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Validity and Practicality of E-Module Model Inquiry Based Online Learning to Improve Student Competence

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Abstract: The advent of the 4.0 revolution has had an impact on the education industry. Postgraduate skills need to be able to manage technology, be connected and digitally resilient. Therefore, there is a need to update and find suitable learning models and media to meet these needs. The purpose of this study was to determine the effectiveness and utility of an inquiry-based e-learning model of e-modules for enhancing student competency. This type of research employs the development of the Plomp model which consists of three stages, namely Preliminary research, Prototyping Phase, Assessment Phase. The research conducted was limited to validity and practicality tests. The instruments used were validity and practicality questionnaires. The validity become evaluated the use of Aiken's V scale and the practicality was evaluated using Likert scale. Based on data analysis, the results of validity testing by experts on the substance of the material obtained a value of 0.84, visual communication display 0.94, learning design 0.81 and software use 0.78 which is in the valid category. Then the practical results by teachers were 89.71 and by students were 87.28. This suggests that the e-module developed is legitimate and realistic for use in in addition research.

Keywords: E-modul model inquiry; Online learning; Practicality; Validity

Introduction

The presence of the industrial revolution 4.0 era has affected many fields, namely industry, education, and technology. Improving human quality such as human connectivity, building digital resilience and human resource accountability is one of the efforts that can be made to improve human quality (Shahroom et al., 2018; Liao et al., 2018).

The era of revolution 4.0 in the field of education requires students to be able to show excellence on a global scale such as producing graduates who master technology. This challenge does not only apply to students, but also to teachers. Teachers are required to be able to improve the competence of students under any circumstances. One of them is in the conditions of the Covid-19 pandemic that hit Indonesia in 2020. Learning has to continue to work optimally both online and offline. In addition, the learning model applied by teachers must be able to direct students to have the ability to understand, predict and think creatively and critically about all information so that students have the skills needed to face the 4.0 revolution era (Winata, 2020).

A competency is the set of attitudes, knowledge and skills that a student must acquire, live and master after studying a subject, completing a course or completing a specific unit of education, this is conveyed in Government Regulation No. 32 of 2013. Competence is a collection of abilities to compile, build various information and then evaluate it based on facts and opinions (Hanelahi, 2020; Arwanda et al., 2020). Based on Permendikbud Number 104 of 2014 that attitude stems from feelings (like or dislike) related to a person's tendency to respond to something/object. Permendikbud Number 22 of 2016 concerning process standards explains that knowledge is possessed through activities of knowing, understanding, applying, analyzing, evaluating to creating. Skill competencies are related to manual and motor skills.

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With the rapid development of technology, it is no longer a foreign thing for us to be familiar with technology, namely the internet. We are familiar with technology, namely the internet. In addition, the internet as a medium that can be modified to increase student interest. One example of the results of modification, namely e-modules (Cheva, 2019). E-modules are teaching materials displayed in electronic form that can be directly connected to a link that when accessed is directly connected to the internet. The link is not only connected to the internet but also to video, audio and animation which certainly makes learning more interesting (Kemdikbud, 2017).

E-modules have benefits in comparison to printed modules, which are in the form of an attractive interactive media because they can display videos, images, audio, animation, have the ease of navigation and are equipped with formative tests/quizzes that can show real-time feedback on the learning process of students (Ramadayanty et al., 2021). In addition, E-modules can encourage students to increase self-confidence to take an active role, as well as courage and confidence in expressing opinions in the learning process (Fadhillah et al., 2020). Then the advantage of using this e-module is that it can be used for independent learning without a teacher (Noer et al., 2021). Because, one of the criteria for a feasible e-module must be able to facilitate students in investigating the information contained in the e-module (Ravista et al., 2021).

The learning process implemented using e-modules is to display audio visuals, sound, movies and ease of use (Gunawan et al., 2010). The benefits of e-modules depend on how it is used, it can be as teaching material as well as learning media. E-modules are presented electronically which are then packaged in the form of hard disks, floppy disks, CD, flash disks which can later be operated using computers and smartphones (Wijayanto, 2014). Thus it can be concluded that learning using e-modules can display audio visual, sound, movies operated using a computer or smartphone. Another effort that can be used to improve learner competence besides e-modules is to choose the right learning model, namely the inquiry model (Sari et al., 2020)

Learning using the inquiry model can improve learner competence because it directs students to carry out their own learning (Syahrial et al., 2019). Where the learning material is not provided directly (Maharani et al., 2020). Inquiry comes from English inquiry which can be interpreted as the process of asking and finding out answers to scientific questions (Hayati et al., 2017). Thus, if students search for their own information about learning materials, it will be stored for a long time in the student's memory.

