

# *The Development Of E-Module Based On Guided Inquiry Using Adobe Flash Professional CS6 In Materials The Diversity Of Living Things And Classification Of Living Things For Students In Class X MIPA SMAN 3 Batam*

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**Abstract** – The teaching materials based on Information and communication technology are widely uses as a tool in schools today. Based on preliminary investigation data by students of class X MIPA in SMAN 3 Batam shows that the learning materials used are not in accordance with the competency standards. Furthermore, there are also difficulties by students learning the materials biology.

This study aims to produce an e-module based on guided inquiry in the material diversity of living things and classification of living things that valid, practical, and effective to use. The type of research is development research using the Plomp model, and The design of research used in the field trial is intact group comparison. The assessment are carried out through learning activities, cognitive, affective, and psychomotor learning outcomes of students. The data analysis technique in this study used parametric and non-parametric data analysis techniques.

The results showed that the e-module based on guided inquiry is very valid with a score of 93,06%. The results of field trials on student learning activities showed the score 83,00% with very valid criteria, cognitive learning outcomes cognitive learning outcomes 81,25 of students who passed the minimum mastery criteria, 76.72% affective learning outcomes with effective criteria, and psychomotor learning outcomes with a value of 82.50% with very effective criteria. The results showed that the guided inquiry-based e-module on the material on biodiversity and classification of living things that had been developed was valid, practical, and effective.

**Keywords** – Adobe Flash Professional CS6, Guided Inquiry, E-Module, Development.

## I. INTRODUCTION

The development of Information and Communication Technology in the 21st century greatly affects in the education aspect, one of which is teaching materials based on Information and communication technology are widely uses as a tool in schools today. Meanwhile, the 2013 curriculum is a system in education that has being persued by the government to be able to face the challenges of the globalization era. The learning process in the 2013 curriculum is learning based on scientific approach that are emphasizing on knowledge competence, attitude competence, and skill competence.

The curriculum 2013 learning must to provide opportunities for student to to construct knowledge in their cognitive processes so that students have the ability to actively search, process, construct, and use knowledge [1] One of the learning models that can involve all students' abilities in learning activities is the guided inquiry models. Guided inquiry learning models is a learning activity that involves all students' abilities to search for and investigate a problem systematically, logically, analytically so that they can formulate their own findings confidently [2]. This kind of learning is centered on students as subjects to be actively involved in it in order to achieve the expected learning objectives.

The advancement of science and technology demands changes in the ways and strategies of teachers in teaching [3]. One effort to improve the quality of education at school is using quality learning resources [1]. The teaching materials used must be in accordance with the competency standards and approaches in the 2013 curriculum. One of the teaching materials that allows

students to learn independently is e-module [4]. Electronic module (E-Module) is a form of presentation of learning materials in the form of modules that are displayed in a digital format that is systematically arranged for the purposes of student self-study [5]. E-modules can be equipped with interactive media such as video, audio, animation, and other interactive features that can be played by students [6]. The use of guided inquiry-based e-modules in learning helps students to easily understand the subject matter independently, and its use is very practical, and has time efficiency [7]. Adobe Flash is the main software in the development of teaching materials such as animation, video, virtual labs, games, and interactive multimedia [8].

Based on the results of conducted interviews on a biology teachers at SMAN 3 in Batam City, said that during learning students are not allowed to use smart cell phones in class, but students are allowed to use their own laptops to find references in learning. However, in reality students are more active in using their laptops for activities other than learning needs. Based on problem analysis conducted by 38 students showed that; (1) not all students have their textbooks as a study reference, (2) the utilization of the use of technology owned by students as a learning reference has not been maximized, only about 14.8% is used for learning activities, (3) students have difficulty in understanding some biology learning materials in class X. That shown by the average daily test achievement of students on the classification of living things in one class is only about 42% completed and 57% of students incomplete. based on analysis of study materials shows the learning materials that have been used contain minimal visual material display, so the teacher uses other teaching media such as powerpoint (ppt) to display visual material in the form of images or videos needed for more explanation. This shows that the use of learning materials used during learning is not efficient. In addition, there is no integration of a learning model in the book, the use of learning materials that have not been directed to student activities so that they do not support the competencies and skills that students want to develop.

