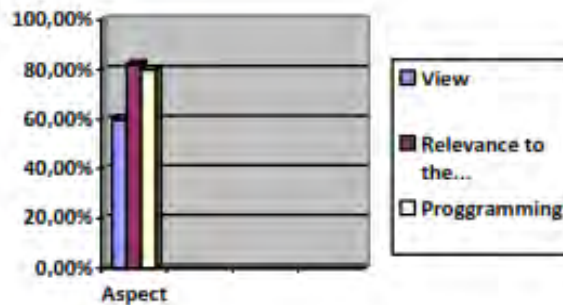


Fig 2. Percentage of Media Learning Eligibility X

The result of X learning media analysis on stoichiometric material as a whole has percentage covering (1) aspect of view of 60,00% (quite feasible) meaning that some of instructional media display need to be revised and need to be developed, (2) aspect relevance to the matter to 82,22 % (feasible), but still needs to be developed, (3) programming aspect of 80,00% (feasible), but still needs to be developed.

Based on the results of the analysis can be identified deficiencies contained in the learning media X

stoichiometric material. For the feasibility of the display on learning media X is quite feasible but needs further revision and development. For example in the cover design view and main menu, display media usage manual, display media support. For the feasibility of the material on learning media X is feasible but still needs to be developed. For example on the scope of the content, the ability of the media in improving the character of learners. In the feasibility analysis programming on learning media X is feasible, but need to be developed. For example on the quality of the navigation key, the quality of the navigation structure.

B. Analysis of Learning Media Y

In the learning media Y is also done the same as In learning media X that is using the standard contents of the media assessment instrument. The results of the analysis can be seen in Figure 3.

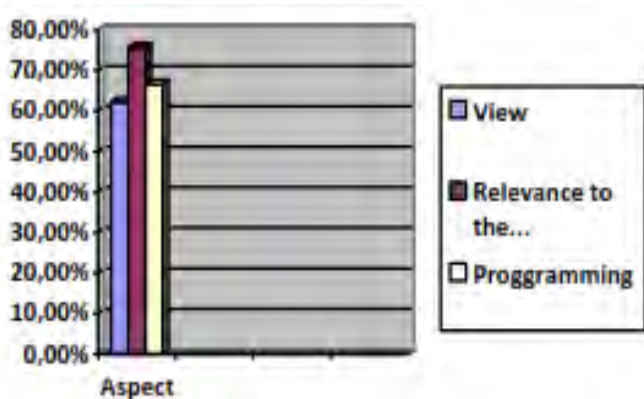


Fig 3. Percentage of Media Learning Eligibility Y

The result of Y learning media analysis on stoichiometric material as a whole has percentage covering (1) aspect of view of 62,22% (quite feasible) meaning some of instructional media display need to be revised and need to be developed, (2) aspect of relevance to the matter to 75,56 % (quite feasible), but still needs to be developed, (3) programming aspect of 66,67% (quite feasible), but still needs to be developed.

Based on the results of the analysis, it can be seen the deficiencies contained in the learning media of stoichiometric materials Y. For the feasibility of the display on the learning media Y is quite feasible but requires further revision and development. Development needs in view of media use, cover design and main menu, display of animation on media, display of media support. The feasibility of the material in the learning media Y is quite feasible but still needs to be developed. For example giving examples and adding practice questions to evaluation. And for the feasibility analysis of programming on learning media Y is very feasible, this is because to display learning media Y can use all types of video player applications on mobile or computer.

IV. CONCLUSION

The result of learning media X analysis as a whole is feasible and the learning media Y is quite feasible but needs to be revised and developed by paying attention to the deficiencies that have been analyzed in order to be applied to the developed learning media. So with the development of new learning media produced and more quality.

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