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DEVELOPMENT OF E-MODULE (ELECTRONIC MODULE) BASED ON ETHNOSCIENCE IN NATURAL SCIENCE SUBJECT OF HUMAN REPRODUCTION FOR JUNIOR HIGH SCHOOLS

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ABSTRACT

The implementation of the 2013 curriculum was developed into a curriculum that combines various aspects, namely attitudes, knowledge, and skills. Through the 2013 curriculum, educators are required to be able to improve the quality of education so as to produce independent and creative students. Integrated science learning is presented in the context of science that includes the environment, technology, and society. Science education (science) can also be developed by relying on the uniqueness and excellence of a region, including culture and technology based on local wisdom (traditional). So that in schools there needs to be learning that contains materials based on local wisdom to prevent the loss of local wisdom from a region. This study aims to develop an e-module based on ethnoscience (local culture) for grade IX students of junior high schools/Islamic junior high schools and to determine the level of validity and practicality. The e-module developed uses the ethno-science method which consists of direct observation, explaining phenomena scientifically, and being able to draw conclusions. This research is a research and development (R&D) with the Plomp model. The validity test was conducted by 3 science lecturers from Faculty of Mathematics and Natural Sciences Universitas Negeri Padang, and the practicality test was conducted by 2 science teachers from State Junior High School 1 Painan and 3 IX.3 students, 4 IX.6 students and 20 IX.7 students at State Junior High School 1 Painan. The instruments used were validity and practicality questionnaires and data Cohen Kappa. This research produces an e-module of the human reproductive system based on ethnic with an average kappa moment of 0.90 which has a very high level of validity. The results of the teacher's practicality test and the student's practicality test obtained an average kappa moment of 0.76 and 0.81 respectively with high and very high levels of practicality.

Keywords: *E-module, Observation, Ethnoscience, Local Wisdom, Model Plump*

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INTRODUCTION

Integrated science learning is presented in the context of science that includes the environment, technology, and society. Science Education (science) can also be developed by relying on the uniqueness and superiority of a region, including culture and technology based on local wisdom (traditional) (Kartono et al., 2016). This shows the importance of local wisdom to be maintained. Therefore, in schools there needs to be lessons that contain material based on local wisdom to prevent the loss of local wisdom from a region (Kasa, 2011). One effort to maintain local wisdom is to design e-modules that contain local wisdom (ethnoscience). E-modules (electronic modules) are one of the teaching materials that are very much needed in the era of the Covid-19 pandemic. Where in the era of the Covid-19 pandemic, it is not possible to study face-to-face, so that e-module teaching materials can be accessed through mobile phone or laptop. An e-module is an electronic version of a module that can be read on a computer and designed with software required. According to (Putrianata & Chairunisa, 2020) this e-module can be accessed properly through mobile phone or a laptop online or offline which can help students. E-module based on ethnic packaged in a more attractive form. Where ethnic that are around students will help them understand the lessons easily because they can see and feel the real science contained in society (Haspen et al., 2021).

In 2013, the Ministry of Education and Culture hoped that all learning, including science, could utilize local culture and wisdom (Ethnic) in the surrounding environment as a source of learning. Ethnic is a strategy for creating a learning environment by integrating culture as part of the science learning process so that it is useful for life (Suastra, 2010). Ethnoscience is also an activity that is able to transform between native science and scientific science. According to (Damayanti et al., 2017) science learning using teaching materials based on ethnic will make students more interested and enthusiastic about learning. This learning aims to introduce students to facts or phenomena that develop in a society that can be linked to existing scientific science materials as knowledge. Students will feel that learning with ethnoscience is based on the recognition of community culture as a fundamental (basic and important) part of education, expression and communication of an idea and the development of knowledge (Atmojo, 2012).

