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The Development Of Interactive Learning Media On Alkaline Group Elemental Chemistry Materials Using *Articulate Storyline 3*

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Abstract

In chemistry subjects, one of the things studied is alkaline elemental chemistry. Learning elemental chemistry is not only memorization but requires a thought process in understanding it so that learning media is needed. The purpose of this research was to produce interactive learning media which were suitable for use in alkaline group elemental materials using *articulate storyline 3*.

The development of this media used a 4-D model developed by Thiagarajan. The 4-D model had four stages, they were defining, designing, developing, and disseminating. The validation of learning media was carried out by 2 validators, and also a readability test was carried out on class XII students of SMA Negeri 5 Malang.

Interactive learning media products that had been developed using *articulates storyline 3* were HTML5 files. The results of development research were obtained with very feasible criteria from material experts by 86%, media experts by 84% and student readability tests by 85%. Thus, the development of this learning media had met the high feasibility of use.

Keywords: elemental chemistry, interactive learning media, *articulate storyline 3*

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1. Introduction

Science is needed by students, one of which is the field of chemistry. Chemistry subjects are compulsory subjects that are included in the high school curriculum (high school). Chemistry is the study of the chemical structure, substances, and changes that occur in matter, including natural processes and designed experiments (Lee & Osman, 2012). Understanding chemistry requires complex reasoning and thinking with many representations, including macroscopic, symbolic, and sub microscopic level representations (Becker et al., 2015). This makes students have difficulty learning

chemistry so they are not interested in chemistry lessons.

The chemistry lesson in the elemental chemistry chapter will be met by students in class XII odd semesters. Based on observations by researchers at SMA Negeri 5 Malang during the pandemic in class XII MIPA 1 and XII MIPA 3 that learning is carried out online and offline, students have difficulty understanding elemental chemistry lessons because teachers still rely on companion textbooks and students are also required to study independently. at home. It is known in research by Shifa & Hidayah (2020) which shows that teachers still rely on companion textbooks without learning media, this conventional method is less able to

attract students' interest in studying elemental chemistry. After reading the book on elemental chemistry, students will be given the task of doing exercises on the companion book in Wahyuni & Yerimadesi's research (2021). Students also feel monotonous with the text in the book during the learning process (Dwiningsih et al., 2018). The process of learning the chemistry of the alkaline group elements is not only by knowing and memorizing the meaning of the concept, but further than this thought requires a thought process in knowing its meaning. Students find it difficult to memorize the characteristics of each element on the periodic table, so that the learning process feels passive if there is no supporting learning media. Elemental chemistry not only explains the terminology, but also abstract concepts related to the reactions that occur in these elements (Dwiningsih et al., 2018).

During the learning process, students need tools to better understand the material given by the teacher. This tool for educators is called learning media. Rapid technological advances change the form of learning media which are no longer limited to teaching aids and models. In the 21st century, teachers must have skills in the IT field because education will continue to follow the flow of technological developments (Jalil et al., 2021). The use of technology in education improves the learning process (Mohammad, 2018).

Utilizing technology as a learning tool is one approach in the field of education (Hapsari & Pamungkas, 2019). In the research of Ambarita & Purnamasari, (2020); Apsari et al (2020) teachers still have difficulty in developing learning media due to lack of technological capabilities, so that the learning media used are limited and less varied. Articulate storyline 3 is a program with smart brainware that is easy, and simple and has complete features for creating learning media. The output obtained is an HTML file that can be used offline without the need for a quota or internet network. Teachers can easily create media using the articulate storyline 3 software because it looks and operates almost the same as PowerPoint.

The learning media articulate storyline 3 can be used as a teaching tool used by

teachers (Santayasa et al., 2020). This is because articulate storyline 3 is considered more interactive and able to make students more interested in learning (Santayasa et al., 2020). The use of interactive multimedia-based learning media by combining text, images, sound, video, animation by (Setyowati et al., 2020) can improve students' understanding of concepts. The interactive buttons on articulate storyline 3 are able to make students feel the sensation of learning using interactive applications. Interactive learning media was developed because it can help students who have various ways of learning so that learning becomes effective (Purba et al., 2017).

