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Validity and Practicality of Chemical Equilibrium E-Module Based on Integrated Guided Inquiry (IGI) Learning for Senior High School Grade Eleven

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Abstract—Chemical equilibrium is a material studied in class grade eleven for senior high school which consists of theory and practicum, so that teaching materials are needed that can support the characteristics of this material. This study aims to produce a chemical equilibrium e-module based on integrated guided inquiry (IGI) to reveal the level of validity and practicality. The type of research used is research and development (R&D). The development model used is Plom which consists of three stages, namely preliminary research, prototyping phase, and assessment phase. The research instrument used was a questionnaire in the form of a validity and practicality sheet. The data obtained from the research instrument were analyzed using the Aiken'V formula, and percentage. Based on the results of data analysis with the Aiken'V formula, the construct validity was 0.89 in the valid category, while for the technical, the Aiken'V value was 0.90% in the valid category. For the practicality assessment by the teacher, 91.49% was obtained in the very practical category and the practicality by the students was 87.84% in the very practical category. It is concluded that the product developed is valid and very practicaly.

Keywords—e-module; chemical equilibrium; integrated guided inquiry; Plomp development model

I. INTRODUCTION

Chemistry is part of science that studies matter, changes in matter and the energy that accompanies these changes [1]. Chemistry as a product is knowledge in the form of facts, concepts, principles, laws and theories [2]. So that in studying chemistry students are not only required to learn more about the concepts and principles of science by rote, the introduction of formula, and the introduction of terms through a series of verbal exercises only. Compared to other fields, chemistry often seems more difficult, at least at a basic level. There are several reasons for this difficult impression. One of them, chemistry has a very special vocabulary. In the beginning, studying chemistry was the same as learning a new language. In addition, some of the concepts are abstract [2].

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So to understand this chemistry, students must have competencies that need to be improved in the 21st century. The Partnership for 21st Century Skills (2013) as one of the educational references states that the competencies that need to be improved in students in the 21st century are learning and innovation skills (critical thinking, communication, collaboration, and creativity), information technology, and media skills, as well as life skills and in fulfilling these skills, learning in schools is more emphasized on the discovery process [3].

One chemical that implements learning model curriculum in 2013 that guided inquiry learning model. Inquiry learning is a learning activity that emphasizes critical and analytical thinking processes to seek and find the answer to a problem in question [2]. In inquiry learning, the activities carried out by students are directed by the teacher to seek and find their own answers to something in question so that the teacher acts as a facilitator and motivator of student learning. The guided inquiry learning model that integrates experimental activities in learning has been developed by Andromeda into an integrated guided inquiry (IGI) which consists of 6 stages, namely orientation, exploration, interconnection, concept formation, application, and closing. Orientation phase, the stage of connecting new knowledge with existing knowledge (old knowledge). Exploration, exploring and constructing several variables in the form of data, tables, graphs, and others obtained through teaching materials and experimental or demonstration activities. Interconnection, connecting experimental/demonstrative facts (macroscopic representations) and symbols with submicroscopic illustrations. Concept formation, students are guided by CTQ (critical thinking question). Application, using the concepts that have been obtained to do the exercises and the closing stage where students make conclusions.

E-module is a set of digital or non-printed teaching media that is systematically arranged which is used for independent learning purposes in an electronic format [4]. E-module development has several advantages. First, the concepts contained in the chemical equilibrium material can be visualized in the form of animations and practicum videos. Both e-modules are presented in an attractive display, equipped with images, text, videos, animations, and websites.

In developing this e-module, the author uses the Flip PDF professional application developed by Wonder Idea Technology Limited. Flip PDF Professional is a feature-rich flipbook maker with page editing functionality. Flip pdf professional has advantages such as being easy to use because it can be operated for beginners who do not know the HTML programming language. Create interactive book pages by inserting multimedia such as images, videos, MP4, audio videos, hyperlinks, quizzes, flash in pdf so they don't have to open in another place or in a separate place but are directly inputted in a PDF file, can be published online or offline, can displays a feed back that shows correct or incorrect answers and scores that can be known directly [5].