However, learning at school was disrupted due to the emergence of the Covid-19 outbreak where the government issued a regulation to carry out learning activities from home or (Work From Home) which is done online (online). Using an online learning system in this school, various problems arise that are faced by students and teachers, such as lesson materials that have not been completed by the teacher and then the teacher replaces it with other assignments (Susanto & Deapalupi, 2020). And also the problem that occurs in schools is the lack of interest and participation in independent learning for students so that this is also a problem in learning from home or online learning and also in the school there are no electronic teaching materials used by science teachers in the online learning process. So, with this E-module it can help students in learning online by using mobile phones anywhere and anytime without any constraints on books.

METHODS

The type of research used by researchers is development research or Research and Development (R&D). According to Trianto (2011: 206) Research and Development (R&D) is a research strategy or method consisting of a process or steps aimed at developing a new product or perfecting an existing product so that it can be accounted for. The research model used is the Plomp model. This model was developed by Tjerd Plomp which consists of 3 stages, namely 1. Preliminary research (initial investigation stage). 2. Prototyping stage (prototype formation). 3. Assessment phase (assessment stage). This research is to produce a product in the form of an E-module based onEthnic on the human reproductive system material for Class IX SMP/MTs.

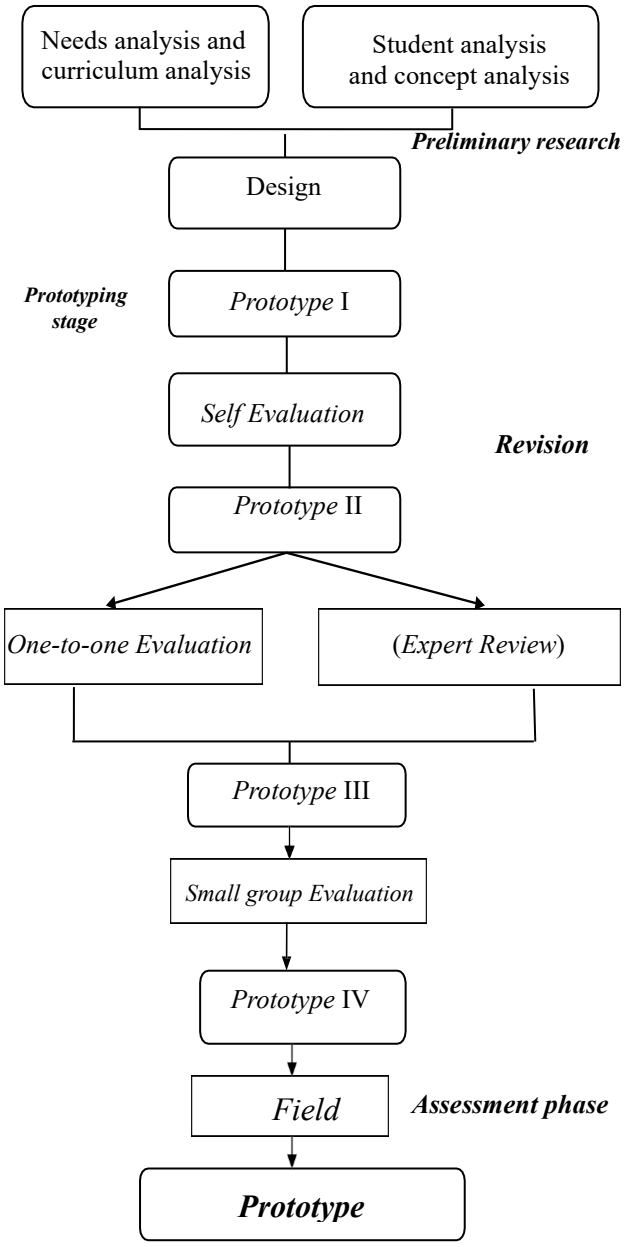

Figure 1. Human Reproductive System E-module Development Procedure Based on Ethnic (Plomp, 2013)

