The implementation of chemistry interactive e-module based on Kvisoft Flipbook Maker to improve student’ self-learning

R. Linda, H. Nufus, and Susilawati

ARTICLES YOU MAY BE INTERESTED IN

The separation of phenolic compounds from bio-oil produced from pyrolysis of corncobs
AIP Conference Proceedings 2243, 020005 (2020); https://doi.org/10.1063/5.0001078

Partial purification and evaluation of bromelain from pineapple stem (Ananas comosus) in cream based preparation and its in vitro anti-inflammatory activity
AIP Conference Proceedings 2243, 030012 (2020); https://doi.org/10.1063/5.0001345

Chemometrics role on optimizing industrial processes or product characteristics: The comparison of D-optimal and I-optimal mixture designs on the prediction of dye mixture composition
AIP Conference Proceedings 2243, 030008 (2020); https://doi.org/10.1063/5.0002670
The Implementation of Chemistry Interactive E-Module Based On Kvisoft Flipbook Maker to Improve Student’ Self-Learning

R. Linda a), H. Nufus, and Susilawati

Program study of Chemistry Education, Faculty of Teacher Training and Education, University of Riau, Pekanbaru, Indonesia.
a)Corresponding author: rozalinda@gmail.com

Abstract. This study was carried out about the implementation of the interactive chemistry e-module based on Kvisoft Flipbook Maker on Stoichiometry. The aim of this study was to know the effect of the student self-learning that used the interactive e-module as teaching material. Study method used pre-experiment with pre-post design. Data was obtained through the distribution of self-learning questionnaires with 4 indicators (self-confidence, high motivation, initiative and responsibility) before and after use e-module at MAN 2 Model in Pekanbaru. The obtained data then analyzed the hypothesis by t-test and N-Gain test. The results showed that there was an increase in students self-learning process in before and after use e-module that is from 50.15% to 88.1%. Magnitude of increase was obtained by N-Gain test that is 0.76, its means the student self-learning was increase in medium category.

INTRODUCTION

Education is an effort to develop and improve human resources. Through education the quality of human beings will be improved. Education is a conscious and planned effort to create a learning atmosphere and learning process that students are able to develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills needed by themselves, society, nation and country [1]. Education is carried out at school, in its implementation it is not always in accordance with what is expected, there are various problems that occur in the learning process one of is student not involved in the learning process. Learning should involve students actively, so students can participate and directly follow the learning process. Teaching can be used to provide students with experience in self-learning by using e-module in the learning process.

Module can be defined as a teaching material that is arranged systematically with a language that is easily understood by students according to their level of knowledge and age so that they can learn independently with minimal assistance/guidance from educators [2], whereas e-module means the electronic formation of the module itself, which certainly has the same characteristics in terms of content and formulation. According to Russell in [3], learning by using module will make learning more efficient, effective, and relevant. Module in the learning process greatly help students better understand the material being studied. According to [4], modules can help schools in realizing quality learning. The application of e-module expected can be conditioned the learning activities in a better planned, independent, complete, and with results clear.

The used of e-module must certainly be in accordance with the development of industrial era 4.0. One of the principles of industrial era 4.0 is the incorporation of machines, workflows, and systems, by applying intelligent networks along the chain and production processes to control each other independently [5], hence a e-module is required suitable for the industrial era 4.0. That suitable e-module can be created using flipbook applications namely Kvisoft Flipbook Maker [6]. This kind of practicality can enrich digital products such as texts, images, audio, videos, animations, flash and links [7]. Than that e-module expected to be able to improve the independence of students in the chemistry subject of Stoichiometry.
Chemical Stoichiometry is a broad concept which is applied in many areas of chemistry, especially analytical chemistry, where the quantitative relationships among number of moles of reactants and products are shown by a balanced equation. It enables learners to solve numerical problems on chemical reactions, concentrations, amounts of substances, titrimation and chemical equilibrium efficiently. These aforementioned related stoichiometric concepts are fundamental in quantitative chemistry. Failure to understand and connect between these concepts creates conceptual problems for students [8]. Because of that, students have to understand this concept, learning Stoichiometry is not only memorizing formulas, but students have to know the meaning of what they are learning, therefore teachers can use an instructional material in the form of e-module that students can learn independently.