Several studies that have been carried out related to the development of the learning model integrated guided inquiry (IGI) have been carried out by Andromeda which are valid and practical to use in learning chemistry in high school [6]. In addition, Andromeda with the development of an module based integrated guided inquiry on colloidal chemistry topics is valid and practical for learning chemistry in high school [7].

Based on the above problems, the authors conducted a study to develope-module-based integrated guided inquiry (IGI) with the title ‘validity and practicality of chemical equilibrium e-module based on Integrated Guided Inquiry (IGI) learning for senior high school grade eleven .

II. Research Method

A. Type of Research

Type of research used is research and development (R&D). R & D is a process or steps to develop a new product or improve an existing product, where all activities can be accounted for. Development research is research that is used to produce certain products and test the effectiveness of these products [8].

B. Development Model

One of the development models is the Plomp developed by Tjeerd Plomp. The Plomp development model consists of three stages, namely the preliminary research, prototyping phase, and assessment phase [9].

C. Data Collection Instrument

Instruments used in this study were: (1) Teacher interview guidelines and student questionnaires (preliminary research), interviews and questionnaires are used in the initial investigation stage to find out the problems of teachers and students in the learning

process and determine the characteristics of e-modules needed by teachers and students. The interviews conducted were interviews in the form of questions asked referring to the interview guidelines that had been prepared, but other questions usually appeared during the interview process. In addition, interview guidelines and questionnaires were also used at the product development stage to find out students' opinions about the developed e-module. (2) The instrument validation sheet, the instrument validation sheet is used to see the suitability of the aspects contained in the validation sheet and the practicality used. The instruments used in the study were e-module validity sheets, teacher practicality, and student practicality. (3) The self-evaluation sheet, the self-evaluation sheet is used to re-check the completeness of the developed e-module components and find out errors in the preparation of based e-modules integrated guided inquiry (IGI). Self evaluation sheet in the form of a check list by the researcher as a party to the development of e-modules. (4) Validation instrument, validation instrument in the form of a chemical equilibrium e-module validation sheet based on the learning model integrated guided inquiry (IGI) used to assess the feasibility of content, construction feasibility (presentation component), linguistic component, graphic component, display, programming, and utilization of the resulting e-module. (5) The e-module practicality instrument, the practical instrument in the form of a questionnaire given is a student response questionnaire and a teacher's response to assess the ease of use, learning time efficiency, and the benefits of the resulting e-module.

D. Data Analysis Technique

Research data were analyzed by descriptive statistics to get the average and percentage. The data analysis technique for each research data can be described as follows:

1. Validity Analysis Techniques

Validator's assessment of each statement is analyzed using the Aiken V formula which is formulated as follows:

$$V = \frac{\sum s}{n(c-1)}$$

Description:

s = The score determined by the validator minus the lowest score in the category used (s = r-Io), with r the score for the validator's choice category and Io the lowest score in the scoring category.

n = Number of validators

c = Number of categories selected by validators

Table 1. Category based on Aiken V formula

Scala Aiken	Category
V ≤0,4	less
0,4 < V ≤0,8	medium
V>0,8	valid

2. Practicality Analysis Techniques

The practicality analysis technique is the same as the validation questionnaire, so the assessment of the practicality sheet is also obtained from the provision of teacher and student response questionnaires. The questionnaire data obtained were analyzed using a modified formula according to Prastowo (2011):

$$\text{NP} = \frac{\text{R}}{\text{SM}} \text{X } 100\%$$

Description

NP: Practicality value

R : Score given by validator

SM: Maximum score

Table 2. Practicality assessment category

No	Value (%)	Aspects Assessed
1	86-100	Very practical
2	76-85	Practical
3	60-75	Moderate
4	55-59	Less practical
5	≤54	Not practical

III. RESULT

A. Preliminary Research

1. Needs analysis

Analysis is carried out by analyzing the demands of the 2013 revised 2020 curriculum, namely learner-centered and independent learning. In addition, students demand to be skilled in using media, technology, information, and communication (ICT).