In the chemistry subject, the chemistry chapter of the alkaline group elements is not yet available interactive learning media with articulate storyline 3. Based on this description, the author is interested in raising the title "DEVELOPMENT OF INTERACTIVE LEARNING MEDIA ON CHEMICAL MATERIALS ON ALKALI ELEMENTS USING ARTICULATE STORYLINE 3".

2. Research Method

This development uses a 4-D model developed by Thiagarajan, Dorothy S. Semmel, and Melvyn I. The four stages can be seen by looking at Figure 4 is as follows:



Figure 1. 4-D Development Model
(Source: Adapted from Thiagarajan 1974: 6-9)

Development of interactive learning media on alkaline group elemental chemistry using a 4-D research and development model. The stages of the 4D model consist of: (1) define, (2) design, (3) develop, (4) disseminate. At this definition stage, the activities aimed at

determining the requirements needed in developing chemistry learning media include the process of collecting data, the process of asking students' interests with the media that has been given previously, the purpose of developing learning media, how to develop media and analyzing core competencies. The purpose of this design stage is still in the early stages of the product, including media selection, test preparation, format selection and initial media design. The development stage is carried out with the aim of producing a final product that is suitable for use. The feasibility of the media is obtained from testing so that a valid and feasible media is obtained. The deployment stage, which is the last stage in the development model, was not carried out by researchers due to limited costs and time required, so the researchers were only at the trial stage limited to the development stage.

The types of data that will be required are quantitative data and qualitative data. To obtain quantitative data, the researchers obtained from the questionnaire results in the form of numerical data on the assessment of material experts, media and student responses regarding interactive learning media using articulate storyline 3. Qualitative data was obtained from suggestions and input from media expert validation results and material expert results. The type of data collection instrument is determined by the data being collected by the researcher using observation data collection techniques and questionnaires or questionnaires. Data analysis was carried out by qualitative descriptive analysis for qualitative data by researchers from suggestions and comments collected from expert opinions, and quantitative data analysis used to process data in the form of numbers from validation questionnaires.

The formula used in the analysis is as follows:

$$P = \frac{\sum X}{\sum Xi} \times 100\%$$

Description:

P : percentage of test subjects results

X : maximum number of answers in the aspect of assessment of test subjects

X : number of answers scored by test subjects

100% : constant

After determining the results calculation using a formula, then determining the feasibility of learning media that has the guidelines in Table 1.

Table 1. Eligibility Criteria for Media

Percentage	Criteria	Description
81%-100%	Very valid	Can be used without improvement
61%-80%	Valid	Can be used with minor improvements
41%-60%	Less valid	Needs major improvement recommended not to use
21%-40%	Invalid Ineffective	Invalid Ineffective, cannot be used
00%-20%	Very Invalid	Very ineffective, cannot be used

Source: Akbar, (2013)

Learning media products is said to be feasible if it gets a presentation result of 61% or more.

3. Result and Discussion

3.1 Product Description Development Results

The learning media that has been developed by the researchers is articulate storyline 3 with the chemical material of alkaline class XII semester 1 elements in HTML5 format. This media requires a PC/computer device to operate it. The learning media, articulate storyline 3, the chemical materials of the alkaline group elements are arranged in a full color display. The product produced in this study is interactive learning media on alkaline group elemental chemicals using articulate

storyline 3 with product specifications as follows:

- a. The product format is an HTML5 file operated without an internet network or offline
- b. Learning media products can be operated using a PC/computer with a windows operating system 7, 8, 10 (32 bit and 64 bit) and Mac OS.
- c. The learning media products developed are not only in the form of text but the material in the media also consists of images, audio, video, and animations that complement each other
- d. Articulate storyline 3 learning media is composed of several components, namely basic competencies, learning materials, and quizzes which are questions of media This learning is broadly divided into four parts, namely instructions, competencies, materials and quizzes. The layout of the media display is

first the initial media intro or media cover, the main menu, the instructions menu, the competency menu, the material menu, and finally the quiz menu. The material menu begins with videos related to everyday chemistry, then continues with alkaline materials consisting of abundance, physical properties, chemical properties, manufacture and benefits of alkaline elements. The quiz menu contains 6 questions that can be used as an assessment of the material that students have learned. The following parts of the learning media developed can be described in detail.