The concept of ‘self-learning’ is associated with, or part of, a number of other educational concepts such as ‘personalised learning’, ‘student-centred learning’ and ‘ownership’ of learning as the vital to the continuing development of a system of school education that promotes high quality learning [9]. On self-learning, learners who may be guided by teachers, but who are not dependent upon them, learners who accept degrees of freedom and responsibility in initiating and carrying out the activities that lead to learning [10]. The application of this self-learning process is expected to also be obtained through the use of e-modules that have been developed, which begins through a literature study of various related scientific literature.

The result study by [11], founded that the development of a chemical e-module on electrolyte and non-electrolyte material are (1) e-module development declared very feasible to use based on the results of validation. (2) e-module can improve students critical thinking skills. (3) based on a limited trial of the results of the questionnaire responses of teachers and students, the development of e-module received a positive response. Another result study by [12], founded the physics e-module activity is one of the teaching materials that demands student’s independency to find a concept. Which is this statement supported based on the results of a research conducted by [13] which shows that the developed physics digital modules is suitable for use as self-learning materials for students or as a materials on self-learning.

The purpose of the study was to analyze the student self-learning that used the interactive e-module as teaching material. E-module used in this study is an e-module that was previously developed by the research team and have passed validation and trials with validity scores on media, pedagogic and content aspects, respectively 93%, 88.66% and 90, 6% and the response of teachers and students respectively by 90.5% and 90.36%. The developed a-module has advantages such us; can be used by teachers during the learning process and students outside classroom as an independent reading material. If we comparing with printed modules, e-modules offer interactive nature that makes navigation easier, loads images, audio, video and animation, and has formative tests/quizzes equipped with automatic feedback.

With the using of the e-module that have been developed, we sought to establish whether there was any enhancement in students self-learning. This is because previously research has shown that students face difficulties in studying the underlying principles of Stoichiometry. Therefore, it is important that using e-module to help students on self-learning in ways to steal the attention of the learning and to apply what they have learned to new situations.

**RESEARCH METHODS**

**Types of Research**

This study used a quantitative approach with pre-experimental research design (also known as the ‘before and after’ or ‘pre- and post-test’ design) may be threatened by a number of biases. In this design, participants are selected on the basis of performance below a pre-specified threshold in a test, pre-tested, exposed to an educational intervention and then post-tested. Observed improvements in the outcome measures ascribed to the intervention in a causal relationship [14].

**Sample**

The sample of this study was students in MAN 2 Pekanbaru. Samples were taken by purposive sample technique. This study is the self-learning of students in chemistry on the subject of Stoichiometry. Data collection was taken by the method of documentation, interviews and questionnaires.
**Data Analysis Technique**

Data were analyzed by t-test and N-Gain test to see an increase of student self-learning. t-Test was used to analyzed the hypothesis by SPSS 16 dan N-Gain test was used to know how much an increase of self-learning with formula by [15];

\[
\text{N-Gain} = \frac{S_{\text{post}} - S_{\text{pre}}}{S_{\text{NAKC}} - S_{\text{pre}}}
\]

The results then categorized based on the following Table.1 by [15].

<table>
<thead>
<tr>
<th>N-Gain Score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Gain &gt; 7</td>
<td>High</td>
</tr>
<tr>
<td>0.3 &lt; N-Gain &lt; 7</td>
<td>Medium</td>
</tr>
<tr>
<td>N-Gain &lt; 0.3</td>
<td>Low</td>
</tr>
</tbody>
</table>

The content analysis of researchers conducted discussions with the research team.

**RESULTS AND DISCUSSION**

Self-learning is a dependent variable, a variable that is influenced by the flipbook maker kvisoft-based e-module teaching material. To measure students' self-learning the instrument was used in the form of a questionnaire. The questionnaire was conducted before and after learning. The questionnaire used consisted of 20 questions with 4 indicators. Explanation about increasing student self-learning before and after using e-module based on Kvisoft Flipbook Maker on Stoichiometry material.