In addition, this analysis was conducted by interviewing four chemistry teachers, each from SMAN 3 Padang, SMAN 10 Padang, SMAN 12 Padang, and SMAN 14 Padang. Based on the results of interviews with teachers that have been carried out, it is known that several things are as follows: (1) For the self-learning model, the four schools apply discovery learning, while the integrated guided inquiry model has never been done. (2) The teaching materials and media used in general are printed books, student activity sheets (LKPD), and power points (PPT). The teaching materials used alone have not fully guided students to find concepts independently and motivate students to be active. During this COVID-19 pandemic, teachers need teaching materials that can support online learning. The use of more innovative and technology-based teaching materials will better support the learning process. (3) To present 3 multiple levels of chemical representation in the learning process the teacher only conveys 2 levels, namely only symbolic and macroscopic. This is because it is difficult for teachers to present the sub-microscopic level in delivering material.

Based on the results of interviews with teachers, researchers tried to develop an electronic-based teaching material as an innovation and alternative to continue to support the online learning process that took place in the midst of the current pandemic. Where in this e-module teaching material itself uses the integrated guided instruction (IGI) learning model which is very rarely used by teachers in schools. The integrated guided inquiry (IGI) learning model can involve maximally all students' abilities to search and investigate systematically and critically, so that they can find concepts independently. In addition, in the e-module there is also a model that displays 3 levels of multiple chemical representations, namely symbolic, macroscopic, and sub-microscopic so that it is very helpful for students in understanding chemistry.

2. *Curriculum analysis*

This analysis aims to formulate indicators of competency achievement and learning objectives in accordance with the competencies expected based on the 2013 revised 2020 curriculum. Based on the curriculum analysis, it is found that the 2013 revised 2018 curriculum requires students to actively seek, process, and construct knowledge in the learning process and skilled in using media, information technology, and communication. So this can be realized by using technology-based teaching materials, namely e-modules based on the integrated guided inquiry (IGI) learning model.

The operational verb used in KD 3.7 is to analyze which is included in the cognitive domain of C4. Analyzing is breaking down material into its constituent parts and detecting how these parts relate to the overall structure or purpose. So to study the chemical equilibrium material, a learning model is needed that emphasizes critical and analytical thinking processes to seek and find the answer to a question in question. One of the appropriate and recommended learning models in the 2013 curriculum is the guided inquiry learning model. The purpose of learning through the integrated guided inquiry (IGI) learning model by digging information from various learning sources, simple investigations and processing information, it is expected that students are actively involved during the teaching and learning process, have an attitude of curiosity, are careful in making observations and are responsible for expressing opinion, answer questions, give suggestions and criticisms and can distinguish reversible and irreversible reactions, explain dynamic equilibrium, distinguish homogeneous and heterogeneous equilibrium, present the value of the concentration equilibrium constant (Kc), present the value of the pressure equilibrium constant (Kp), present the value of the partial pressure equilibrium constant (Kp) based on the value of the equilibrium constant of concentration (Kc) or vice versa, presents the value of the degree of dissociation of the equilibrium reaction, analyzes the factors that affect the direction of the shift in the chemical equilibrium, analyzes the application of the factors that affect the shift and direction of balance in the industry by developing religious attitudes (faith and piety, carrying out all His commands), independence (creative, innovative, integrity (honest, responsible).

3. *Concept analysis*

Results of concept analysis can be used to plan the sequence of concept learning and levels of concept achievement that are expected to be mastered by students.