Some research results show that the use of e-modules in learning can make it easier for teachers to deliver material, so that learning time becomes more efficient [9]. Amalia and Advinda said that guided inquiry-based learning resources are able to make students more active in carrying out scientific activities [1]. Cheva and Zainul said that the use of guided inquiry-based e-modules in learning helps students to easily understand the subject matter independently, and its use is very practical, and has time efficiency [7]. Based on that, in order to support the objectives of the 2013 Curriculum and to face 21st century education, an e-module based on guided inquiry need to developments.

## II. METHODS

This research is part of development research using Plomp model development which consisted of preliminary research phase, development or prototyping phase (development or prototyping phase), and assessment phase (assessment phase) [9]. This research was aimed at producing products an e-module based on guided inquiry for Keanekaragaman Hayati and Klasifikasi Makhluk Hidup subjects. This research was conducted at SMAN 3 Batam with 38 students. Activities carried out at preliminary research phase include curriculum analysis, and concept analysis, problem analysis, and needs analysis.

The development or prototyping phase aims to design solutions to problems that have been identified in the initial investigation phase [10]. The activities carried out at this stage are product development in the form of an e-module based on guided inquiry for Keanekaragaman Hayati and Klasifikasi Makhluk Hidup subjects for students of class X MIPA SMA. This phase begins with the storyboard design of an e-module based on guided inquiry, this activities are called development phase of prototype I. The development of an e-module based on a guided inquiry product using the Adobe Flash Professional CS6 application program, the development stage is carried out by self-evaluation using a checklist instrument. This phase is called development of prototype II.

The results of the development of prototype II were carried out through consultation with experts (expert review) using a validation questionnaire from the aspects of construct, content, and graphics. The validity value analysis uses the following equation with the validity criteria in Table 1.

$$Validity = \frac{item\ score\ obtained}{maximum\ score} \times 100\%$$

Table 1. E-Module Validity Criteria

Interval (%)	Category
81 – 100	Very Valid
61 – 80	Valid
41 – 60	Adequate Valid
21 – 40	Less Valid
0 – 20	Invalid

This phase followed by one to one evaluations were carried out on three class X students using interview guide sheets The results of this phase is called Prototype III. At this stage the prototype is evaluated through of small group evaluation in a group of students consisting of 6 students in class X, with different abilities of students (high ability, medium, and low ability levels). This formative evaluation used a student practice questionnaire sheet. The results of the revised Prototype III were called Prototype IV.

The results of the development at this stage will be continued to the assessment phase conducting large group trials (field tests) in class to see the practicality and effectiveness of the product. Practicality is carried out by filling out questionnaires by a teacher and students to obtain data that will be used in revising the product. The practicality data of the use of the learning module is analyzed by percentage (%), using the following formula.

$$Practicality = \frac{\text{item score obtained}}{\text{maximum score}} \times 100\%$$

Table 2. E-Module Practicality Criteria

Interval (%)	Category
81 – 100	Very Practical
61 – 80	Practical
41 – 60	Adequate Practical
21 – 40	Less Practical
0 – 20	Unpractical

The implementation of large group trials using a intact group comparison research design were taken from one group in a class, namely group B in class X MIPA 2 as many as 20 students. The following is a description of the research flow of the intact group comparison design in Figure 1.

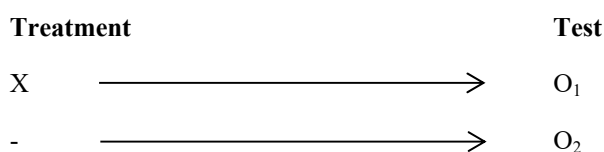


Figure 1. Intact Group Comparison Research Flow

Description:

$O_1$  = The results of the measurement of half the treated group.

$O_2$  = The results of the measurement of the half of the untreated group.

X = The use of an e-module based on guided inquiry.

This study divides a group of research subjects from a certain population, into two samples, namely half the experimental group (which is treated) and half the control group that is not given treatment [11], then both classes were given the same final test (posttest). This phase followed by an assessment of the effectiveness test includes the results of observations of learning activities, learning outcomes in the cognitive, affective and psychomotor domains of students. The results of the cognitive value of students are obtained through the value of multiple-choice questions. Cognitive learning outcomes of students are calculated based on the completeness of the average value of students in 1 study group. If the group's average score is at the passing standard, it can be concluded that the biology learning process using e-module based on guided inquiry has been successful.