RESULT AND DISCUSSION

Needs Analysis Results

Needs analysis is conducted to see and know the needs of teachers and students in online learning, see and know the picture of the conditions or basic problems that occur in the field related to the online learning process in schools. At this stage, the results of the needs analysis are carried out by observation and interviews with educators. Based on the results of interviews with educators at State Junior High School 1 Painan, the school has implemented the 2013 curriculum with methods used in learning including discussions, questions and answers, and lectures. As well as the teaching materials used by educators in the learning process in the form of printed books, modules, and student worksheets and slide PowerPoint. However, educators have difficulty in providing teaching materials that can support online learning activities. This is also stated (Basar, 2021) that educators are required to be creative in delivering material through online learning media. And the teaching materials used during previous learning did not support online learning, did not have attractive colors and images and were still in printed form so that students were bored, bored and not enthusiastic in doing the assignments contained in the teaching materials provided by educators, and with its form which is still printed, it does not provide a solution to online learning so that it is not practical to carry anywhere. In agreement with the statement (Satriawan, 2015) that students have a weakness, namely not being provided with interesting modules from the material that has been delivered, the effect is that students will have difficulty repeating the material in the learning process, especially in online learning.

Curriculum Analysis Results

This curriculum analysis was conducted to study the curriculum used in schools, especially Junior High Schools 1 Painan. The curriculum analysis aims to study basic competencies, competency achievement indicators, scope of materials, and learning activities carried out as a basis for developing ethnoscience-based e-modules on human reproductive system material. Based on the results of the curriculum analysis through interviews with science teachers at the school, the 2013 curriculum has been implemented with basic competencies on human reproductive system material up to stage C3, namely connecting, where students in basic competencies (KD) are asked to connect one concept with other concepts that are interrelated. So that the development of ethnoscience-based e-modules on human reproductive system material is adjusted to the curriculum analysis that has been carried out (Puskur, 2006) states that learning carried out by linking the real world to students' daily lives will facilitate students' understanding of concepts and improve and motivate students in learning. The existence of ethnoscience-based learning Ethnic, students can connect the phenomena or culture that occurs in the local community with scientific studies so that the learning received by students becomes more meaningful which will later have a positive impact on student learning outcomes. This is supported by the statement in (Sudarmin, 2014) which states that student learning achievement can be improved by a combination of original science (indigenous sains) with science learning in the school environment.

Student Analysis Results

The student analysis stage was carried out by interviewing science subject educators and distributing observation questionnaires to several students, because during online learning in the Covid-19 conditions, learning was carried out at school according to the circular letter, it was carried out with shifts A and B or alternately every week. This analysis was carried out with the aim of determining the characteristics of students, the difficulties faced by students, and the needs of students for teaching materials. This was taken into consideration in compiling teaching materials. Based on the results of the educator interviews, students had difficulty with the material on the human reproductive system where students found it difficult to understand the language of printed books used in online learning. The limited number of books meant that not all students had them and also the difficulties experienced were in identifying the images in the modules used by educators, which became a problem. Meanwhile, based on the results of the observation questionnaire given to students, it can be concluded that students strongly agree with the existence of E-modules based on Ethnic on the reproductive system material because students can learn independently from home or anywhere using Mobile Phone Under any circumstances.

Concept Analysis Results

Concept analysis aims to identify concepts that must be mastered by students. The results of the concept analysis that has been carried out can be concluded that the variables in each material on the human reproductive system involve explaining, identifying, understanding and connecting scientific facts with original science and also in each concept of the material students must master it.

Prototype Formation Stage Results (Prototype Stage)

In this second stage, an E-module design will be created based on Ethnic on the human reproductive system material. This stage is carried out by forming a prototype (prototyping stage) on the E-module design based on Ethnic from the results of the analysis carried out at the initial investigation stage (preliminary research). At this stage each prototype is tested with the steps of formative evaluation, namely self-evaluation (self-evaluation), member ratings (expert review), one-on-one evaluation (one to one evaluation), small group evaluation (small group evaluation).