4. *Student analysis.*

Based on Piaget's theory of development, high school age has entered the formal operational stage. At this stage students are able to think abstractly, namely thinking about ideas and they are able to think of several alternative problem solving. In other words, at this stage students have begun to have the ability to draw conclusions and develop hypotheses [11]. Therefore, it is very important to train students' thinking skills so that their cognitive abilities can increase and continue to develop according to the stage of development. Based on the results of student questionnaires, it was found that most students liked colorful learning resources, equipped with pictures and videos related to learning materials, arranged regularly so that they were easy to understand and accompanied by practice questions. So it is necessary to have innovations in teaching materials that can increase students' interest and mastery of material in understanding chemical equilibrium material, one of which is by using technology-based teaching materials, namely e-modules based on the integrated guided inquiry (IGI) learning model.

B. Prototyping Phase

1. Prototype 1

Prototype I is the result of the design and realization of the preliminary research. The e-module is designed based on practical guidelines for the preparation of the 2017 e-module from the ministry of education and culture, which consists of (1) cover, (2) introduction, (3) learning, (4) self-assessment, (5) modified evaluation as needed. In the activity sheet, the guided inquiry learning stage is used according to Hanson (2005) which was later developed by Andromeda into an integrated guided inquiry (IGI) which consists of 6 stages, namely: (1) orientation; (2) exploration; (3) interconnection; (4) concept formation; (5) application; and (6) conclusion. For activity sheets containing demonstration videos, The College Board (2012) used component stages of laboratory activities, namely: (1) Title; (2) Alignment to Chemistry Curriculum Framework; (3) Prior skills; (4) Instruments and materials; (5) Safety; (6) Prelab questions; (7) Procedures; (8) Investigations; (9) alternative microscale; and (10) Postlab assessment.

2. *Prototype II*

This stage is carried out through formative evaluation in the form of self-evaluation of the prototype I that has been produced. Based on the results of self-evaluation, it was found that prototype I needed revisions to several parts that should exist in the resulting prototype I. One of them is to correct errors that seem like typos, molecular formulas or the use of spaces.

3. Prototype III

In the development of prototype III, a formative evaluation was carried out in the form of a one-to-one evaluation to determine the level of practicality and expert judgment to obtain the level of validity of the developed e-module.

At the one to one evaluation stage, interviews were conducted after the e-module was given and understood by the students as a whole. Interviews were conducted with 3 students of class XI MIPA SMA Negeri 3 Padang consisting of 1 student with low ability, 1 student with moderate ability and 1 student with high ability. For the selection as suggested by the chemistry teacher who teaches chemistry in class XI MIPA. The selection of students based on their level of ability is intended so that the data and input obtained can represent the opinions of students as a whole. Interviews were conducted after they had done learning using the prototype II e-module.

From the results of the interview, there are several aspects that need to be evaluated at the one to one evaluation stage, namely the presentation of the material contained in the e-module, unclear images, and video errors.

In terms of appearance, based on the results of interviews conducted, it is known that the three students interviewed stated that the e-module developed was attractive and had the right color. For instructions for using e-modules, they can understand well how to use it. In terms of presenting the material, students stated that it was simple and easy to understand. The presentations delivered have been arranged systematically, but there are also opinions that there is no explanation of the material because this is in accordance with the integrated guided inquiry (IGI) learning model. For some pictures there are those who think that they are not clear or not big enough and videos that sometimes get errors due to network problems from students' cellphones. So that improvements were made by including an enlarged image in the e-module.

Prototype II that has been produced was evaluated by six validators, material experts and three media experts. After making improvements according to the suggestions and input from the validator on the chemical equilibrium e-module, then the validator provides an assessment of the e-module that has been developed using an instrument in the form of a validation sheet.

Table 3. The results of the data analysis expert validation material.

Rate aspect	Aiken V value	Category
Component content	0,87	Valid
Component linguistic	0,91	Valid
Component presentation	0,88	Valid
Component kegrafikan	0,89	Valid
Average	0,89	Valid

Based on the analysis results of the validation sheet, the average AikenV value is 0.89 with a valid category. So it can be concluded that the integrated guided inquiry (IGI) based chemical equilibrium e-module is valid starting from the components of content, language, presentation, and graphics. Furthermore, a technical evaluation of the e-module is carried out by media experts, among the components assessed are the display component, programming, and utilization aspects.

