

Development of Interactive E-Module Chemistry Magazine Based on Kvisoft Flipbook Maker for Thermochemistry Materials at Second Grade Senior High School

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ABSTRACT This investigation aims to develop an interactive e-module chemistry magazine-based teaching material based on Kvisoft Flipbook Maker on thermochemistry for Senior High School grade XI/MA level. The research design is a development research (Research and Development) with Plomp's model. The object of the research is the e-module inter-addictive chemistry magazine based on Kvisoft Flipbook Maker. The data instrument collection is a validation sheet form that is given to four validators and user response sheets to two chemistry subject teachers and 30 students of Senior High School grade XI focusing on Science Class. The data analysis technique is by calculated the percentage score of the validation assessment and user response. The results revealed that the developed e-module interactive chemistry magazine based on Kvisoft Flipbook Maker filled out the valid criteria by the material validators based on content substance assessment aspect with a percentage 88.89% and learning design 97.22% and by the media validators based on display (visual communication) with a percentage 96.88% and software utilization 100%. While the User responses based on the teachers' and students' responses were in very good criteria with each score 92.61% and 86.80%

Keywords Interactive E-Module, Kvisoft Flipbook Maker, Chemistry Magazine, Plomp Development Model, Thermochemistry

1. INTRODUCTION

In industrial revolution 4.0, technology has become the basis of human life. This era affected many sets of life, such as economics, politics, arts, cultures and including education sides. Technology in the education side is called e-learning. According to Wahyuningsih & Makmur (2017), the use of e-learning in learning according to the latest research has a positive impact on processes and target learning. E-learning will enable students to interact with anyone and access information whenever needed. In addition, the learning process will be more effective and efficient in terms of time and energy.

Technology development can be used in the learning process. Students are positioned as learners who hold the main role; students are required to have full activities, even individuals who learn teaching materials (Sanjaya, 2014). The learning resources used are usually books, student worksheets and articles. The learning source is still in printed form, therefore it is necessary to develop technology and develop learning resources in the form of improved print into computer-based or e-learning (Asyhar,

2012). One of the learning resources that can be developed based on computers is the learning module.

Electronic modules are expected to attract students' interest in learning and can illustrate abstract material, can be accessed easily by students using computers and various types of gadgets anywhere and anytime, thus allowing students to get immediate feedback and understand the subject matter completely.

Based on interviews with chemistry teachers, the learning module has been used as a learning resource in SMAN 8 Pekanbaru and SMA Cendana Pekanbaru. Information was obtained that the module is still not interactive because it only contains a description of the materials, set of formulas and some images related to the material that causes unpleasant learning. Supported by the questionnaire, the data obtained 71.38% of students find it difficult to understand thermochemistry topics because

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most of them do not have many references for the material. According to Keenan, thermochemistry is a basic knowledge that needs to be understood not only to find out how much energy needs to be given or that can be obtained from chemical reactions, but also as a basic knowledge for the study of the theory of chemical bonds and structures.

According to Linda, Herdini, and Putra (2018), one of the materials in chemistry that is difficult is the chemical reaction and energy. Therefore, it needs a teaching material that can make students happy and easy to understand about thermochemistry. Lesson materials need to be developed in interactive modules. This electronic-based module (e-module) is a magazine form called e-magazine. The interactive chemistry magazine electronic module will be developed in the form of HTML format software that can be accessed via PC, android, USB and so on.

The application used for making the e-module interactive chemistry magazine is Kvisoft Flipbook Maker. Kvisoft Flipbook Maker is software used to make the display of books or other teaching materials into a flipbook-shaped digital electronic book. The software can be downloaded freely through internet access (Sugianto, Abdullah, Elvyanti, & Muladi, 2013).

Related to those explanations, it is needed to do research about the development of interactive teaching materials in chemistry learning in thermochemistry materials. The development of interactive teaching materials proposed in the form of interactive e-module chemistry magazine based on Kvisoft Flipbook Maker for thermochemistry material at second-grade Senior High School.