Prototype I Formation

Prototype I is a prototype produced from the design and realization of preliminary research. Prototype I produced in the form of an ethnoscience-based e-module with stages equipped with activities from the Ethnoscience approach which include the direct observation stage, explaining phenomena scientifically, and making conclusions from the previous stages that are designed to be interesting and easy to understand language. The steps taken in the development of an Ethnoscience-based E-module on the human reproductive system material for grade IX SMP/MTs are E-modules designed in accordance with basic competencies and the 2013 curriculum. The design

of this e-module uses the Writer Presentation Spreadsheets (WPS) and Canva applications, Times New Roman font type, and Berlin San FB with a spacing of 2 font sizes 12,14,18 and 22. Making products more attractive and motivating students to learn is taken from writer presentation spreadsheets (WPS) and Canva. Each of these applications has its own uses. From the use of WPS, the insert menu is used, namely shapes, to add an interesting impression to the Ethnoscience-based E-module. The components in the e-module are cover, foreword, table of contents, study guide, competency review, concept map, ethnoscience approach, e-model content, competency test, answer key, observation sheet and reference list. The following are the results of the prototype I design described as follows:

Figure 2. Prototype E-Module system Human Reproductive

This stage was carried out again revision or improvement from the expert review stage with some input suggestions and input from validators. Prototype II that has been produced was validated by three validators. The kappa moment obtained from the validation of the e-module on the content component is 0.93 with a very high validity category, the presentation component is 0.86 with a very high validity category, the language component is 0.85 with a very high validity category and the graphic component is 0.97 with very high validity. Based on this, the conclusion that can be drawn from the number of kappa moments of all aspects is 0.90 with a very high validity category. The results of the e-module validation data analysis on all aspects can be seen in Table 1 and Table 2.

No	Category	Rate k	Validity Category
1.	Content Components	0,93	Very high
2.	Presentation Components	0,86	Very high
3.	Component Linguistics	0,85	Very high
4.	Graphics Components	0,97	Very high
	Average	0,90	Very high

Table. 1. Date Validation Results

No	Aspects Assessed in Small Group Trial (Student Response Questionnaire)	K	Validity Category
	Ease of Use		
1	Instructions for using the e-module are easy to understand.	0,96	Very high
2	The material presented is clear	0,91	Very high
3	The steps of the learning activities found in the module are clear.	0,91	Very high
4	The language used in the e-module is easy to understand.	0,96	Very high
5	This e-module uses clearly legible letters.	0,91	Very high
6	E-module is easy to use or operate.	0,96	Very high
7	E-modules can be used repeatedly	0,91	Very high
8	This e-module is easy to carry because it can be stored in a bag, book, etc.	0,96	Very high
Average for Ease of Use		0,94	Very high
	Learning Time Efficiency		
1	E-modules help me learn at my own pace learn on my own.	0,91	Very high
Average for Learning Time Efficiency		0,91	Very high
	Benefits of Use		
1	E-modules help me learn independently	0,96	Very high
2	E-module helps me understand the material	0,96	Very high
3	The images and illustrations presented in the e-module can make it easier for me to understand the material.	0,96	Very high
4	E-module help meunderstand material through questions.	1	Very high
5	The e-module increased my curiosity.	0,91	Very high
6	E-modules increase my enthusiasm for learning.	0,96	Very high
7	I enjoy learning using this e-module.	1	Very high
Average for benefits		0,96	Very high
Overall average		0,94	Very high

Table. 2. Date Practicality Test

No	Aspects Assessed in Field Trials field test (Teacher Response Questionnaire)	k	Validity Category
	Ease of Use		
1	Instructions for using the e-module are easy to understand.	0,75	High
2	The material presented is clear	0,75	High

