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Development of E-Module Based on Learning Cycle 6E for the Sub-material of the Distribution of Flora and Fauna in Indonesia and Worldwide for High School Students

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Abstract

This research aims to develop a learning product in the form of an E-Module (Electronic Module) based on the Learning Cycle 6E for the sub-material of the distribution of flora and fauna in Indonesia and worldwide for grade XI high school students with established validity standards. The research method used is Research and Development (R&D) with the ADDIE model, consisting of the analysis, design, development, implementation, and evaluation stages. The analysis stage includes student needs analysis, basic competency analysis, and competency analysis. The design stage involves formulating learning objectives, research and evaluation instruments, and the structure of the E-Module. The development stage includes collecting materials, creating the E-Module, distributing and testing with experts, followed by analysis and revision of the results. The implementation stage involves applying the developed E-Module in a classroom trial with students. The final stage is the evaluation stage, which is conducted to analyze errors during the implementation phase and errors in data collection. This research was conducted at Madrasah Aliyah Negeri 2 Jember with trial subjects being 34 grade XI IPS 4 students. Research instruments used were validation sheets and student response questionnaires. The validation test results of the E-Module by three experts obtained a score of 93.7% for E-Module expert, 98% for content expert, and 100% for learning practitioner, indicating very valid interpretation and suitability for use without revision. The practicality level of the E-Module was determined based on student responses, with a percentage of 92.3% for small group and 93% for large group, categorized as very practical.

Keywords: E-Module, Learning Cycle 6E, Flora and Fauna

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1. Introduction

Improving the quality of learning involves three main aspects: student development, teacher skills, and learning facilities. Teachers need to choose diverse approaches, and their expertise in understanding how students learn is crucial. Schools have a significant responsibility in enhancing the quality of learners through updating teaching materials and learning models (Rudiatna, 2022). The effectiveness of learning requires innovation, such as the use of E-Modules through smartphones and student-centered learning models. E-Modules play a crucial role in learning, aligning with the preferences of students who prefer electronically-based teaching materials. E-Modules can be accessed through laptops/computers or android devices and used by teachers as an evaluation tool (Nurdin et al., 2022). Geography integrates natural and human aspects in analyzing environmental life. Abstract content such as the distribution of flora and fauna requires visual images for easier understanding by students (Istuningsih et al., 2022).

According to Qamariah et al. (2023), electronically accessible modules for students have various benefits and characteristics. In terms of benefits, electronic modules can make the learning process more interesting, interactive, available anytime and anywhere, and enhance the quality of learning. According to Prihatiningtyas et al., 2020, E-Modules have advantages, such as flexible usage capability anywhere and anytime. These E-Modules do not require large storage space, only requiring available electronic device memory. The presence of E-Modules provides support in classroom learning, facilitates student access through smartphones, and enables teachers to directly publish their content through E-Module product development. The use of electronic materials has become a necessity because the majority of students are interested in electronically-based learning, which is considered more practical. Additionally, a suitable learning model to build student focus is the Learning Cycle 6E, involving six stages: elicit (formulation), engagement (access), exploration (exploration), explanation (explanation), elaboration (elaboration), and evaluation (evaluation), (Tanfiziyah et al., 2021). In this model, students are required to be actively involved, experience, reflect on discoveries, interpret considering initial schemes, and predict the application of knowledge in new situations (Rohman, 2022).

Based on an interview with a geography teacher, the material on the distribution of flora and fauna was previously taught using PowerPoint (PPT) and Student Worksheets (LKS). The instructional materials usually come from Erlangga and Viva Pakarindo publishers, but the teacher felt that the visualization of images was too abstract due to the lack of color, and the teaching materials were not optimal in focusing on students at MAN 2 Jember. Therefore, the use of E-Modules is considered highly suitable for learning at MAN 2 Jember, where students' learning tools and sources are inseparable from the use of laptops and smartphones. The advantages of E-Modules include flexible access and not requiring significant storage space. E-Modules assist both students and teachers in classroom learning by being easily accessible through smartphones, and they enable teachers to publish content directly (Astuti et al., 2022).