The results of preliminary studies have been carried out, namely that teachers have used electronic teaching materials at school. However, its utilization is not optimal, because the teaching material has not been equipped with an integration of learning models and practicum which will certainly affect the competence of students' skills. In addition, the electronic teaching materials also do not meet the standards for developing teaching materials from Kemdikbud 2010, namely in the display (visual communication) section, namely in the animation, sound and video section, there is no electronic teaching material.

This certainly results in teaching materials becoming less interactive and learning becomes less interesting so that learning is monotonous. In addition, related to so that the results obtained are maximized, a learning model is needed that is able to build students' basic understanding, namely the inquiry learning model (Munzil et al., 2021). Analyzing the application of inquiry learning in schools, teachers admit that they do not understand the syntax of the application of the inquiry model. So this model is very rarely applied in schools. This is evident from the survey results to some students who do not even recognize the term inquiry learning model.

The inquiry model has several advantages, namely first, balancing cognitive, affective and psychomotor aspects so that learning is more meaningful. Second, students are given the freedom to learn according to their own style. Third, this model adheres to the principle that experience causes changes in behavior due to the learning process and this concept is included in the concept of modern psychology. Fourth, this model is able to facilitate learners who have above-average abilities. Fifth, learning becomes more lively by using the inquiry-based learning model. Sixth, it is able to form and develop students' basic concepts. Seventh, it is able to transfer a concept to a new concept. Eighth, it can provide sufficient time for learners to process and accommodate the new information they get. Ninth, able to encourage learners to think openly, honestly, have initiative, and objectively. Tenth, able to make the learning atmosphere occur in two directions, meaning that the teacher is not the only source of information. Eleventh, it allows students to utilize various learning resources. Lastly, it trains students to learn positively and can develop the information they get (Husni, 2020).

To support the target of the industrial revolution 4.0 so that students master technology well. Then the learning model that will be applied to this e-module is the Inquiry Based Online Learning model. Consists of several syntaxes, namely *Online Orientation, Problem Identify in e-Resource, Exploration Using ICT Tools, Report Findings, Closure* (Novitra et al., 2021). The syntax of this model will guide learners in carrying out the learning process using the Inquiry based online learning model.

So that learning takes place in a directed manner and will certainly make learning more efficient.

The Inquiry Based Online Learning e-module are developed using the Flip PDF professional application developed by Wonder Idea Technology Limited. Flip PDF Professional is a feature-rich flipbook maker with page editing capabilities. Advantages of Flip pdf professional include ease of use as it can be operated by beginners who do not know HTML programming language. Create interactive book pages by inserting images, videos, mp4, audio video, hyperlinks, quizzes, flash and other multimedia into PDF so that you don't need to open them elsewhere or in a separate place, just import them directly to PDF Can be published online or offline from the file, can show feedback on correct or incorrect answers, and directly known results (Meliza et al., 2022).

This research is important to do because the e-module can be used as a suggestion to improve student competence which consists of attitude, knowledge and skill competencies. With the help of the e-module model of inquiry based online learning it is hoped that physics learning can take place optimally. It is also hoped that students can make the best use of e-modules

Based on the problems and facts that have been described, researchers developed an E-Module model of Inquiry Based Online learning. Inquiry Based Online learning with the title "Development of E-Module Model Inquiry Based Online Learning to Improve Student Competence".

Method

The type of research used in this study is research and development (R&D). This research uses the Plomp development model. In Plomp's development model, there are 3 stages, namely preliminary research, prototyping stage, and assessment phase (Plomp, 2007). The research conducted validity and practicality tests on the developed e-modules. The research subjects were physics lecturers and physics teachers of SMAN 1 Koto Baru Dharmasraya, 11th grade students of SMAN 1 Koto Baru Dharmasraya.

The research method used is Research and Development (R&D). The research model used is the Plomp development model. Plomp's development model consists of 3 research steps, namely preliminary investigation, formation, prototype phase and evaluation phase (Plomp, 2013).

