

Developing Learning Media Based on *Lectora Inspire* on Chemical Equilibrium

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Abstract: This study aimed to develop *Lectora Inspire* learning media on chemical equilibrium material. This research was a development research (Research and Development, R&D) with the Four-D development model which included the stages of define, design, develop and disseminate. The object of this research was *Lectora Inspire* learning media. The applied instrument was a validation sheet given to one media validator and two material validators. The data were analyzed by calculating validation assessment scores. Assessment score from media validators is 98.53% with valid criteria and the score from material validators is 96.93% with valid criteria.

Keywords: Learning Media, *Lectora Inspire*, Chemical equilibrium.

1. Introduction

The most basic component in learning is the teacher. He holds a very strategic role in the effort to achieve learning success. In order to achieve Government Regulation No. 32 of 2013 as an amendment to Government Regulation number 19 of 2005, concerning of National Education Standards Article 19 Paragraph 1, a teacher can use innovative approaches, models, methods, strategies and learning media to organize an interactive, inspiring, fun, challenging learning process, motivating students [1].

Based on observations, most of teachers at SMA Negeri 8 Pekanbaru (a senior high school) have applied power point text (PPT) as the medium for presentation. However, this medium is considered as not utilize technology and communication optimally to support efforts to increase students' critical thinking skills. Thus, one effort that could be done was using instructional media in chemical learning activities to achieve the level of ICT competency so that it could be used in supporting effective chemical learning [2].

The ability to think critically is a directed and clear process that is used in mental activities such as solving problems, making decisions, persuading, analyzing assumptions, and conducting scientific research [3]. The ability to think critically, to solve problems and to collaborate becomes an important competency in entering the 21st century life [4]. This is a requirement for schools today.

The 21st century is a century of knowledge that presents a wide spread of information along with the rapid development of technology. Thus, the learning process also requires renewal efforts, especially in the use of technology that is in accordance with the development of science and technology today. For this reason, educators are required to be skilled in utilizing school facilities in accordance with the development of era in an efficient and environmental-friendly manner, as well as to achieve optimal learning goals. The facility can be a means of presenting a learning medium. Learning media occupy a position that is quite important as a component of the learning system because there is a communication process and takes place in a system [5].

Lectora Inspire is an effective program in making learning media. It is an electronic learning software (e-learning) that is relatively easy to apply because it does not require an understanding of sophisticated programming languages [6]. The use of *Lectora Inspire* learning media based on this research can facilitate students in understanding a concept in learning material, especially chemical equilibrium. It includes visualization of the process of changing the chemical equilibrium reaction system due to the influence of factors from outside equilibrium system through animated images.

It is expected that from the research on *Lectora Inspire*-based chemical learning media, it can improve the quality of learning in entering the industrial revolution 4.0. This is because the stage of

the industrial revolution 4.0 emphasizes the optimization of information and communication technology (ICT) based learning.

2. Related Works

The relevance of this research is the previous research by Faruk which concluded that the interactive learning media based on *Lectora Inspire* developed was valid, practical, and highly recommended to be used as a source of students' independent learning [9]. This study contributed to the development of *Lectora Inspire*-based learning media on chemical equilibrium material that can be used as an independent learning media for students.

Chemistry learning in high school is still considered difficult by most students because most of the knowledge in chemistry is abstract. Hence, it requires a learning media that can concretize abstract concepts. Chemical balance has an abstract concept which is a concept relating to submicroscopic events [10].

The use of instructional media is expected to attract students' interest in learning a material or to be able to stimulate students, to follow the progress of information technology, to help students' understanding in learning a material with illustrations, pictures, videos or animation at home, and to make it easier for teachers to teach in the class and to foster innovative and creative learning traditions.

Lectora Inspire is an Authoring Tool software to develop e-learning content developed by Trivantis Corporation. *Lectora Inspire* is very easy to use in developing Interactive Learning Multimedia (MPI) content.

Zahroni and Mahfudz declare the use of learning media to improve critical thinking skills [11]. The ability to think critically is characterized by the ability to identify the assumptions given, the ability to formulate the subject matter, the ability to determine the consequences of a provision taken, the ability to detect bias based on different points of view, the ability to reveal data/definitions / theorems in solving problems, and the ability to evaluate relevant arguments in solving a problem [12].