3	The steps of learning activities available on the e-module clearly	0,75	High
4	The language used in the e-module is easy to understand.	0,75	High
5	This e-module uses clearly legible letters.	0,89	Very high
6	E-module is easy to use or operate	0,75	High
7	E-modules can be used repeatedly	0,89	Very high
8	This e-module is easy to carry because it can be stored in a cell phone, flash drive, etc.	0,89	Very high
Average Ease of Use		0,80	High
	Efficient Learning Time		
1	E-modules help students learn according to their own pace. his ability	0,75	High
2	By using this e-module time learning becomes efficient	0,75	High
Average Learning Time Efficiency		0,75	High
	Benefits of Use		
1	E-modules help teachers' role as facilitators	0,75	High
2	E-modules reduce the workload of teachers to explain the material repeatedly	0,75	High
3	E-modules help students learn independently	0,75	High
4	E-modules help students understand the material	0,75	High
5	E-modules can be used by teachers in the process learning	0,75	High
6	Images and illustrations presented in the e-module can make it easier for students to understand the material	0,75	High
7	E-modules make the learning process easier pleasant	0,75	High
Average User Benefit		0,75	High
Overall Average		0,76	High

Table 3. Results of Data Analysis of E-module Practicality Assessment in Field Tests (field test) based on the Teacher Response Questionnaire

Based on Table 3. Results of the analysis of the practicality assessment data for the e-module in the field test (field test) based on the educator response questionnaire, the average kappa moment in terms of ease of use of the e-module is 0.80 with high validity, learning time efficiency is 0.75 with high validity, and benefits of use are 0.75 with high validity. The overall kappa moment obtained from the results of the analysis of the practicality assessment data of the e-module in the field test based on the teacher response questionnaire is 0.76 with high validity.

No	Aspects Assessed in Field Trials field test (Student Response Questionnaire)	k	Validity Category
	Ease of Use		
1	Instructions for using the e-module are easy to understand.	0,85	Very high
2	The material presented is clear	0,79	High
3	Steps of learning activities available on the e-module it is clear	0,82	Very high
4	The language used in the e-module is easy to understand.	0,89	Very high
5	This e-module uses clearly legible letters.	0,85	Very high
6	E-module is easy to use or operate	0,78	High
7	E-modules can be used repeatedly	0,86	Very high
8	This e-module is easy to carry because it is stored in mobile phones, flash drives, etc.	0,95	Very high
Average Ease of Use		0,85	Very high
	Efficient Learning Time		
1	E-module helps me learn accordingly my own learning pace	0,78	High
Average Learning Time Efficiency		0,78	High
	Benefits of Use		
1	E-modules help me learn independently	0,78	High
2	E-module helps me understand the material	0,85	
3	Images and illustrations presented in the e-module can make it easier for me to understand the material	0,86	Very high
4	E-module helps me in understanding the material through questions	0,75	High
5	E-module increases my curiosity	0,75	High
6	E-modules increase my enthusiasm for learning	0,82	Very high
7	I enjoy learning using this e-module.	0,89	Very high
Average User Benefit		**0,81**	**Very high**
Overall Average		**0,81**	**Very high**

Table 4. Results of Data Analysis of E-module Practicality Assessment in Field Trials (field test) based on student response questionnaire

Based on Table 4. Results of the analysis of the practicality assessment data for the e-module in the field test (field test) based on the average student response questionnaire (kappa moment) in terms of ease of use of the e-module is 0.85 with very high validity, efficient learning time is 0.78 with high validity, and the benefits of using the e-module are 0.81 with very high validity. The overall average kappa moment obtained in the field test based on the student response questionnaire is 0.81 with a very high validity category.

Based on Table 3 and Table 4, it can be concluded that prototype IV is an e-module based on ethnic on the Human Reproductive System material that has been created and has a high and very high practicality category with an average kappa moment value of 0.76 and 0.81. After the field trial (field test) to prototype IV, revisions were made according to suggestions given by educators and students. With this e-module, it is expected to motivate students in learning, especially in the online learning process.

