

## Interactive Digital Lessons for Alkaline Group Elements via 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 to understand it, so learning media is needed. Articulate Storyline 3 is an intuitive program equipped with robust features for developing educational media. Its user-friendly design, similar to PowerPoint, and allows teachers to easily create engaging learning materials. The research aims to produce interactive learning media that were suitable for use in alkaline group elemental materials using articulate storyline 3. The development of this media used a define, design, develop, and disseminate (4-D) model. The learning media was validated by two experts and tested for readability with 12th-grade students. The development research results showed high feasibility, with material experts rating it at 86%, media experts at 84%, and student readability at 85%. Thus, the development of this learning media had met the high feasibility of use.

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

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### 1. Introduction

Science is needed by students, one of which is the field of chemistry. Chemistry subjects are compulsory subjects included in the high school curriculum. Chemistry studies 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. 12<sup>th</sup> student in odd semester will encounter chemistry lessons in the elemental chemistry chapter. Based on researchers' observations during the pandemic in students of natural science 12<sup>th</sup>

grade 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 doing exercises on the companion book (Wahyuni, et al., 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. Chemistry learning is abstract and difficult to understand if there is no visualization model. This causes students to become bored so they are often busy with their own activities such as

chatting with friends, playing games and so on, so that students pay less attention to the teacher's explanations (Rokhim et al., 2023).

For some students, chemistry is very boring because there are materials that cannot be seen by the eye, such as atoms, and can only be seen from their symptoms (Widarti & Triwidiastuti et al., 2022). 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 no longer limited to teaching aids and models. In the 21<sup>st</sup> 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). Teachers have many ways to increase students' learning motivation, namely by providing enthusiasm, understanding, and presenting interesting learning media so that students are happier in the learning process (Widarti et al., 2022).

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 developing learning media due to lack of technological capabilities, so the learning media used are limited and less varied. Articulate storyline 3 is a program with smart brainware that is easy, 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.

Teachers need to take part in training activities and direct assistance to load simple learning media intensively without programming language. This training activity is also beneficial for teachers because it can be accessed anywhere and at any time (Rokhim et al., 2023).

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 chapter on the chemistry of alkali group elements, interactive learning media with an articulated storyline is not yet available. In this material, learn about the abundance of alkali metal elements in nature, the physical properties of alkali metal elements, and the uses of alkali metal elements in everyday. One of the characteristics of this material is that it tends to be abstract and complex, such as the abundance of alkali metal elements that exist in nature, where the reactivity of alkali metal elements is considered and the form of compounds that are often found. In studying an abstract and complex chemical concept, three representative levels are needed, such as macroscopic, microscopic and symbolic. The macroscopic level is an aspect that explains things that happen in everyday life, the microscopic level is the events of daily life from a microscopic perspective and the symbolic level explains real phenomena expressed in the form of images.

Students are given sub-matter questions based on a representative level to determine students' initial abilities and ability to understand the material so that differences in understanding or differences between concepts understood and actual information will be detected (Widarti et al., 2022). If students do not understand the material too often, then the potential for experiencing misconceptions about the material is higher and can create bigger problems (Permatasari et al., 2022; Rokhim et al., 2023).

## 2. Research Method

This development uses a 4-D model developed by Thiagarajan, Dorothy S. Semmel, and Melvyn I. 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; (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, in 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 questionnaire sheet used in this research contains questions related to the media being developed which will be assessed by validators and students by giving a score of 1-5. On the questionnaire sheet there is also a column for comments, suggestions and input for the media being developed. The data analysis technique used is an average calculation to determine the percentage of feasibility or validity by adding up the total validator answers and then dividing by the total value of the highest answer. 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
xi	: 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 (Akbar, 2013). Learning media products is said to be feasible if it gets a presentation result of 61% or more.

**Table 1. Eligibility Criteria for Media**

Percentage(%)	Criteria
81-100	Very valid
61-80	Valid
41-60	Quite valid
21-40	Less valid
0-20	Invalid

### 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 students of natural science 12<sup>th</sup> grade in HTML5 format. 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; (1) the product format is an HTML5 file operated without an internet network or offline; (2) 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; (3) 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; (4) 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, there are instructions, competencies, materials and quizzes. The layout of the media display is first the initial media intro or media cover, the main, instructions, competency, 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 six 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. The media start page as shown in Figure 1.



**Figure 1. Display Cover Home Page Media**

The home page consists of media cover display, menu display, instructions menu, core competency menu and basic competency menu. The intro page of learning materials, contains material apperceptions that focus on the material to be studied by students as shown in Figure 2.



**Figure 2. Intro Section of the Media**

The intro page of learning materials consisting of intro menu display material, video intro display, question intro display, and intro feedback display. The learning material page, contains material that will be studied by students which consists of several sub-chapters as shown in Figure 3.



Figure 3. Display of Learning Material

The complete learning material page consists of the display of the material menu, display of alkaline elements, physical properties, chemical properties, abundance, elemental materials, and elemental benefits. The closing section contains the end of the lesson, there is the quiz menu to determine the level of understanding after studying the material that has been studied, there is developer info and a bibliography.

### 3.2. Validation Results

The results of data analysis consist of two types of data, quantitative data and qualitative data. The two data were generated from the evaluation of two validators, they are 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
<b>Overall average score</b>		<b>86</b>	<b>Very Feasible</b>

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

No	Aspects Assessed	Average (%)	Criteria
1	Feasibility	84	Very valid
2	Graphics	83	Very valid
3	Feasibility of presentation	85	Very valid
<b>Overall average score</b>		<b>84</b>	<b>Very valid</b>

Based on the learning feasibility criteria, 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). 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.

### 3.3. Readability Test Results

The readability test was carried out involving 15 students of 12<sup>th</sup> grade of natural science. 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 4.

Table 4. Readability Test Results

No	Aspects Assessed	Value (%)	Criteria
1	Media operation	84	Very valid
2	Media design	87	Very valid
3	Material	83	Very valid
<b>Overall average score</b>		<b>85</b>	<b>Very valid</b>

Referring to the learning eligibility criteria, 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. In research conducted by Widarti et al (2022) developed virtual laboratory media using the 4D method, and showed media expert validation of 87.8% (very valid), and material validation of 82.7% (very valid). The readability test results obtained percentage values of 91.1% and 92.3% (Very Valid) (Widarti et al., 2022). 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). In line with research from Rokhim, et al. (2023), students before using Jable Board learning media had low interest in learning and poor learning outcomes, but after using Jable Board, student learning outcomes increased by 24.18% and received a response positive from the school (Rokhim et al., 2023).

This learning media certainly has advantages and disadvantages. The advantage of this learning media is that it can help students understand abstract material by visualizing it through this learning media, while the weakness is that the process of making learning media products takes quite a long time.

#### 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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