Table 4. Results of data analysis of media expert validation

Rate aspect	Aiken V value	Category
Display aspect	0,92	Valid
Programing aspect	0,89	Valid
Aspect utilization	0,88	Valid
Average	0,90	Valid

Based on the results of questionnaire data analysis in table 4, the average value of Aikens'V as a whole is 0.90 with a valid category. So it can be concluded that the integrated guided inquiry (IGI) based chemical equilibrium e-module is valid.

4. Prototype IV

At this stage, a formative evaluation is carried out in the form of a small group evaluation of the resulting prototype III. This small group trial was conducted on 6 students of class XI MIPA SMAN 3 Padang consisting of 2 students with low abilities, 2 with moderate abilities, and 2 students with high abilities who had studied chemical equilibrium material. Each student gets an integrated guided inquiry (IGI)-based equilibrium e-module design that is opened via a laptop and cellphone.

After all learning activities are carried out, namely activity sheets 1 to activity 4 and evaluation questions. So at the end of the meeting students were asked to fill out a practicality questionnaire related to the use of e-modules that students had done in the learning process. This questionnaire aims to see the practicality of the integrated guided inquiry (IGI)-based chemical equilibrium e-module when used in small groups before proceeding to the large group test stage (field test). The aspects assessed in this small group are attractiveness, ease of use, time efficiency and the benefits of e-modules when used.

Table 5. The results of the practicality data analysis of the small group stage of e-modules.

Indicator	NP	Category
Ease of use	91%	Very practical
Time efficiency	87%	Very practical
Utilization	88%	Very practical
Average	89%	Very practical

Based on the results of the analysis contained in table 5, it is obtained The practical assessment of the chemical equilibrium e-module based on integrated guided inquiry (IGI) by 6 students was 89% in the very practical category. From this prototype IV, a valid and very practical integrated guided inquiry (IGI) based chemical equilibrium e-module was produced. The next stage is the assessment stage.

C. Assessment Phase

The next stage is the last stage in the development of e-modules with this plomp development model is the assessment stage. However, in this study, the assessment stage carried out was only up to the large group practicality assessment (field test) and the e-module practicality assessment by teachers involved in chemistry learning, while the effectiveness stage was not carried out due to time constraints during the Covid-19 pandemic.

For the practicality test by teachers, two teachers at SMAN 3 Padang and one teacher at SMAN 12 Padang. The practicality of the e-module is known from the results of the practical questionnaire analysis of the teacher participant responses after seeing and using the integrated guided inquiry (IGI)-based chemical equilibrium e-module. The results of the practicality questionnaire data processing by the teacher can be seen in table 6.

Table 6. The results of the practicality questionnaire analysis by the teacher.

Indicator	Average P	Category
Ease of use	93,33%	Very practical
Time efficiency	90,02%	Very practical
Utilization	91,12%	Very practical
Average	91,41%	Very practical

Based on the results of thequestionnaire analysis based on integrated guided inquiry (IGI) chemical equilibrium e-module by the teacher, it was found that the aspect of ease of use was an average of 93.33%, time efficiency was 90.02% , and 91.41% benefit.

So that the average percentage of practicality of the chemical equilibrium e-module based on integrated guided inquiry (IGI) by the teacher is 91.41% with a very practical category. Meanwhile, the large group practicality test was carried out on 32 students of class XI SMAN 3 Padang. The following is a table of analysis of the e-module practicality questionnaire by students.

Table 7. Results of practicality questionnaire analysis by students at the field test stage.

Indicator	NP	Category
Ease of use	90,84%	Very practical
Time efficiency	83,75%	Practical
Utilization	88,93%	Very practical
Average	87,84%	Very practical

Based on the results of thequestionnaire analysis of the integrated guided inquiry (IGI) based chemical equilibrium e-module by students, the percentage of ease of use is 90.84%, time efficiency is 83.75%, and benefits are 88.93%. So that the average percentage of practicality of the chemical equilibrium e-module based on integrated guided inquiry (IGI) by students is 87.84% with a very practical category.