The preliminary study designs a research-based e-learning module model for e-learning by analyzing the Graduate Competency Standards (SKL), analyzing learners, and analyzing learning activities to enhance learner competency. This research was conducted at the Prototyping Phase stage, which consists of the stages of self evaluation, expert review, one to one evaluation, small group and field test as shown in Figure 1 below.

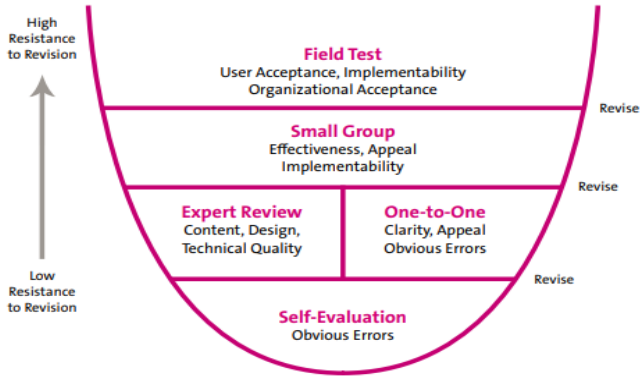

Figure 1. Formative Evaluation of the Plomp development model (Plomp & Nieveen, 2013)

The prototype making stage consists of prototype I, prototype II, prototype III, and prototype IV. According to the introduction study stage, prototype I was created. Next, an independent evaluation of prototype I was made using a checklist of the components contained in the e-module. If there was still a lack of e-module components, then revisions were made so that prototype II was made. Subsequently, an expert review was performed on 3 experts. After the product verification is completed, one-to-one evaluation will be conducted on the three students using the prototype II. The experiment is conducted by asking the three students how to make the prototype III using the prototype II. The next stage was a group experiment in which 9 students were given questionnaires about Prototype III, which was produced to produce Prototype IV.

In the assessment phase, a field test was conducted to test the practicality of the prototype IV that had been produced. The practicality test was carried out on teachers and students by distributing practicality questionnaires that had been made previously. The data collected from the validity and practicality questionnaires were then subjected to analysis using following Aiken's V formula:

$$V = \frac{\sum_s}{[n(c-1)]} \quad (1)$$

Description: S = r - lo lo = The lowest validity assessment number (in this case = 1); c = The highest validity assessment number (in this case =4); r = The number given by the validator; n = Number of assessments.

Table 1. Aiken's V Validity

Aiken's Mean Score	Category
≥ 0.6	Valid
≤ 0.6	Not valid

Then the formula for calculating practicality is:

$$\text{Value} = \frac{Score\ obtained}{Maximum\ Score} x100 \quad (2)$$

Table 2. Practicality Category

Indicator Achievement	Category
81-100	Very Practical
61-80	Practical
41-60	Practical Enough
21-40	Less Practical

Result and Discussion

The development of the Inquiry Based Online Learning E-module model was carried out based on the results of a preliminary study that had been carried out. The results of the preliminary study obtained that the teacher had used electronic teaching materials at school. However, the utilization is not optimal, because the teaching material has not been equipped with an integration of learning models and practicum. of course it will affect the competence of students' skills. In addition, the electronic teaching materials also do not meet the standards for developing teaching materials from Kemdikbud 2010, namely in the display (visual communication) section, namely in the animation, sound and video section, there is no electronic teaching material. This certainly results in teaching materials becoming less interactive and learning becomes less interesting so that learning is monotonous. Related to the analysis of the application of inquiry learning in schools, teachers admit that they do not understand the syntax of the application of the inquiry model. So this model is very rarely applied in schools. This is evident from the survey results to some students who do not even recognize the term inquiry learning model. The display of the developed e-module can be seen based on the following display.

Figure 2 is the cover of the E-module which contains the material title, class, learner identity, and author identity. Figure 3 contains a preface that is about the author and the table of contents of the material contained in the e-module. The table of contents serves to make it easier for readers to see on what page the material they are looking for. Figure 4 contains the syntax of Inquiry Based Online Learning on the E-Module. Consists of syntax Online Orientation, Problem Identifiy in e-Resource, Exploration Using ICT Tools, Report Findings serta Closure. Figure 5 contains interactive exercises, that is, when students fill in the answers in the available boxes, the results will immediately come out in the form of answers that students fill in wrong or right.