- a. The media start page consists of (1) media cover display, (2) menu display, (3) instructions menu, (4) core competency menu, and (5) basic competency menu. Figure 5-9 showing the opening section of the media.



Figure 5. Display Cover Media



Figure 6. Display Menu



Figure 7. Display Instructions



Figure 8. Display Core Competencies



Figure 9. Display Basic Competencies

- b. The intro page of learning materials, contains material apperceptions that focus on the material to be studied by students consisting of (1) intro menu display material, (2) video intro display, (3)

question intro display, and (4) intro feedback display. Figure 10-13 which shows the intro part of media learning materials.

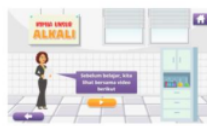


Figure 10 Display Material Menu Intro



Figure 11 Video Intro Display



Figure 12 Question Intro Display

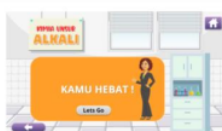


Figure 13 Intro Feedback Display

c. The learning material page, contains material to be studied by students consisting of several sub-chapters, namely (1) the display of the material menu, (2) display of alkaline elements, (3) physical properties, (4) chemical properties, (5) abundance, (6) elemental materials, and (7) elemental benefits. Figure 14-20 which shows the part of the learning material.



Figure 14. Display Material Menu



Figure 15. Display Material Alkali Elements

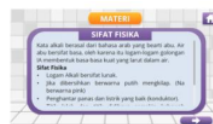


Figure 16. Display Material Physical Properties

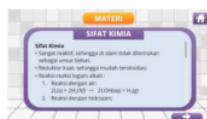


Figure 17. Display material chemical properties



Figure 18. Display material abundance

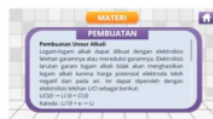


Figure 19. Display Material Making Elements



Figure 20. Display Material Benefits Elements

d. The closing section contains the end of the lesson, namely the quiz menu To determine the level of understanding after

studying the material that has been studied, there is developer info and a bibliography shown in Figure 21-23.



Figure 21. Display of Quiz Questions



Figure 23. Display of Developer Info



Figure 22. Display of Bibliography

3.2 Validation Results

The results of data analysis consist of 2 types of data, namely quantitative data and qualitative data. The two data were generated from the evaluation of 2 validators, namely material experts and media experts as well as student questionnaires. Qualitative data obtained through the suggestions and responses of the validator. Table 2 presents quantitative data from material expert validation and in Table 3 presents quantitative data from media expert validation.

Table 2. Results of Quantitative Data Analysis Validation of Material Experts

No	Aspects Assessed	Average(%)	Criteria
1	Feasibility of content	88	Very Feasible
2	Feasibility of presentation	84	Very Feasible

3	Languages	87	Very Feasible
Overall average score		86	Very Feasible

Table 3. Results of Quantitative Data Analysis Validation by Media Experts

No	Aspects Assessed	Average(%)	Criteria
1	Feasibility	84	Very Feasible
2	Graphics	83	Very Feasible
3	Feasibility of presentation	85	Very Feasible
Overall average score		84	Very Feasible

In Table 4 and Table 5 shows the results of the validation data analysis from the two experts according to the aspects that have been assessed. Based on the learning feasibility criteria in table 6, namely the

presentation feasibility aspect with the percentages obtained by 86% and 84%, it can be described that the learning media is categorized as very feasible or can be used but needs to be revised before being used in learning. The validation results show that articulate storyline 3 can be used as a learning medium (Yumini & Rakhmawati, 2015); (Primary, 2019); (Rohmah & Bukhari, 2020); (Setyaningsih et al., 2020); (Princess et al., 2021). These results are in accordance with the

research of Putri et al., (2021) that articulate learning media with a result range of 60-90% have good and proper criteria as learning media.