IV. DISCUSSION

A. Validity of e-module chemical equilibrium based on integrated guided inquiry

Based chemical equilibrium e-module Validation of the-based chemical equilibrium e-module integrated guided inquiry (IGI)using an assessment questionnaire sheet that has been validated by six lecturers as material and media expert validators and three teachers chemical. The selection of validators is based on the opinion of Sugiyono (2017:414) which states that product validation can be carried out by several experts or experienced experts to assess the products produced. There are 4 components that are assessed by material experts, namely the components of content, language, presentation, and graphics according to the Ministry of National Education (2008:8). The data obtained from the six validators were analyzed using the Aiken V formula.

Assessment of the components of the content of the e-module obtained an Aiken V value of 0.87 with a valid category. The value obtained illustrates that the-based chemical equilibrium e-module integrated guided inquiry (IGI)has been in accordance with the demands of basic competencies of 3.6, 3.7, 4.7, GPA, and learning objectives. In accordance with the learning abilities of students at the SMA/MA level, formative questions are given e-modules with chemical equilibrium material. As well as the truth of facts, concepts, and principles presented in the e-module scientifically.

The results of the validity of the linguistic component obtained Aiken V value of 0.91 which is included in the valid category. The-based chemical equilibrium e-module based integrated guided inquiry (IGI) on its linguistic component can be said to be valid, which is based on the results of the evaluation of the e-module experts to provide clear information to students, the language used can be understood. In addition, the-based chemical equilibrium e-module integrated guided inquiry (IGI)uses a language that is in accordance with the Indonesian spelling (EBI). The use of symbols / symbols that have been consistent in each learning activity. This is in accordance with the linguistic feasibility component set by the Ministry of National Education (2008: 28).

For the presentation component, the Aiken V value is 0.88. The values obtained indicate that the-based chemical equilibrium e-module is integrated guided inquiry (IGI)valid. The value obtained shows that the-based chemical equilibrium e-model is in integrated guided inquiry (IGI)accordance with the components of the learning e-module preparation according to the Ministry of Education and Culture in 2017, according to thelearning model integrated guided inquiry (IGI). The orienting stage can focus and motivate students in the learning process. The exploration stage has been able to make students explore and construct several data variables, tables, graphs, images, and videos in the form of models. The interconnection stage can make students connect 3 levels of multiple chemical representations (macroscopic, sub-microscopic, and symbolic) connecting experimental facts with sub-microscopic and symbolic illustrations to answer critical questions. At the concept formation stage with critical questions, it has started with simple questions to complex questions, so that with these critical questions students can find concepts. The application

stage has been able to make students use the concepts that have been obtained by working on practice questions. At the closing stage, students can draw conclusions.

The graphic component obtained Aiken V value of 0.89. The values obtained indicate that the-based chemical equilibrium e-module is integrated guided inquiry (IGI)valid. So that it can be described the type and size of the letters used in the e-module can be read clearly, lay-out or an attractive layout, images and videos that can be observed clearly and are relevant so that students can find concepts. According to Prastowo (2010:124) by including pictures in a teaching material can increase the attractiveness of teaching materials and student boredom in studying it can also be reduced. And the cover and design of thebased chemical equilibrium e-module integrated guided inquiry (IGI)is overall interesting. For comparison of each component in construct validation can be seen in Figure 1.