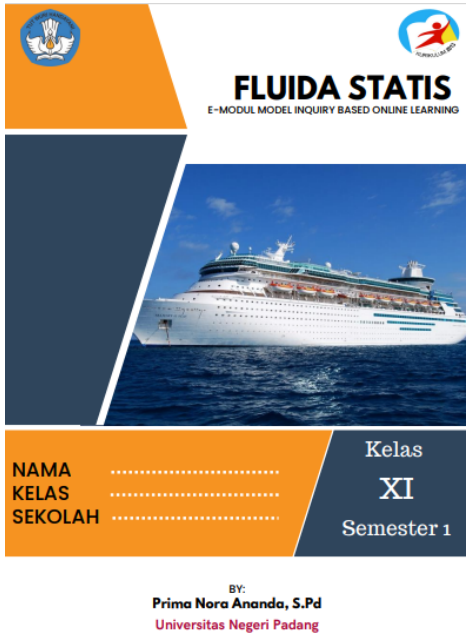

Figure 2. E-odule cover

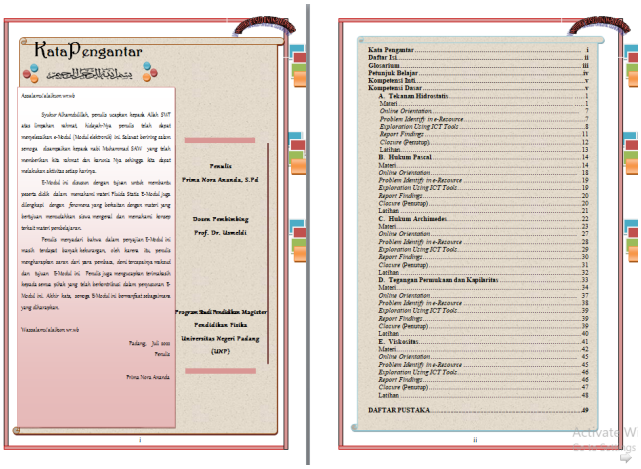

Figure 3. Preface and table of contents

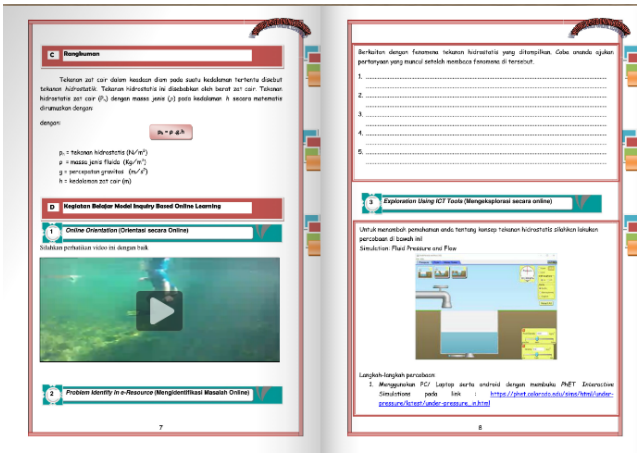

Figure 4. Inquiry based online learning E-modul syntax

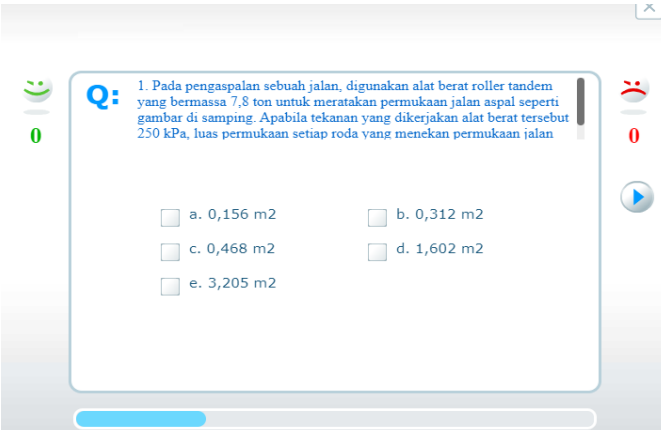

Figure 5. Exercise

The development of the Inquiry Based Online Learning e-module model has formative evaluation stages consisting of self evaluation results, expert review results, one to one evaluation, small group practicality results and practicality results from teacher and student responses.