Learning activities, affective and psychomotor can be seen from the results of observations of the learning process carried out by students. The classical attitude analysis uses the following equation with the effectiveness criteria in Table 3. The data were analyzed using a non-parametric test, using the U test (Mann Whitney Test), conducted to compare the differences between the control group and the experimental group.

$$Percentage = \frac{\text{item score obtained}}{\text{maximum score}} \times 100\%$$

Table 3. E-Module Effectiveness Criteria

Interval (%)	Category
81 – 100	Very Effective
61 – 80	Effective
41 – 60	Adequate effective
21 – 40	Less effective
0 – 20	Uneffective

### III. RESULT AND DISCUSSION

#### 3.1. Result

This research started from the storyboard design and prototype development of an e-module based on guided inquiry. E-Module based on guided inquiry in materials the diversity of living things and classification of living things has several components; (1) Cover, (2) cover title and author, (3) foreword, (4) table of contents, (5) preface (description and instructions), (6) KI, KD, and IPK, (7) concept maps, (8) learning activities, (9) material description, (10) learning videos, (11) exercises, (12) summary, (13) evaluation, (14) answer key, (15) reference, and (16) glossary. Some of the components are shown in Figure 2 and Figure 3.

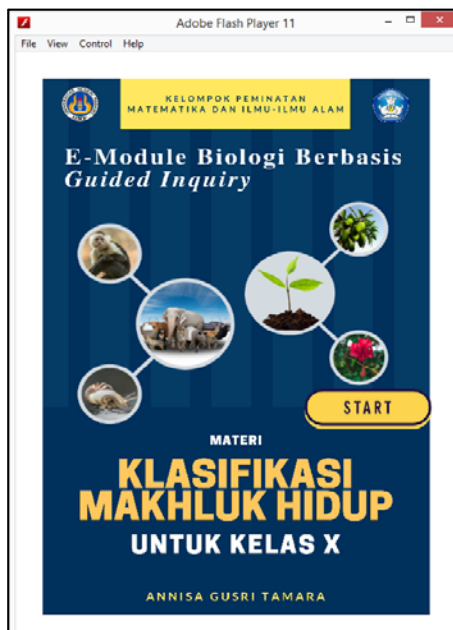


Figure 2. E-Module Cover

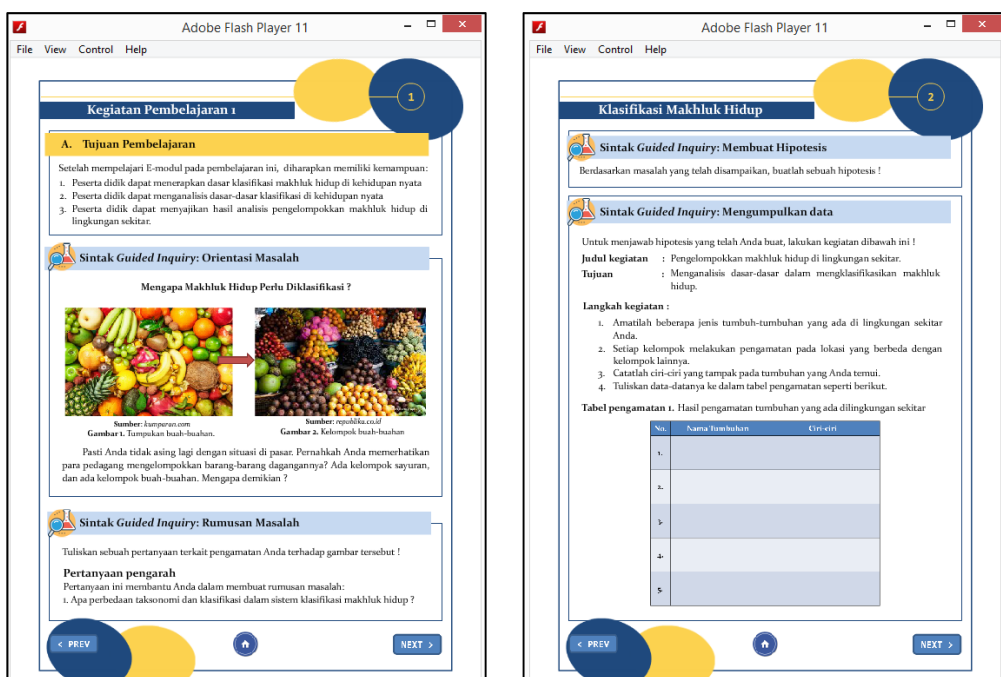


Figure 3. Learning Activity Based On Guided Inquiry

After the e-module based on guided inquiry is designed, a self-evaluation is carried out after the result are obtained from the e-module. The improvement results from the self-evaluation resulted in a prototype II. Furthermore, an assessment is carried out by students through one to one evaluation from the students' perspective of the e-module that has been developed. The results of interviews conducted with students are known that the e-module based on guided inquiry can be easily accessed, have complete components, and the display design of the e-module based on guided inquiry is quite attractive.