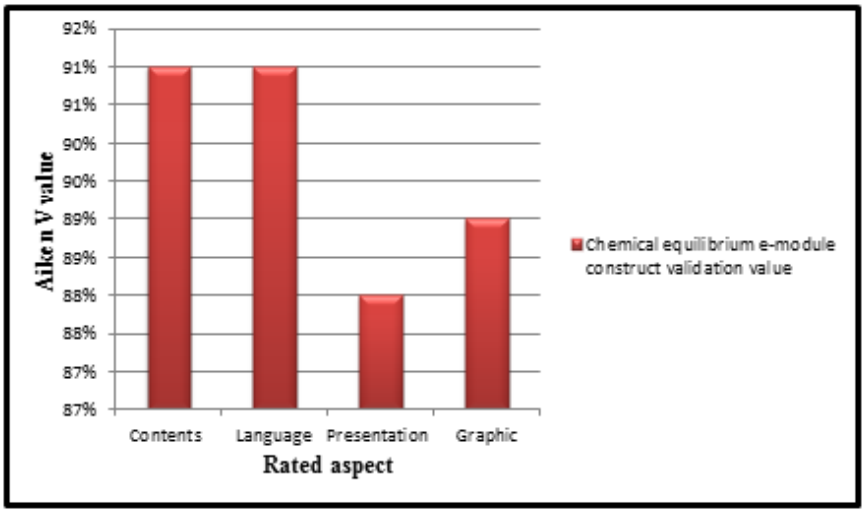

Figure 1. Graph of the value of the validation value of the chemical equilibrium e-module construct.

Based on the values given to the six validators, the average Aiken V value was 0.89 with a valid category. The results of the validation data show that the chemical equilibrium e-module based on the integrated guided inquiry (IGI) is valid and in accordance with the components in the validity questionnaire assessment.

B. Practicality of based chemical equilibrium e-module integrated guided inquiry (IGI)

The practical test of the chemical equilibrium e-module based on integrated guided inquiry (IGI) was conducted by 3 teachers, namely 2 from SMAN 3 Padang, 1 teacher from SMAN 12 Padang, and 41 students in class XI MIPA SMAN 3 Padang.

In the one-to-one evaluation, three students with different abilities were interviewed. Based on the results of the interview, it can be seen that the chemical equilibrium e-module based on integrated guided inquiry (IGI) which was developed has ancover attractiveand appearance, students understand the instructions for using the e-module. In terms of pictures and videos, it has made students interested in doing learning, but there are obstacles when playing videos. This is because the network on the student's cellphone is not good. For the presentation of the material itself, students stated that the presentation of the material in the e-module had used language that was easy to understand. In addition, students also argue that in the e-module there is no explanation of the material, this is in accordance with thelearning model integrated guided inquiry (IGI), where students find their own concepts from the learning outcomes carried out. For the learning steps with themodel integrated guided inquiry (IGI)itself, it is clear and easy to understand so that students can find concepts with the syntax contained in the e-module.

Phase smallgroup,conducted trials small groups(smallgroup)as 6 participants. In this small group trial, practicality tests were carried out on products in the form of prototype III which had been assessed by experts. The results of the analysis of the practicality assessment of the chemical equilibrium e-module based on integrated guided inquiry (IGI) based on the results of student response questionnaires in small group trials in Appendix 26 obtained an average value of 89% and is included in the very practical category. The data obtained indicate that the e-module in the form of prototype III is practical to use. Furthermore, the product developed

after the small group trial was revised according to the suggestions and input obtained from students in small groups. One of the improvements is writing errors, missing letters, and question sentences in the e-module.

The results of the graph of the practicality questionnaire response analysis data at thestage small group can be seen in Figure 2.

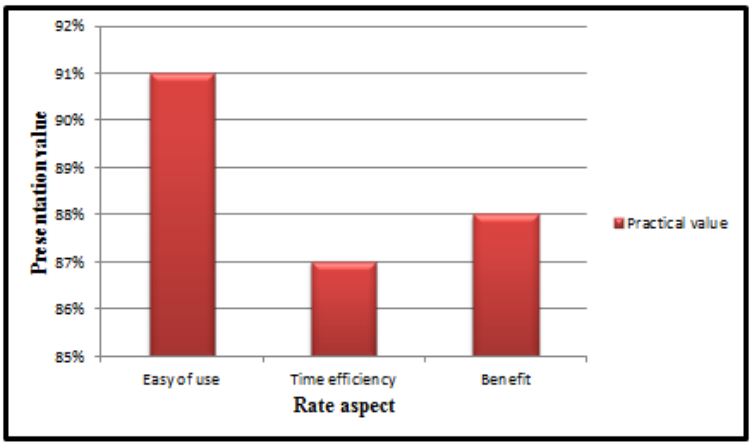

Figure 2. Graph of the practicality value of the chemical equilibrium e-module in the stage small group.