2. METHOD

This study was conducted in the Chemistry Education Study Program of FKIP Riau University Pekanbaru with the test in class XI Science 2 of SMAN 8 Pekanbaru and XI Science 1 of SMA Cendana Pekanbaru started from November 2018 until April 2019. The development of the thermochemistry interactive e-module chemistry magazine was designed using Research and Development (R & D) with the Plomp model. R & D is a research design used to produce specific products and to test the effectiveness of it. The design of this study uses the Plomp model, which according to Rochmad (2012), is a development model which consists of the first investigation phase (preliminary investigation), design phase (design), realization/construction phase (realization/ construction), and validation phase, trial and revision (evaluation, test and revision) and implementation phase. It can be seen in Figure 1.

The instrument which is used as a data collecting technique is the validation sheet and user response sheet. The validation sheet is used to get information about the validity of teaching materials and other instruments based

on expert judgment. Information obtained through this instrument can be used as a material for consideration in revising the thermochemistry interactive e-module chemistry magazine. This validation sheet was assessed by 2 material validators and 2 media validators regarding the assessment of substance content, learning design, display (visual communication), and software utilization. The user response questionnaire was used to collect the data on user responses (teachers and students) to the thermochemistry e-module interactive chemistry magazine in SMAN 8 Pekanbaru and SMA Cendana Pekanbaru.

The data collection techniques were a literature review and field studies. The literature review was conducted to obtain theoretical relevant information, while field studies were conducted to obtain data related to the validity and user response to the thermochemistry interactive e-module chemistry magazine.

The data analysis techniques used in this study are the validity and analysis of user responses. Validity analysis is based on scores that are taken from the validator for each aspect of the assessment. This is how to calculate the percentage score with the equation formula:

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

Explanation:

P = Percentage score (%)

n = Number of Scores Obtained

N = Maximum of Score Obtained

The results obtained were converted into qualitative values based on the assessment criteria of the attitude measurement scale with a score of 1-4. The validity criteria can be referred to in Table 1.

Analysis of the user responses (teachers and students) is determined based on the percentage of alternative scores positive statements by using this formula:

$$R = \frac{f}{n} \times 100\%$$

Explanation:

R = Percentage of alternative scores statement of positive attitude (%)

f = Number of scores obtained

n = Total maximum score

Table 1 The validity criteria

Percentage (%)	The Validity Criteria
75,00-100	Valid
50,00-74,99	Quite Valid
25,00-49,99	Less Valid
0,00-24,99	Invalid

Table 2 Criteria response of users

Percentage (%)	Criteria Response of Users
75,00-100	Very Good
50,00-74,99	Good
25,00-49,99	Less Baik
0,00-24,99	Not Good

The results obtained were converted into qualitative values according to the assessment criteria for attitude measurement scale with a score of 1-4. Criteria for the response of users (teachers and students) can be seen in Table 2.

3. RESULT AND DISCUSSION

This development research produced the product of an interactive e-module chemistry magazine form based on Kvisoft Flipbook Maker for thermochemistry material. Interactive e-module chemistry magazine thermochemistry was developed within 6 months. This product can be accessed online and offline by teachers and students, it can be used during the learning process in the classroom and as an independent teaching material outside school hours using computers, laptops, notebooks, and various gadgets with Android and iOS operating systems. The gadget used must be equipped with supporting applications with HTML, HTML Mobile, and EXE / APP formats such as GOM and Mozilla Firefox. Development research uses the Research and Development (R & D) method with the Plomp model. These are the following explanation of this research finding results for each development stage.

3.1 Preliminary Investigation Phase

This phase consists of several stages: front end analysis, student analysis, competency analysis, and material analysis. In the front end analysis, the results were related to the teaching materials used. The teaching materials commonly used in the learning process are printed teaching materials like textbooks and printed modules at SMA Cendana Pekanbaru. The module only contains a description of the material, a set of formulas and some exercises so that the module is not in accordance with the structure of teaching materials that have been settled by the Directorate of Education Staff. Ideally, a module has a compilation component consisting of titles, learning instructions, basic competencies, learning materials, supporting information, training, assignments, and assessments.