3. Material & Methodology

3.1. Data

Techniques of data collection applied in this study were literature and field studies. Literature study was conducted to obtain theoretical information from various relevant literatures, while field studies were conducted to obtain data related to the validity and user response to *Lectora Inspire*-based learning media on chemical equilibrium. The data were analyzed by using descriptive analysis, such as calculating the percentage of validity and user response.

3.2. Method

Lectora Inspire learning media on chemical equilibrium was developed by using the Four-D development model. The Four-D Development Model consists of four stages: define (defining stages), design (design stages), develop (development stages) and disseminate (stage of dissemination) [13]. Figure 1 presents a flow diagram of the development of *Lectora Inspire* learning media on chemical equilibrium with the Four-D development model.

The define phase aimed to define and describe the requirements of media preparation. The define phase includes 3 main steps. First, Analysis of the front end aims to raise and determine the basic problems encountered in learning. The front-end analysis begins with the knowledge, skills and initial attitudes of students to achieve the final goal, like the objectives listed in the curriculum. The second phase, analysis of the characteristics of students is carried out with the level of cognitive development of students. Student analysis is needed because the instructional material developed must be adjusted to the characteristics of students to be right on target. The third phase, task analysis is a collection of procedures to determine content in units of learning.

The design phase is the stage where the results of the analysis are compiled and linked to the learning media that will be developed. The activities at this planning stage include the collection of supporting materials for media development such as pictures, videos, animations and texts relating to chemical equilibrium material and the initial design of media in the form of storyboards. The

storyboard is applied until it becomes a media that is ready to be assessed by the validator at a later stage.