Discussion

E-module development research based on Ethnic on the human reproductive system material for grade IX SMP/MTs using the Plomp model. The Plomp model consists of 3 stages, namely the initial investigation stage (preliminary research), prototype formation stage (prototyping stage), and assessment level (assessment phase). Each stage in the formation of the prototype goes through steps of formative evaluation consisting of self-evaluation (self-evaluation), one-on-one evaluation (one to one evaluation), member ratings (expert review), small group evaluation (small group evaluation), and field trials (field test). The evaluation is carried out to determine the quality of the product produced in the form of an e-module based on ethnic on the Human Reproductive System material for Grade IX SMP/MTs (Junior High Schools). There are several criteria that determine the quality of a product, namely validity, practicality, and effectiveness. In this study, it was only limited to two criteria, namely validity and practicality. The results of the validity and practicality tests that have been carried out are as follows:

E-module Validity

Validity stage in e-module based ethnic conducted by 3 validators, using an assessment questionnaire that had been given to the validators. The assessment given by the validators to the e-module was based on ethnic In the Human Reproductive System material using a questionnaire consisting of 4 types of components, namely content components, language components, presentation components, and graphic components. At this validity stage, the data obtained is processed using the formula Kappa Cohen. E-module based ethnic on the Human Reproductive System material, it was assessed by the validator with the validity for the 4 components having a very high category, with the average result of the validation data analysis given being 0.90 which has a very high category. Based on the data obtained in table 19, it can be concluded that the e-module based on ethnic on the human reproductive system material for class IX SMP/MTs is very valid. The results of the validity of the e-module based on ethnic on the human reproductive system material for class IX SMP/MTs by the validator can be seen in Table 5 below:

No	Category	Rate k	Validity Category
1.	Content Components	0,93	Very high
2.	Presentation Components	0,86	Very high
3.	Language Components	0,85	Very high
4.	Graphics Components	0,97	Very high
Average		**0,90**	**Very high**

Table 5. Results of Validation Data Analysis of All Aspects Assessed in the E-module by the Validator

Based on the results of the data analysis in Table 18, it can be concluded that the E-module is based on Ethnic on the human reproductive system material with an average obtained from all categories, namely 0.90 with a very high validity category. The validity of teaching materials can be seen if the teaching materials are in accordance with the indicators of content validity and construct validity (Sudjiono, 2013). The validity value of an E-module is seen based on the decision category based on the formula kappa moment listed in table 5 (Boslaugh & Paul, 2008: 12). The results of the validation data for all aspects can also be seen in the following image:

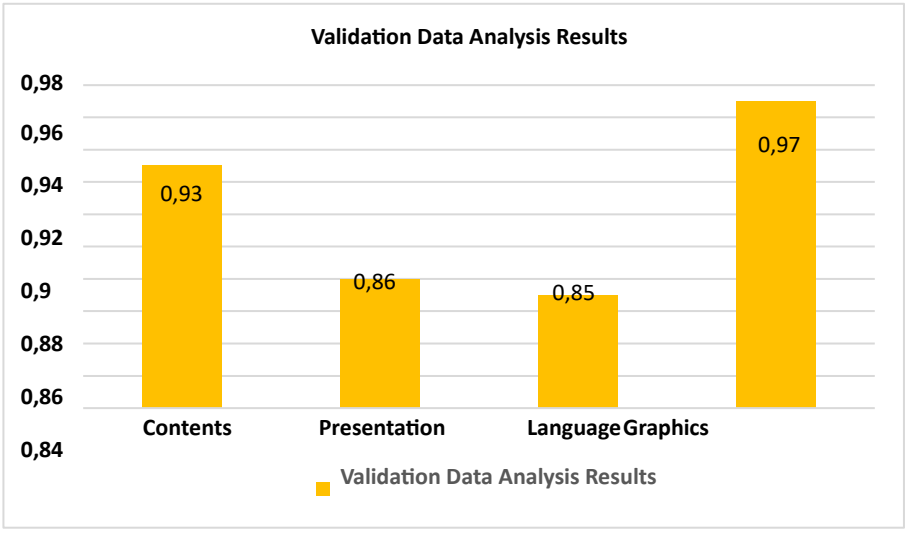

Figure 3. Validation Data Analysis Result

E-module Practicality

Practical stage in e-module based ethnic conducted based on the evaluation that has been conducted using a practicality questionnaire that has been validated by the validator. In the practicality activity, it is conducted from the one-on-one evaluation stage (one to one evaluation), small group evaluation (small group evaluation), and the field trial stage (field test). Practicality is determined based on the assessment of the product in the form of an assessment instrument in the form of a questionnaire given to educators and students. The practicality carried out is assessed from 3 basic components, namely the ease of use component, efficiency of learning time and benefits of use. The practicality data of the e-module that has been obtained is analyzed based on the formula kappa cohen to gain value kappa moment.