This is reinforced by the analysis of the needs of E-Modules based on the Learning Cycle 6E conducted on June 20, 2023, involving 139 student respondents from XI IPS 1 to XI IPS 4 classes, with a total percentage of 87.38 stating a need and 12.56 stating no

need. Overall, the students of XI grade have never used the Learning Cycle 6E learning model, so they feel the need to use E-Modules based on the Learning Cycle 6E in the geography lesson on the distribution of flora and fauna in Indonesia and the world.

The use of E-Modules based on the Learning Cycle 6E as instructional material has been conducted by previous researchers with a focus on various subjects and their materials. Among them, the research results on the development of E-Modules based on the Learning Cycle by Mimin et al. (2021) show that the expert validation of the electronic module using the ADDIE model yielded excellent results. This module is categorized as suitable and attractive as a student learning resource. (1) The difference lies in the material (geography) and the use of the Learning Cycle 6E learning model. Then, the research by Tarigan et al. (2022) shows that the E-Module based on the Learning Cycle 7E obtained a "very feasible" level after validation by validators. (2) The difference lies in the use of the 5 stages of the ADDIE model, (2) geography material, and (3) the addition of one stage in the Learning Cycle 7E model, while previous research used 4 stages of ADDIE. The research by Agusti et al. (2021) indicates that the E-Module using exe-learning has material quality that is suitable and very suitable for use in buffer solution learning. The difference is (5) the addition of a website based on Exe Learning.

Based on the above identification, the development of E-Modules based on Learning Cycle 6E using the ADDIE model is needed to meet the learning needs of students, especially in the material on the distribution of flora and fauna in Indonesia and the world, which has not been widely developed in geography learning. The selection of flora and fauna distribution material is based on the results of a student needs analysis questionnaire which shows that the majority of students require visualizations of real images rather than abstract images contained in Student Worksheets (LKS). This study aims to assess the feasibility and determine student responses to the E-Module Based on Learning Cycle 6E, Sub Material Distribution of Flora and Fauna in Indonesia and the World for high school students (SMA/MA) that is currently being developed. Therefore, the research is conducted with the title "Development of E-Modules Based on Learning Cycle 6E for the Sub-material of the Distribution of Flora and Fauna in Indonesia and Worldwide for High School Students."

2. Method

The research conducted is a type of research and development (R&D) utilizing the ADDIE development model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation (Sari et al., 2017). The selection of the ADDIE development model is due to its organized and systematic stages. The analysis stage includes needs analysis, basic competency analysis, and curriculum analysis. The design stage involves formulating learning objectives, assessment and evaluation instruments, and the structure of the E-Module. The design of the E-Module product produced by the researcher includes: (1) cover page, (2) compiler page, (3) concept map, (4) table of contents, (5) glossary, (6) introduction, (7) learning activities covering the Learning Cycle 6E syntax, (8) bibliography. The development stage includes distributing the product for testing by validators, which is then validated by experts and revised according to the suggestions or input from the experts, among others, there are two geography education lecturers from Jember University, namely Prof. Dr. Sri

Astutik, M.Si. (E-Module Expert Validator) and M. Asyroful Mujib, S.Pd., M.Sc. (Content Expert Validator), and one geography learning practitioner from MAN 2 Jember, namely Rita Zahara, S.Pd. (Practitioner Expert Validator). Validation is done using instruments such as the E-Module feasibility validation sheet, material validation sheet, and learning practitioner validation sheet. The validation score calculation uses the formula (Ridha, 2021) as follows:

$$\text{Percentage score} = \frac{\sum obtained\ score}{n\ x\ \sum maximum\ score}\ x\ 100\% \quad (1)$$

Explanation:
n : Total Number of Questionnaires
100% : Constant

The results of the calculated average percentage will be assessed according to the validation criteria (Ridha, 2021), as follows:

Table 1. Validation Criteria

No.	Level of Achievement	Interpretation	Description
1	80,1%-100%	Very Valid	Can be used without revision
2	70,1%-80%	Valid	Can be used, but with minor revisions
3	60,1%-70%	Sufficiently Valid	Can be used, but with major revisions
4	50,1%-60%	Less Valid	Not recommended for use due to significant revisions
5	1-50%	Not Valid	Cannot be used

Source: (Ridha, 2021)

The implementation phase involves applying the developed E-Module to teacher trials and student response trials in real classroom situations. The target trial in this study used the Purposive Sampling Area method with students from class XI IPS 4 as the sample, selected based on the average formative scores of geography subjects below or close to the passing grade, which is 77. The research population includes students from class XI IPS 4 of MAN 2 Jember for the academic year 2023/2024 odd semester, as shown in Table 2.

Table 2. Research Population and Sample

No	Class	Total	Average Formative Score
1.	XI IPS 1	36	79
2.	XI IPS 2	34	80
3.	XI IPS 3	35	85
4.	XI IPS 4	34	78
	Total	**139**	

Source: Document from MAN 2 Jember.

The data from the conducted trial are analyzed using a Likert scale. The Likert scale is used to analyze student responses and measure their opinions on the tested E-Module. The Likert scale in this student response questionnaire is guided by (Ridha, 2021) with scores modified according to the following table:

Table 3. Likert Scale

Category	Interpretation
1	Strongly Disagree
2	Disagree
3	Somewhat Disagree
4	Agree
5	Strongly Agree

Modification (Ridha, 2021)

The obtained data will then be processed to obtain the questionnaire results of the E-Module. The calculation of the questionnaire results uses the following formula:

$$\text{Percentage score} = \frac{\sum obtained\ score}{n\ x\ \sum maximum\ score}\ x\ 100\% \quad (2)$$

Explanation:
n : Total Number of Questionnaires
100% : Constant

After obtaining and calculating the questionnaire results, the conclusions will be drawn using the criteria for student responses presented in the following table:

Table 4. Student Response Criteria

No.	Level of Achievement	Category
1	1-50%	Not Practical
2	50,1%-60%	Less Practical
3	60,1%-70%	Sufficiently Practical
4	70,1%-80%	Practical
5	80,1%-100%	Very Practical

Modification (Ridha, 2021)

An electronic module can be considered "practical" if the value of P ≤ 80%. However, if the electronic module does not fall into the practical category, an evaluation stage will be conducted for the assessments with low scores. Subsequently, the electronic module will be revised to align with those indicators.

The evaluation stage is the final step in the ADDIE development model, aimed at evaluating the process of developing the E-Module product. Evaluation involves correcting errors based on feedback from E-Module experts, content experts, and learning practitioners, especially regarding formatting and example images. After revisions, the product is tested in small and large groups to determine student responses to the developed product.

3. Results and Discussion

A. Analyze Stage

The first stage is to conduct an analysis of student needs using a questionnaire. The purpose of this student needs analysis is to understand what students require in the learning process. The results of the student needs analysis questionnaire can be seen in Table 5. below:

Table 5. Results of Student Needs Analysis

No.	Questionnaire of Needs Analysis	Percentage (%)	
		Yes	No
1.	Do you like study geography?	83,7	16,3
2.	Do you face difficulties when studying geography materials that require visualization (images)?	82,2	17,7
3.	Are you familiar with the Learning Cycle 6E-based learning model?	93,3	6,6
4.	Do you need an electronic module presented in clear and concise sentences through a smartphone medium on the topic of the Distribution of Flora and Fauna in Indonesia and the World?	90,3	Cc 9,6
5.	In your opinion, is it necessary to use Learning Cycle 6E-based electronic modules on the topic of the Distribution of Flora and Fauna in Indonesia and the World in geography learning?	87,4	12,6
	Total Percentage	**87,38**	**12,56**

Source: Data Processing, (2023)

The results in Table 5 are based on the comparison of students who made a selection, divided by the total number of students who filled out the questionnaire. A total of 135 students from four classes XI IPS 1-4 filled out the questionnaire, with 87.38% choosing YES and 12.56% choosing NO in the student needs analysis. This indicates that the majority of students in the research location require the E-Module Based on Learning Cycle 6E teaching materials.