**Indicator of Self-Confidence**

Having a sense of confidence in resolving an issue shows that the initial data is 49.66% with unfavorable criteria, whereas after treatment the data result is 87% with good criteria. It shows that self-confidence after learning with Kvisoft Flipbook Maker e-module is better than before. This was seen when the researcher taught at the second meeting that there were no students who cheated to do the exercises and the student want to show off.

**Indicator of High Motivation**

The second indicator is having a high motivation; the results of the questionnaire before the research were obtained 46.16% with poor criteria, while after the study 89.5% with a good criterion. Students motivation can be seen in the second and third meetings, that students want to ask the teacher about the chemical material that they not understood and while attending the lesson, because there are rarely participate in the process of learning.

**Indicator of Initiative**

The third indicator for the questionnaire was initiative, the results show that before the study was obtained at 42.16% with poor criteria and after research 91 % with good criteria. In the first to sixth meeting student were asked to start taking the initiative to make their own notebooks without being told.

**Indicator of Responsibility**

The results of the questionnaire before the study were 48.5% with poor criteria. Whereas after the research was obtained at 90.85% with good criteria. This can be seen in the meeting of the two students when they were quizzesing, they were really working on it without complaining. Likewise, when the learning process at the fourth meeting.
students want to move into the classroom and do the exercises without having to be appointed by the teacher. This means that students want to go forward with reluctance and are responsible for completing it.

The application of the Kvisoft Flipbook Maker-based e-module on Stoichiometry material has increased every indicator of self-learning. This can be seen in Fig.1.

![Graph of the percentage indicator of self-learning](image)

**FIGURE 1. Graph of the percentage indicator of self-learning**

Student self-learning before use e-module obtained 50.15% with a low category and after learning 88.1% with a high category, with sample 25 students. This is in line with the results of research by [15] who concluded that the use of Chemistry Magazine module Inquiry-based in chemistry learning material oxidation and reduction reactions affect student learning outcomes with biserial correlation coefficient of 0.513 and a contribution of 26.32 %. To show the comparization of differences before and after used e-module as in Table 2.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Before</th>
<th>After</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 - 100</td>
<td>0</td>
<td>21</td>
<td>0</td>
<td>84%</td>
</tr>
<tr>
<td>60 - 79</td>
<td>2</td>
<td>4</td>
<td>8%</td>
<td>16%</td>
</tr>
<tr>
<td>50 - 59</td>
<td>13</td>
<td>0</td>
<td>52%</td>
<td>0</td>
</tr>
<tr>
<td>30 - 49</td>
<td>10</td>
<td>0</td>
<td>40%</td>
<td>0</td>
</tr>
<tr>
<td>N</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 2. Comparization results of the tendency differences of self-learning before and after used e-module**

 Category: High, Moderate, Low, Very low
To see the graph of the differences tendency of self-learning before and after learning can be seen in Fig 2.

**FIGURE 2.** Graph of differences of tendency of self-learning before and after use e-module

Analysis of hypotheses to determine the increase of independence learning before and after applied e-modules. Data is obtained both before use e-module and after using e-module the results of the data are normally distributed. Furthermore, the data in the analysis of hypothesis testing using parametric statistics with t-test using SPPS 16. The results obtained are that t-count > from t-table, which is 20.4 > 2.064 and the probability value is 0.001 < 0.05. It means that there is an increase in the self-learning of students that use e-module based on flipbook maker on Stoichiometry material. The increase that occurred with N-Gain obtained was 0.3 < 0.76 < 7 which means that the increase was in the medium category.

**CONCLUSION**

The implementation of the interactive chemistry e-module based on Kvisoft Flipbook Maker on Stoichiometry can improve the student self-learning with 4 indicators such us; self-confidence, high motivation, initiative and responsibility. The results showed the increase in students self-learning process in before and after use e-module that is from 50.15% to 88.1%. Magnitude of increase was obtained by N-Gain test that is 0.76, its means the student self-learning was increase in medium category.

**REFERENCES**