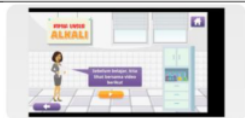



Qualitative data obtained from both validations Table 4 shows the qualitative data obtained from comments and suggestions. Qualitative data is used as input and suggestions for product revision which are shown in Table 5.

Table 4. Qualitative Data Validation Results of Media

Validator	Suggestions/ Comments
I	<ul style="list-style-type: none"> - In the material for the chemical properties sub-chapter there is an error in writing the reaction of alkaline elements with ammonia - There is the word "compound" in the sentence in the sub-section. the chemical properties chapter by replacing it with the word "metal" - Changing the answer "KCl" to "AgCl" on the quiz before entering the material menu - In the element benefits sub chapter only the sentence "NaOH is used to make soap" should be given a description of the type of soap such as bath soap or laundry soap - Error in writing the word "harga potensi" should be written "harga potensia" - Correcting the teacher's animated image on the material menu - The graphic in the abundance sub-chapter does not show the number of percent abundance of each element - Adding an exit button to media
II	<ul style="list-style-type: none"> - Adding videos of chemical reactions that occur in alkaline group elements

Table 5. Results of the Revision of Previous Learning

Before Revision	After Revision
There is an error in writing the reaction of alkaline elements with ammonia :	Writing the reaction of alkali elements with ammonia:
$2M(s) + 2NH_3(l) \rightarrow 2M^+(s) + 2NH_2(s) + H_2(g)$	$2M(s) + 2NH_3(l) \rightarrow 2M^+(s) + 2NH_2(s) + H_2(g)$
The sentence "heating at high temperature causes the compound to decompose into these free atoms excited or moving to a higher energy level"	To be the sentence "heating at high temperature causing the metal to decompose into these free atoms excited or moving to a higher energy level"
The sentence in the sub-chapter on the benefits of the element "NaOH is used to make soap"	Becomes the sentence "NaOH is used to make bath soap"

Error writing in the sentence "electrolysis of salt solution Alkali metals will not produce alkali metals because the electrode potential value is more negative than that of water."	The sentence "electrolysis of alkali metal salt solutions will not produce alkali metals because the electrode potential value is more negative than water"
change the answer "KCl" on the quiz before entering the material menu	Become the answer "AgCl" on the quiz before entering the material menu
No video	Added video reaction of alkaline group elements
There is no exit or "exit"	Button Added "exit" button
	
	

3.3 Readability Test Results

The readability test was carried out at SMA Negeri 5 Malang, which involved 15 students of class XII MIPA 1. 15 students tested the articulate storyline 3 learning media and assessed the media. The following data on the results of the learning media trials are presented in Table 6.

Table 6. Readability Test Results

No	Aspects Assessed	Value (%)	Criteria
1	Media operation	84	Very Feasible
2	Media design	87	Very Feasible
3	Material	83	Very Feasible
Overall average score		85	Very Feasible

Referring to the learning eligibility criteria in Table 6, the readability test by students with an average value of 85% can be described as learning media is categorized as very suitable for use as learning media but still requires

product revision. This is in line with the research of Putri et al., (2021) which states that students can use articulate storyline 3 learning media well when learning independently. While the qualitative data obtained in the readability test generally students gave positive responses to learning media, in general students commented if the elemental chemistry learning media was suitable for use because it was a learning media (Indra et al., 2021).

4. Conclusion

Based on the research that has been carried out, interactive learning media products for alkaline class elements have been developed using articulate storyline 3 in the form of HTML5 files. The results of the validation of learning media in terms of material with a value of 86%, in terms of media with a value of 84% and student readability test obtained a value of 85% belonging to the criteria that are very suitable to be used as learning media for the chemical material of the alkaline group elements. Learning media products still require revision with guidelines from comments/suggestions given by the

validator in order to obtain better media after repair. The limited time that the researcher has suggested, for further researchers to conduct trials to determine the effectiveness of articulate storyline 3 interactive learning media, as well as develop articulate storyline 3 media with other chemical materials.

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