On student analysis, the information gained is related to the abilities and attitudes of students towards thermochemistry material and analysis of the students' needs. Data distribution of questionnaires shows that 90.67% of students need alternative teaching materials such as modules that can be used to study thermochemistry material more easily and interestingly. In addition, 88.54% of students often use a PC or gadget as a learning resource for chemistry, at school and at home. This is in accordance with the 21st-century learning process that requires students to be able to know information and communication in technology as one of the media to improve students' understanding in a particular subject, especially in thermochemistry.

In the competency analysis, the results are related to competency attitudes, knowledge and skills that are

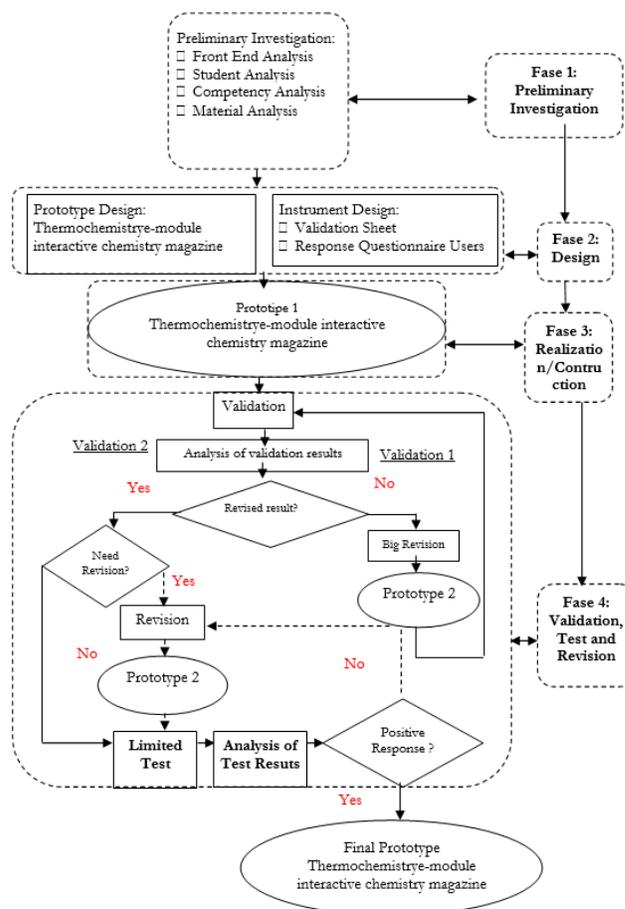


Figure 1 Plomp development model flow adapted and modified from Azhar (2011)

expected to be possessed by the students after the following thermochemistry learning on the syllabus of high school chemistry subjects by the Ministry of Education and Culture. Thermochemistry materials are found in essential competencies 3.4, 4.4, 3.5 and 4.5 with the main subject and learning activities.

In the material analysis, the information obtained is related to the concepts of thermochemistry material, which are systematically compiled and detailed. It also formulated learning objectives that must be achieved by students. The material is arranged according to the senior high school chemistry syllabus and appropriate with the lesson plan on the thermochemistry topic. The number of meetings for thermochemistry material consists of 4 meetings.

3.2 Design Phase

In this phase, the prototype design and assessment instruments were produced. The prototype project is in the form of an interactive e-module chemistry magazine thermochemistry as the results from various analyses that have been conducted to obtain a prototype which contains some contents suited with the ICT-Based Learning Materials Development Guide by the Ministry of National Education Directorate General of Primary and Secondary Education Management in 2010. The design of the

instrument is in the form of a validation sheet by the material and media validators and the response questionnaire user (teachers and students). It refers to the Guidelines for the Development of ICT-Based Teaching Materials by the Ministry of National Education Directorate General of Primary and Secondary Education in 2010. The questionnaire responses for users (teachers and students) were obtained according to the research needs with reference to the questionnaire response of users (teachers and students) from relevant research.