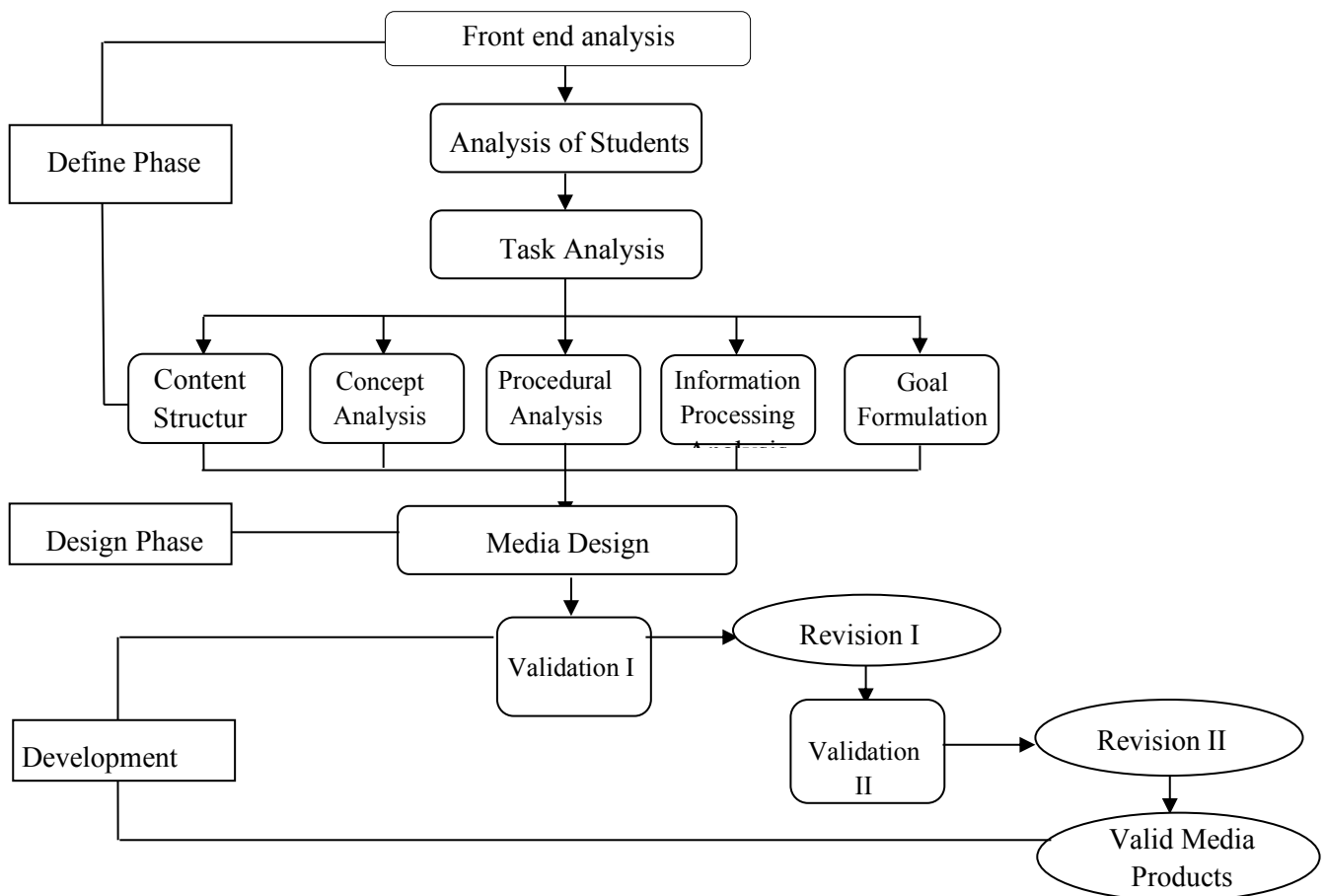


Figure 1. Flow chart of Four-D model development

The development stage is the stage of conducting media assessment through expert validation and testing. Validation was carried out by one media validator and two material validators. The validity of *Lectora Inspire* learning media on chemical equilibrium from the assessment of each validator using validation sheets was analyzed using a formula by Abdul Rohmad et al. [14]:

$$P = \frac{n}{N} \times 100\%$$

Where:

P = Score Percentage (%)

n = Number of scores obtained

N = Total maximum score

The percentage obtained is converted to qualitative values with validity criteria as shown by Table 1 [14].

Table 1. Validity Criteria

Percentage (%)	Criteria
75.00 - 100	Valid
50.00 - 74.99	Valid Enough
25.00 - 49.99	Less Valid
0.00 - 24.99	Not Valid

4. Results and Discussion

4.1. Result

This media development research resulted in a *Lectora Inspire* learning media product on chemical equilibrium. This medium was developed to be one of the teaching materials for teachers as educators in the learning process and as a source of students' independent learning when they are outside school hours. This medium passed the validation stage by the validators and was tried out to users (teachers and students).

The Define stage was conducted through: (1) Front-end analysis: most students considered chemistry to be an elusive subject. Scientific attitudes and scientific process skills possessed by students were relatively low. This was marked by the lack of students' ability to solve the problem analysis questions related to everyday problems. Even though PPT presentation medium was applied, it could not guide students to practice scientific skills, to solve problem, and to build knowledge independently. As a result, a lack of meaningfulness of learning for students to improve critical thinking skills emerged. For this reason, the development of *Lectora Inspire* learning media was proposed on chemical equilibrium. This learning medium can visualize the abstract concept of matter in the form of how particles react to each other in a chemical equilibrium reaction, and how changes in concentration, pressure, volume and temperature could affect the equilibrium shift. (2) Analysis of the students' characteristics: students of SMA/MA in grade XI Science who studied chemical equilibrium were generally aged 15-17 years. They are in the formal operational stage, be able to think about abstract concepts, make a hypothesis and be able to solve logical problem. (3) Task analysis: the systematic and detailed concept of chemical equilibrium includes dynamic equilibrium, the factors that influence the shift in equilibrium, the degree of dissociation, the price of K with related reactions, the equilibrium constant of concentration, the pressure equilibrium constant, and the relations of K_p and K_c .

Table 2. The Validity of *Lectora Inspire* Learning Media in Chemical Equilibrium

No	Aspects of Validity	%	Category
1	Media Validity	98.5	Valid
2	Material Validity	96.6	Valid
2a	Pedagogic Aspect	98.9	Valid
2b	Content Aspect	95	Valid
Average %		97.5	Valid

The design stage produced an initial design outline of the media developed in the form of a *Lectora Inspire* learning media storyboard on the chemical equilibrium. The media description on the paper contained the overall design of the learning media created. The storyboard was produced until it was ready to be assessed by the validator at a later stage.