This phase followed by an expert assessment through expert review validation consists of three lecturers. Expert assessment is carried out from four aspect, which are aspects of construction, content, graphics, and language. Validity results of the e-module based on guided inquiry from expert review can be seen in Table 4.

Table 4. E-Module Validity Test Results

<b>Assessment Apects</b>	<b>Percentage(%)</b>	<b>Category</b>
Construction	95,83	Very Valid
Content	98,61	Very Valid
Graphics	91,67	Very Valid
Language	86,11	Very Valid
<b>Average</b>	<b>93,06</b>	<b>Very Valid</b>

Based on expert assesment shows that e-module based on guided inquiry has been fully fill validity criteria of an e-module. However there are also provide suggestions from expert review for improvements to the modules developed. The suggestions and improvement results can be seen in Table 5.

Table 5. Suggestions And Results of E-Module Improvements

<b>Suggestions</b>	<b>Follow-up</b>
Improve guided inquiry steps.	The guided inquiry steps has been improved.
Write the steps of inquiry as instructions in the introduction	The guided inquiry steps has been written down.
The image on the cover must match the context of the title.	The image on the cover has been changed.
Improve concept map material.	The concept material has been improved.
Greetings to readers must be consistent.	The greetings has been changed from "Kamu" to "Anda".
Watch for punctuation errors.	The punctuation has been fixed.

Prototype III followed to evaluated by a small group of students, to get improvement from the evaluation of the practicality of the e-module. The number of students consisting of 6 students in class X, with different abilities of students (high ability, medium, and low ability levels). The small group evaluation showed results with a total average of 87.3% with very practical category.

The results of the assessment phase were carried out a field test using an intact group comparison research design. Subject was students in class X MIPA 2 namely group A as an control group and B as a experiment group each consisting of 20 students, and a biology teacher. The results of practicality evaluation by students from experiment group can be seen Table 6.

Table 6. E-Module Practical Test Results by Students

Assessment Apects	Percentage(%)	Category
Ease of Use	86,9	Very Practical
Learning Time Efficiency	79,4	Very Practical
Benefits	84,9	Very Practical
<b>Average</b>	<b>83,71</b>	<b>Very Practical</b>

Based on Table 6 it is known that the average practicality result by students is 83,71% with very practical category. This shows that e-module based on guided inquiry is very practical to be used by students in the implementation of biology learning process. The results of practicality evaluation by a teacher can be seen in Table 7.

Table 7. E-Module Practical Test Results by Teacher

Assessment Apects	Percentage(%)	Category
Ease of Use	75,00	Practical
Learning Time Efficiency	75,00	Practical
Benefits	75,00	Practical
<b>Average</b>	<b>75,00</b>	<b>Practical</b>

Based on Table 7 it is known that the average practicality result by teacher is 75% with practical category. This result shows that e-module based on guided inquiry is practical to be used by teacher in the implementation of biology learning process.

The assessment phase followed by effectiveness test of the e-module in classification of living things material by experiment group using e-module based on guided inquiry and control group using their text books in biology learning process. The assessment obtained from learning activities and student learning outcomes which include learning outcomes in the cognitive, affective, and psychomotor domains. The results can be seen in Figure 4.