The e-module is designed in the form of a magazine so that it looks more attractive and contains magazine contents in the form of scientific articles, profile

personalities, tips and galleries that can add students' insights into thermochemical material. Besides, the designed e-module is also equipped with audio, video, animation, flash and links.

3.3 Realization/construction Phase

This phase is the realization of the prototype design and assessment of the instruments. The realization of the prototype design was the interactive e-module chemistry magazine based on Kvisoft Flipbook Maker on thermochemistry material. Then the realization of the assessment instrument is in the form of validation sheets and user response questionnaires (teachers and students).



Figure 2 Revised result by the material validators (a) before revision and (b) after revision

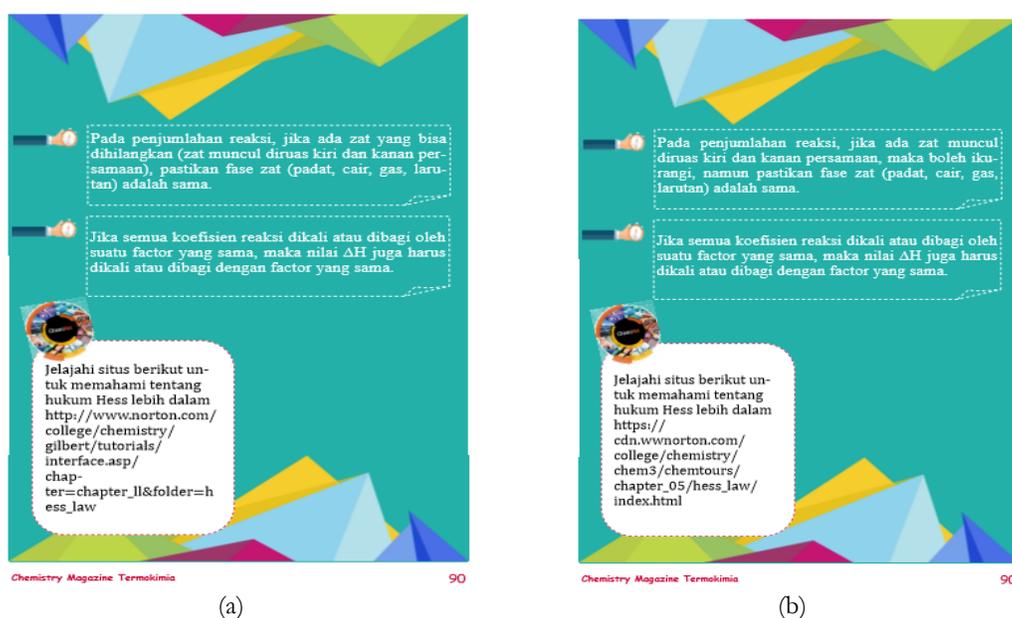


Figure 3 Revised result by the media validators (a) before revision and (b) after revision

Table 3 The results of the assessment of each aspect validation

No	Assessment Aspect	Percentage Score by Validator
1	ContentSubstance	88,89%
2	Learning Design	97,20%
3	Display (Visual Communication)	96,88%
4	Software Utilization	100%
Average Score Percentage		95,74%
Criteria for the Overall Validity of All Aspects		Valid

3.4 Realization/construction Phase

The results were obtained from the validation phase, test and revision in comments and suggestions form, which also obtained the final assessment of the prototype that has been made. The followings are the results of each activity in each phase.