The first result, namely self evaluation, is that this evaluation is carried out before consulting and discussing with experts, a self-evaluation (self evaluation) is carried out first on the e-module that has been designed. The results obtained can be seen in table 3.

Table 3. Self Evaluation Result

Aspect	Before Revision	After Revision
Cover Page	There is no 2013 curriculum logo on the cover A curriculum logo has been added to the cover page.	A curriculum logo has been added to the cover page.
List of images	There is no list of images on the e-module identity page	There is already a list of images on the e-module identity page

The next result is the expert review result. The validation sheet was filled in by three lecturers (expert validators). The results of the e-module validation obtained that the e-module developed was in the valid category. This e-module validation includes five aspects of assessment, namely material substance, visual communication display, learning design and usage software. The results of e-module validity are described in Table 4.

Table 4. Results of E-Module Validity

Validity Aspect	Aiken's V Score	Category
Material Substance	0.84	Valid
Visual Communication Display	0.94	Valid
Learning Design	0.81	Valid
Usage Software	0.78	Valid
Average	0.84	Valid

Based on the validation results, it can be seen that the four validity components are at a value of 0.7-0.9. This shows that the physics e-module of Inquiry Based Online Learning model is in the valid category. This valid physics e-module is called Prototype II.

The results of e-module validation are part of the validity indicators to obtain validation results in accordance with predetermined indicators (Kurniawan et al., 2021). In this developed e-module, there are four validation indicators based on the ICT teaching material development guide from Kemdikbud 2010, which consists of indicators of material substance, communication display, device design and usage software.

The material substance indicator consists of several aspects, namely correctness, material coverage, currentness and readability. Visual communication display indicators then consist of aspects such as navigation, fonts, media, colors, animations, and layouts. Learning Design Indicators include Aspect Title, KI & KD, Learning Objectives, Materials, Sample Questions, Exercises, Creator's Steps and References. The last indicator is the aspect of software used, which is composed of aspects of interactivity, supporting software and originality.

The tool for checking the validity of the physics e-modul of the inquiry-based online learning model belongs to the excellent category. This indicates that the instrument is valid and ready for use. Additionally, the instrument was used to test physical electronic module models for query-based online learning. The validity test of the physics e-module research-based online learning model aims to assess the feasibility of material substance, learning design, visual communication and software use.

After making improvements according to the validator's suggestions by paying attention starting from adding, rearranging and replacing sentences and instructions that are not yet available on the physics e-module Based on the results of the analysis of the physics e-module model Inquiry Based Online Learning is valid according to the expert. Thus the physics e-module Inquiry Based Online Learning model developed can be used in the physics learning process. The trial phase of the developed product was carried out at SMA N 1 Koto Baru Dharmasraya semester 1 of the 2022/2023 school year. These results are in accordance with the research results (Rachmawati et al., 2021) that a research product will be said to be valid if the product is useful for the curriculum. This is proven by the utilization of e-module products in class XI at SMAN 1 Koto Baru Dharmasraya.

The next evaluation result is one to one evaluation. One to one evaluation was conducted on three students using an interview instrument. The physics e-module of Inquiry Based Online Learning model was given to

students of class XI SMA N 1 Koto Baru Dharmasraya with high, medium and low ability. Students were asked to open the physics e-module without being taught first. Researchers asked questions to three students using an interview instrument. Questions given in the form of ease of use, efficiency and attractiveness of physics e-modules. Low ability learners stated that the efficiency of the time needed to understand the physics e-module was a little long. This is because the information in the e-module contains a lot of information related to the application of physics in everyday life.

Learners with moderate ability stated that the time needed to understand physics e-modules did not require a long time. Students think that physics e-modules can be used even in the absence of teachers and friends because the material is clear enough. The results of one-on-one evaluation of three students can be concluded that students easily understand the use of physics e-modules. Images, videos and animations in the e-module make it easier for students to understand learning. There are obstacles in accessing the physics e-module, because it requires a signal or internet so that the e-module can be opened by students. Therefore, the physics e-module as a whole can and is easy to understand, interesting, and efficient.