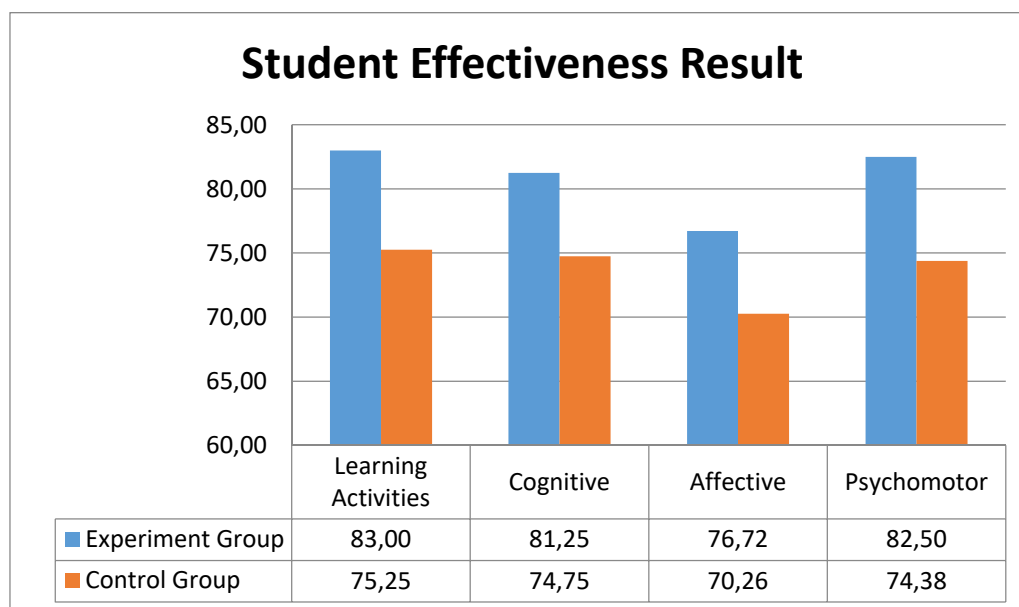


Figure 4. Graph of Student Effectiveness Result in Biology Learning Process

Based on Figure 4 it is known that the average by student learning activities result by experiment group is 83% with very effective category, and the average by control group is 75,25% with effective category. Furthermore, this result tested the hypothesis using the t test. This test was conducted to see the effect of using of the e-module in classification of living things material. The hypothesis test shows that there is a significant difference between the learning activities of the experimental group students and the control group students.

The result of learning outcomes in the cognitive was obtained through a final test in the form of a written test given to the experimental group and control group at the end of the meeting in the learning process. Based on Figure 4 it is known that the average by student learning outcomes in the cognitive by experiment group is 81,25% pass the test, and the average by control group is 74,75% pass the test. Furthermore, this result tested the hypothesis using the t test. This test was conducted to see the effect of using of the e-module in classification of living things material. The hypothesis test shows that there is a significant difference between the learning outcomes in the cognitive of the experimental group students and the control group students.

The result of learning outcomes in the affective was obtained and psychomotor are obtained through student learning activity observation sheets. Based on figure 3 it can be seen that the average by student learning outcomes in affective result by experiment group is 76,72% with effective category, and the average by control group is 70,26 % with effective category. The learning outcomes in the psychomotor result by experiment group is 82,50% with very effective category, and the average by control group is 74,38% with effective category. Furthermore, this result tested the hypothesis using the U test. This test was conducted to see the effect of using of the e-module in classification of living things material. The hypothesis test shows that there is a significant difference between the learning outcomes in the affective and psychomotor of the experimental group students and the control group students.

### 3.2. Discussion

This research resulted in a product in the form of an e-module based on guided inquiry. The development process that has been carried out by researchers is carried out to increase the variety of learning materials, as well as to overcome learning problems related to the dependence on the use of technology owned by students as learning materials in schools. Also the use of varied learning materials and can help develop students' scientific competence. According to Nova, Fitri, & Lufri stated that students' knowledge can be increased by applying the guided inquiry learning model in the learning process [12]. E-module based on guided inquiry learning materials can increase student activity and train students to understand the material independently [7].



The validation of the e-module based on guided inquiry was carried out by 4 validators. E-module based on guided inquiry are said to be very valid because they have fulfilled the four aspects of the assessment based on aspects of construction, content, graphics, and language. Safitri, Arike and Festiyed stated that a module can be said to be in accordance with the desired content if it has obtained validity with very valid criteria [13]. E-module based on guided inquiry fulfills the construction aspect because it is designed to be used on laptops based on windows operation, it also contains visual media components in the form of text, images, and videos, and is designed based on learning outcomes. The e-module based on guided inquiry was fulfills the material aspect because it contains important concepts in the material of biodiversity and classification of living things that are clear and in accordance with learning outcomes. The presentation of difficult concepts such as the shape of organisms, objects and processes has been visualized with pictures and learning videos.