The field test stage is the stage of The next step is after the e-module has been revised from thetrial stage small group. The data on the practicality of the e-modules were obtained by analyzing the responses of the student questionnaires conducted by 32 students of class XI MIPA SMAN 3 Padang who had studied chemical equilibrium material. The average value of the practicality of students was obtained by 87.84% which was included in the very practical category. For more details, the results of the student response questionnaire analysis are in Appendix 27. As for the practicality data of the e-module obtained from the teacher, by analyzing the teacher's questionnaire responses, 2 teachers at SMAN 3 Padang and one teacher at SMAN 12 Padang. The results of data analysis obtained 91.49% which is included in the very practical category. The following is a graphic image of the results of the questionnaire response analysis of students and teachers at thestage field test or field test.

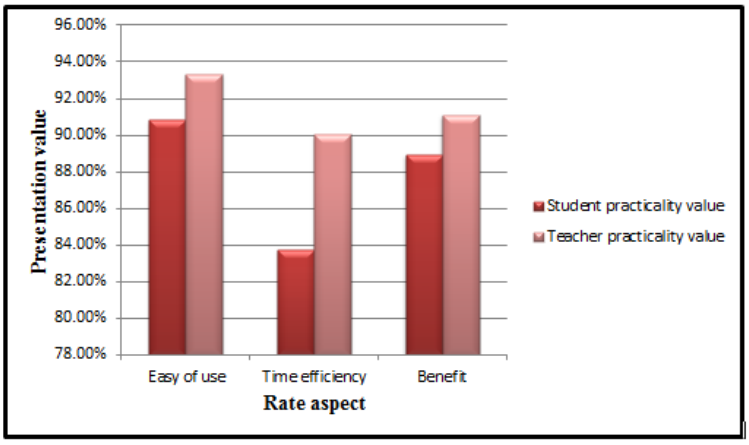

Figure 3. Graph of the practicality of the chemical equilibrium e-module at thestage field test.

Viewed from Figure 3, in terms of ease of use, the average percentage of student response questionnaire results is 90.84% with a very high category. This shows that the-based chemical equilibrium e-module integrated guided inquiry (iGI)that was developed has easy instructions for using the e-module for students. while for teachers the ease of use aspect has a smaller percentage value than the percentage of students. which is 93.33%.

Viewed from the aspect of learning time efficiency, e-modules have a percentage of 83.75% which is included in the practical category for response questionnaires filled out by students, while teachers have a higher percentage value of 90.02% which is included in the very practical category. . The results obtained by students and teachers from the practical analysis of the e-module

in thestage filed test have slightly different values. That is, the average percentage value of the teacher's response questionnaire is greater than that of the students. This is because students are slower in working on e-modules compared to teachers who already fully understand the chemical equilibrium material.

In terms of benefits, e-modules have an average practicality percentage of 88.93% with a very high category. The chemical equilibrium e-module developed with thelearning model integrated guided inquiry (IGI)can help students find concepts independently through critical questions so that they can increase students' enthusiasm and motivation. the results obtained from students have lower scores than the teacher but are not so much different. It can be concluded that students and teachers assess the e-modules produced are very useful for the learning process, can arouse curiosity, and illustrations or video images can make it easier for students to understand the material.

V. CONCLUTION

Based on the results of the research that has been done, it can be concluded that the integrated guided inquiry (IGI) based E-chemical equilibrium module for SMA/MA developed is valid and has a very high level of practicality.

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