The practicality test was a one-on-one evaluation based on interviews, a small group evaluation with a practicality instrument and a field test with a practicality instrument. The measure of usability level is whether teachers and other experts find the material easy to use. The results of the one-on-one assessment were conducted with three students from class XI IPA 3. With the Physics E module, it can be used anytime, anywhere to help students learn the concepts in the study material. The results of the one-on-one evaluation were carried out on three students of class XI IPA 3. With the physics e-module, its use can be done anywhere and anytime, so that it can facilitate students in learning the concepts in the learning material.

Students with low ability stated that the efficiency of the time needed to understand the physics e-module was a little long. This is because the information in the e-module contains a lot of information related to technology. Medium ability students stated that the time needed to understand the physics e-module did not require a long time. Students think that physics e-modules can be used even though there is no teacher and friends because the material is quite clear. The results of one-on-one evaluation of three students can be concluded that students easily understand the use of physics e-modules. Images, videos and animations in e-modules make it easier for students to understand learning. This is in accordance with the results of research by (Adriani et al., 2021) that learning by using media in which there are videos, animations and images can increase students' learning motivation. There are obstacles in accessing the physics e-module, because it requires a signal or internet so that the e-module can be opened by students. Therefore, the physics e-module as a whole can and is easy to understand, interesting, and efficient.

The next evaluation result is the result of Small Group Practicality. Small group evaluation is conducted after the one-on-one evaluation is conducted. Small group evaluation by practicing physics e-modules that have been valid to students. The results of the practicality of physics e-modules on small group student responses can be seen in table 5.

Table 5. Small Group Practicality

Aspect	Indicator Achievement Percentage	Category
Usability	84	Practical
Ease of use	83	Practical
Attractiveness	83	Practical
Clarity	84	Practical
Helpful	86	Practical
Efficient	85	Practical
Advantages of e-modules	85	Practical
Average	85	Practical

Small group evaluation was conducting by experimenting the physics e-module on a small group of students which consisted of 9 people from class XI IPA 3. This assessment was conduct to find out the practicality test of the product. The degree of practicality of physics e-modules in small groups lies in the practical category. The lowest indicator is in the statement of the time needed to understand the e-module is not too long. Students in the small group still need a long time to understand the e-module. Revised the E module and improved its design so that it can be easily understood by students using the rest of the buttons of the module. The highest score is on the statement that the colour composition on the e-module is interesting to read. The e-module is designed with attractive colours so that the physics e-module is attractive to students and ultimately creates motivation in learning. The next evaluation result is the practicality result from the teacher's response.

Table 6. Teacher Practicality

Aspect	Indicator Achievement Percentage	Category
Usability	89.58	Practical
Ease of use	89.06	Practical
Attractiveness	90.62	Very Practical
Clarity	90.62	Very Practical
Helpful	91.07	Very Practical
Efficient	89.58	Practical
Advantages of e-modules	87.5	Practical
Average	89.71	Practical

The results of the practicality of the e-module on the teacher's response, it can be obtained the average value of the practicality of the teacher's response is 89.71. This shows that the e-module made has been practical and feasible to be applied to physics learning at school. The next evaluation results are the results of practicality by students.

Table 7. Student Practicality

Aspek	Indicator Achievement Percentage	Category
Usability	87	Practical
Ease of use	88	Practical
Attractiveness	88	Practical
Clarity	87	Practical
Helpful	87	Practical
Efficient	88	Practical
Advantages of e-modules	86	Practical
Average	87.28	Practical

The results of the average value of the practicality of physics e-modules from teacher responses amounted to 89.71 and students amounted to 87.28 with the practical category. It can be indicated that the physics e-module of Inquiry Based Online Learning model is practically used in the learning process. This result is in accordance with the results of the study (Putri et al., 2022) that the purpose and use of e-modules is so that they can be used anywhere and anytime which shows the level of effectiveness of using e-modules.

Conclusion

The validity turned into evaluated using Aiken's V scale and the practicality became evaluated the usage of Likert scale. in keeping with the statistics evaluation, the validity take a look at outcomes by way of professionals at the substance of the fabric acquired a fee of 0.eighty four, visual communique show zero.94, gaining knowledge of design zero.eighty one and software program usage 0.seventy eight which can be in the valid class. Then the effects of practicality by instructors had been 89.71 and by using students were 87.28. This shows that the e-module evolved is valid and sensible for use in in addition studies.

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