Validation

Validation aims to determine the feasibility of the product to be used in the learning process based on the substance content aspect, learning design for material validator and display (visual communication) and software utilization for media validators in accordance with the ICT Based Learning Material Development Guidelines by the Directorate of Kementerian Pendidikan dan Kebudayaan (2016). Suggestions and improvements are gotten during validation are used as a reference for revisions to get a better e-module. Some examples of revisions made during the validation process by media and material validators can be seen in Figure 2 and Figure 3.

Overall, the validation results show the validity criteria with an average validation score of 95.74%. It means the e-module that has been developed has fulfilled all aspects set

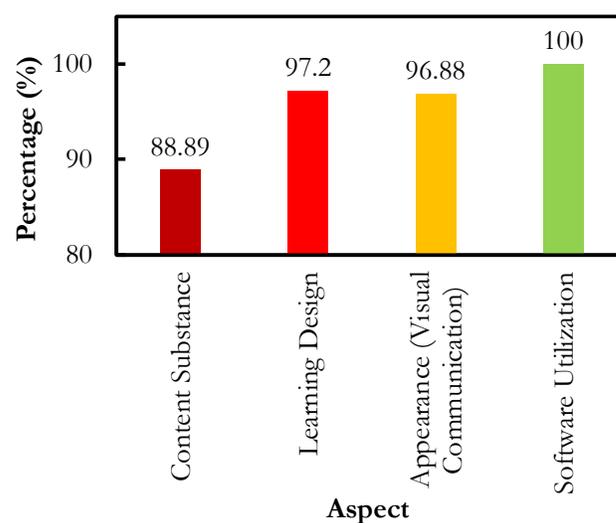
Table 4 The results of the assessment of the response of users (teachers and students)

Respondent	Result (%)	Category
Teachers	92,61%	Very Good
Students	86,80%	Very Good
Average	89,70%	Very Good

by the Kementerian Pendidikan dan Kebudayaan (2016). The results of the assessment of each aspect can be referred to in Table 3 and Figure 4 for the diagram.

Test

Tests were carried out to obtain comments, suggestions, and user-evaluations of the thermochemistry e-module interactive chemistry magazine using the user

**Figure 4** Percentage diagram of the score validation of each aspect by the material validators and media validators

(a)



(b)

Figure 5 The results of a revision made based on test with teachers (a) before revision and (b) after revision

response questionnaire for teachers and students. Overall, the score percentage from the tests of the response of users (teachers and students) to the thermochemistry interactive e-module chemistry magazine was 89.70% with very good criteria. This is because according to the user, the e-module has an attractive appearance and is in accordance with the characteristics of high school level students, contains material clearly and easily understood, and can be accessed anytime and anywhere. The result is in accordance with research conducted by Putri, Muhaimin & Sayhri. (2017) with the title "Development of e-Magazine on Material Acid and Base Solutions for Class XI MIPA Students in SMAN 1 Jambi City" with the results of research in the form of e-magazine assessments according to media experts, material experts, teachers and students' responses each obtained a mean score of 4.53 (very good); 4.86 (very good); 4.1 (good) and 91.64% (very good). The results of the assessment of the response of users (teachers and students) can be seen in Table 4.

Revision

The results of the test obtained comments, suggestions, and improvements from the teacher and students on the e-module. Examples of the results of revisions made based on trials with teachers can be seen in Figure 4 and students can be seen in Figure 5.

4. CONCLUSION

Based on the results of the study, it can be concluded that the development of interactive e-module chemistry magazine based on Kvisoft Flipbook Maker on thermochemistry materials for Senior High School grade XI/Islamic Senior High School was declared valid by the material validator based on aspects of material substance with 88.89% and 97.20% learning design, and by the media validator based on the display aspect (visual communication) 96.88% and the utilization of software 100%. While the tests to teachers and students the results

obtained are in very good criteria with an average 92.61% by teachers and 86.80% by students. The author hopes that the development of interactive e-module chemistry magazine in thermochemistry can be continued in the next research, the implementation phase to test its effectiveness in the learning process by applying interactive e-module chemistry magazine thermochemistry into the learning process directly.

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