Practicality test of e-module based products ethnic on the Human Reproductive System material was carried out on students and educators as respondents using an assessment instrument in the form of a questionnaire. The practical stage carried out on educators as respondents was at the field trial stage (field test) with 2 science teachers of SMP Negeri 1 Painan. In addition, practicality to students as respondents

was carried out with small group trial stages (small group evaluation) namely with 4 representatives of class IX.6 students through group WhatsApp by sending a questionnaire in the form of file and sent back in the form offline also, and at the one-on-one trial stage (one to one evaluation) involving 3 representatives from class IX.3 students through group WhatsApp by sending a questionnaire in shape file and returned in form file Also, distributing questionnaires through groups WhatsApp because one of the anticipations is that there will be no students gathering due to the Covid-19 pandemic and also it will be easier for students to fill out the questionnaire because of the use of WhatsApp which is not complicated.

This is also stated by (Khasanah et al., 2021) that WhatsApp is a simple application and is very appropriate as a learning media compared to other online learning media because it has features for sending messages, images, videos, voices, groups and others. While in the field trial (field test) involving 20 students in class IX.7, field test stage (field test) by selecting 20 students heterogeneously with the abilities of students ranging from high, medium and low. This is intended to train students to accept differences and participants can work with friends with different abilities so that students can learn actively (Istiqomah, 2015). As well as creating learning media online that is classroom because of learning media online This has been used in advance by students in accordance with school policy, so that it becomes one of the supporting media in field tests (field test). According to Hakim (2016) in (Sabran & Sabara, 2019) Classroom is one of the learning media during the pandemic that makes it easier for educators where educators can convey information precisely and accurately to students.

Based on the practicality test, it can be concluded that the analysis data on the ease of use aspect of the e-module has a high and very practical category from educators and students, namely from educators with an average kappa moment of 0.80 and from students with an average kappa moment of 0.85. This states that the developed e-module already has instructions for use that are easy to understand and not complicated. The material presented in the e-module is clear and complete. The e-module is easy to use/operate, can be used repeatedly, and the e-module can be saved in the form of file or printed in a size that is not too large, easy to carry because it can be stored in handphone, flash disk, memory card, or on a laptop, and can also be accessed anytime and anywhere.

The aspect of learning time efficiency of e-modules has a high validity category from educators and also high from students, namely from educators with an average kappa moment of 0.75 and from students an average kappa moment of 0.78. So that it is obtained from educators and students assessed in terms of learning time efficiency, students can learn according to their own pace and by using e-modules, learning time becomes more efficient because there are models such as images and tables in the e-modules that can be understood faster by students.

The aspect of the benefits of using e-modules has a high validity category from educators and a very high validity category from students, namely from educators with an average kappa moment of 0.76 and from students an average kappa moment

of 0.81. So, the e-modules that are developed are able to help students learn independently and can understand the material through stages, images, or tables and questions that presented in e-modules so that it can increase enthusiasm, activity, motivation and curiosity in the learning process. Based on 3 aspects of assessment obtained from both questionnaires from educators and students, students are asked to work on an evaluation in the form of a competency test that is done repeatedly in filling out the evaluation test through the application classroom, because to see the interaction directly to the students. The interaction seen in the students is that the students are very enthusiastic in proving their abilities in this material. The results of the practicality analysis from educators can be seen in graph 2 and students can be seen in graph 3 as follows:

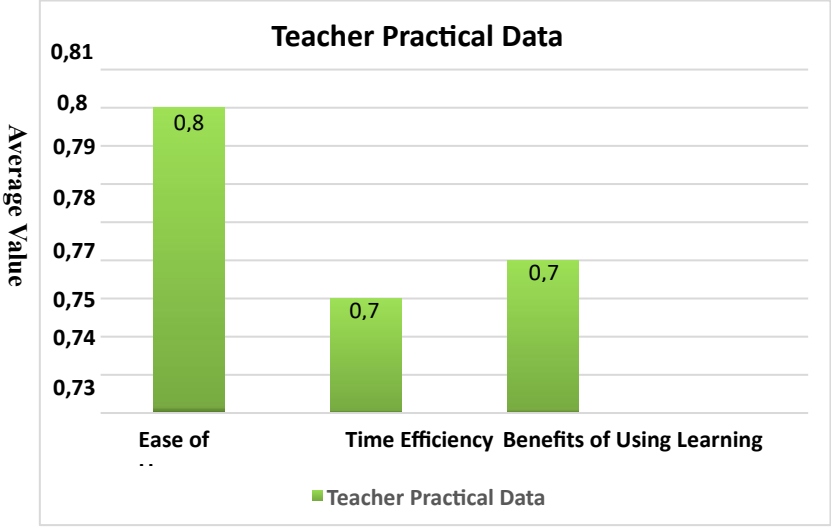

Figure 4. Teacher Practical Data

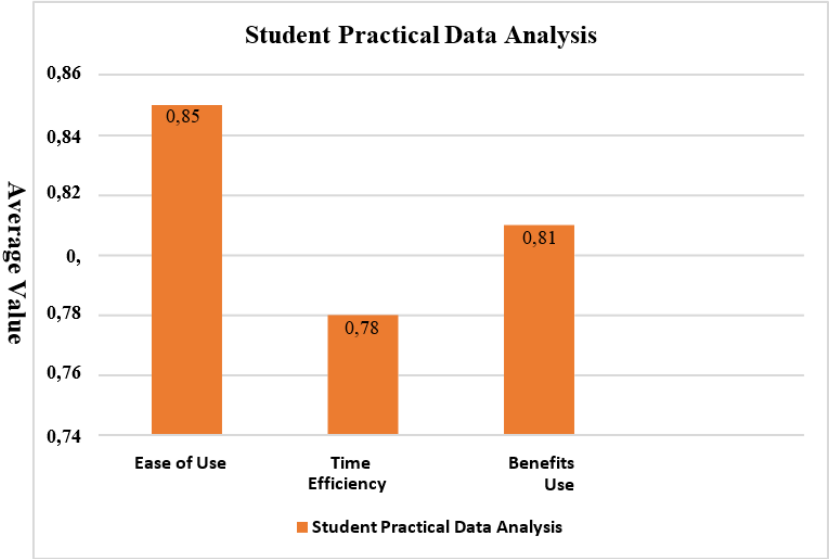

Figure 5. Student Practical Data Analysis

Overall, the results of the analysis of the practicality test of the e-module based on ethnic the material on the Human Reproductive System is stated to be practical and can be used easily by educators and students because the e-module has been designed with stages based on ethnic in accordance with the demands of the 2013 curriculum. The practicality of an E-module is seen based on the decision category based on the formula moment kappa listed in graphs 2 and 3 above (Boslaugh and Paul, 2008: 12). This e-module is expected to be used as an alternative teaching material used by educators and students in the learning process both in the Covid-19 pandemic conditions or not in the Covid-19 pandemic conditions. And also this e-module can be used in online learning, offline, in class or at home, because it can be accessed anywhere and anytime.

CONCLUSION

The validity of ethnoscience-based e-modules on the material of the Human Reproductive System for odd semester class IX SMP / MTs obtained an average of 0.90 with a very high validity category. The practicality of ethnoscience-based e-modules on Human Reproductive System material for odd semester class IX SMP / MTs by educators with an average obtained 0.80 with a high practicality category and by students obtained an average of 0.85 with a very high practicality category.

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