Furthermore, e-module has fulfilled the graphic aspect because it already contains text consisting of the right type of writing, size, color, and punctuation. The presentation of the image is in accordance with the explanation of the material, has the appropriate size, has a clear shape, and attractive color. The videos presented are in accordance with the explanation of the material, have clear visuals, and can be played directly by users without an internet connection. The e-module based on guided inquiry as a whole already has an attractive and clear design. This is also supported by Wulandari, Adnyana & Santiasa's opinion that the use of various types of media listed in the e-module makes the involvement of more senses needed by students to learn so as to help students understand [14]. The validation result of the e-module shows that has fulfilled the criteria for the language aspect because it has used the correct rules of Indonesian and latin (scientific language) and uses communicative language. This result supported by Kamarudin's opinion that the use of good and correct Indonesian language, as well as communicative language can make it easier for students to understand the meaning of [15].

The assessment of the practicality of the e-module based on guided inquiry was carried out in two phase, starting with an assessment by 6 students in the small group evaluation and practical assessment in the field test evaluation by 20 students, and followed by an practical assessment by 1 biology teacher. Aspects of practicality assessment that are seen include aspects of ease of use, efficiency of learning time, and benefits. Based on the ease of use, there are no visible obstacles in using g e-module based on guided inquiry on students' laptops. Applications that have been installed on students' laptops can be used properly and there are no errors or sudden stops.

The effectiveness result was obtained from learning activities and student learning outcomes which include learning outcomes in the cognitive, affective, and psychomotor domains. The results found that the experimental class that used e-module was better than the class that used their text books. The activeness of students in carrying out activities during learning is also influenced by the maximum use of time in learning of biology. The use e-module based on guided inquiry makes learning more effective and time efficient, pictures and instructions for learning activities are clearly and concisely listed, so that teachers do not need to explain repeatedly to students. This result supported by Bahri, Syamsuri and Mahanal, stated that with the e-module in learning the teacher does not need to convey information from the beginning because the features contained in the e-module such as picture stories that facilitate learning activities in the classroom, so that teachers can streamline learning time [3].

The learning outcomes of cognitive domains shows that there is a significant difference between the cognitive domain learning outcomes of students in the experimental group and the control group. The stages and directions contained in the e-module emphasize the process of obtaining information needed by students so that they can understand the concept of the material independently. This result supported by Nurlia et al, stated that students who have high learning independence are expected to be able to study well so that they are able to master the subject matter so that they can improve their biology learning outcomes [15]. Further, Nova, Arsih and Lufri stated that the learning stages contained in the guided inquiry model make students the center of learning so that it will affect the knowledge competence of students [12].

The learning outcomes of affective domains shows that there is a significant difference between the affective domain learning outcomes of students in the experimental group and the control group. The use of an e-module based on guided inquiry can familiarize students to behave in accordance with scientific attitudes such as curiosity, cooperation, open-mindedness, and responsibility. The tasks, exercises, and evaluations contained in the e-module are requirements and responsibilities that must be carried out by students before they move to the next e-module material. The learning stages in the e-module help students to develop an attitude of thinking scientifically and working scientifically. Bahri, Syamsuri and Mahanal stated that Guided inquiry is one of the learning models that can train students to think scientifically and can solve problems as they experience in the real

life. It has also provides an opportunity for students to find or find the meaning of everything they learn, they need to be given the opportunity to argue as problem solvers, as scientists do, in this way they are expected to be able to understand concepts in their own language [3].

The assessment of students' psychomotor learning outcomes showed that the use of e-module based on guided inquiry in the learning process had an effect on improving students' psychomotor learning outcomes. The use of e-modules can be used individually or in groups so as to provide convenience for students to develop their competencies and skills such as discussing, asking questions, and presenting. Furthermore, e-module based on guided inquiry can help students to develop their competencies and skills needed to achieve learning outcomes in accordance with the 2013 Curriculum, namely competency skills. This result supported by Ikhsan's opinion that motor skills of learners become a measure of success in the learning process in the psychomotor realm [16].

#### IV. CONCLUSION

Based on the results of development research that has been obtained from 3 assessment criteria namely; validation, practicality, and effectiveness it can be concluded that e-module based on guided inquiry for keanekaragaman hayati and klasifikasi makhluk hidup materials was valid, practical, and effectively used in the biology learning process. The used of e-module based on guided inquiry can improve students of learning outcomes and help them to develop their competencies and skills.

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