Figure 2. Example of the *Lectora Inspire* learning media display

The development stage produced *Lectora Inspire* learning media on chemical equilibrium with a value media validity was of 98.53%, which is on the valid criteria and the material validity value is 96.93% which is on the valid criteria. It is presented in Table 2.

An example of the display of *Lectora Inspire* learning media on chemical equilibrium developed is presented in Figure 2.

4.2. Discussion

The define phase was the initial stage in the media development process. Based on observation, the media used during the learning process only contained a collection of material, formulas, sample questions, and exercises, but it did not guide students to connect the concepts learned with application in daily life, and it was less able to empower science process skills and problem solving ability as one aspect of critical thinking. Thus, the teacher needed an ideal media that could encourage students to build their own knowledge through everyday problems related to the concepts learned. It was conducted so that students could develop science process skills and problem solving skills to create meaningful learning process.

The design phase started by determining the sequence and number of learning activities in the media compiled based on the syllabus of the 2013 curriculum revised edition in 2016, by taking into account the prerequisite material that was given first to students before learning other materials. The preparation of materials considered the depth and breadth of material coverage because they described how much material was included and the details of the concepts contained in it.

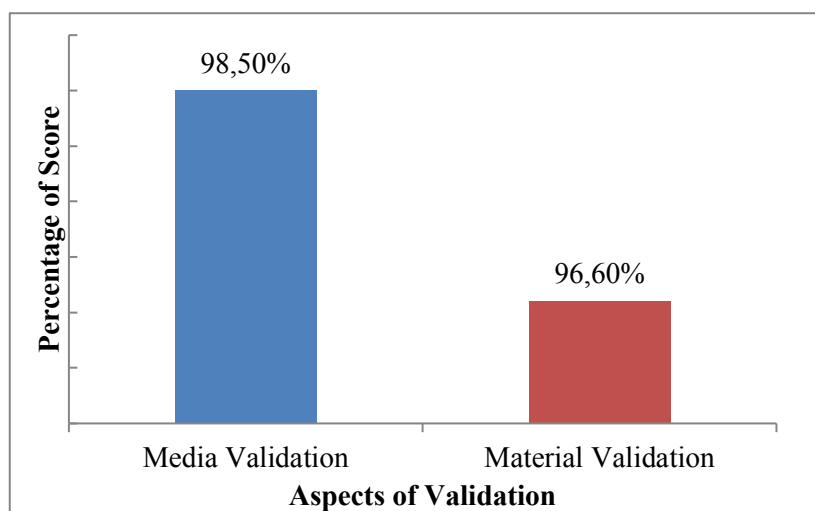


Figure 3. Percentage diagram of validation results

The design phase was followed by making the initial media design in the form of the main menu in the learning media. After the initial design is determined, it continued to the selection of themes and basic background of the appropriate learning media. Next, it searched the contents of learning media such as content, videos, flash animations, sample problems, and music. Then, the storyboard was made in the form of a media framework containing the overall design of the media to be developed so that media creation became more focused. Media realization was performed according to the storyboard designed. Actualization began with creating a home page by entering the main background design and making the main menu button hyperlinked. After that, the main pages were made from the main menu which included pages of competence, materials and evaluation. After all the main pages were created, the process was continued to inserting the contents of the media collected according to needs and it was made as interesting as possible in order to produce a whole media unit that was ready to complete the assessment phase of the validator. After the learning media design was completed, the next step was to design the instrument of data collection in the form of validation sheets adjusted to the grading points based on aspects to be assessed from the learning media developed.

The development stage started from assessing the initial design of the media by material validators, then by the media validator. Each validator assessed based on the assessment aspects

contained in the validation sheet. Validation was conducted twice for each validator and the final validation results were used as data analyzed for each aspect of assessment. Revisions were made based on input and suggestions from the validators. Then, after the revision was carried out, the validators gave scores by showing the revised media to the validator. As a result, the score of media validity derived was 98.5% which means valid and the material validity value is 96.6% which also means valid. The percentage diagram of the validation results by the validator team is presented in Figure 3.

5. Conclusion

Lectora Inspire learning media on the chemical equilibrium which was developed got a value of 98.5% media validity which means valid and the mean material validity value was 96.6% which was on valid criteria.

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