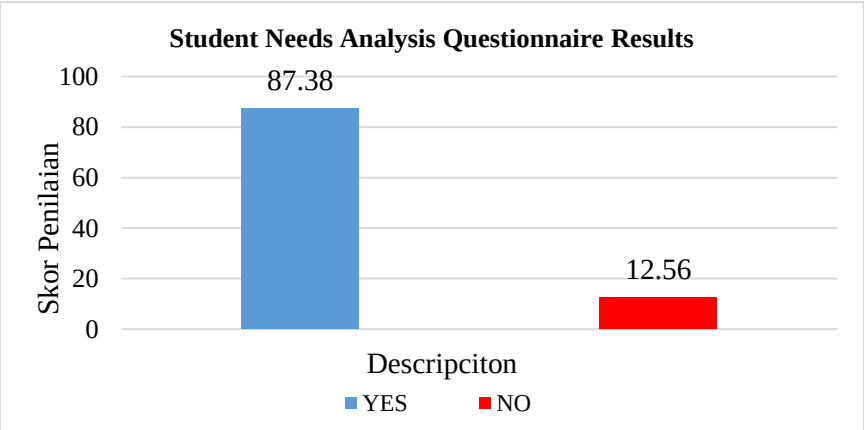

Figure 1. Graph of Student Needs Analysis Questionnaire Results XI IPS MAN 2 Jember

Figure 1. Illustrates the graph of student needs analysis questionnaire results at MAN 2 Jember (classes XI IPS 1-4), showing that 87.38% of students still require new teaching materials, including the Geography E-Module based on Learning Cycle 6E on the subtopic of distribution of flora and fauna in Indonesia and the World developed by researchers. Next is the competency analysis evaluating the suitability of the E-Module product based on Learning Cycle 6E with basic skills (KD) and core competencies (KI), focusing on the coverage of subtopics related to understanding the distribution of flora and fauna, as well as the types of flora and fauna in Indonesia and the World. Core competency assessment involves spiritual, social, knowledge, and attitude skill aspects, with the aim for students to comprehend the material. Lastly, curriculum analysis relates to information obtained through interviews with geography subject teachers. Curriculum analysis is conducted to adjust basic competency (KD) and core competency (KI) indicators to be included in the e-module based on the self-structured curriculum, in accordance with the curriculum used at MAN 2 Jember.

B. Desain Stage

The design stage includes formulating learning objectives, developing assessment and evaluation instruments, as well as structuring the E-Module. In formulating learning objectives, two objectives are included, namely (1) the ability to state and identify the distribution of flora and fauna in Indonesia and the world, (2) the ability to state the characteristics of flora and fauna in each regional part of the area. Then, the development of assessment and evaluation instruments for the E-Module product includes expert validation instruments, E-Module instruments, material instruments, and geography learning practitioner instruments. These instruments have been validated by three Geography Education lecturers and one Geography teacher from MAN 2 Jember. The structure of the Learning Cycle 6E-based E-Module follows ISO standards, including a cover page, compiler page, concept map, glossary, table of contents, introduction (e-module identity, KD, Core Competencies, usage instructions, material description, learning material), as well as learning activities 1 and 2 with the stages of Elicit, Engagement, Exploration, Explanation, Elaboration, and Evaluation.

C. Development Stage

The development stage involves collecting materials, creating the E-Module, distributing it, and conducting expert trials. In collecting materials, the researcher gathers information about the lesson material, exercises, and answers, and uses Microsoft Word software to analyze material about the Distribution of Flora and Fauna in Indonesia and the World. The material is obtained from relevant sources, compiled in Microsoft Word, and involves the use of flora and fauna images from official sites such as National Geographic, as well as relevant videos from YouTube by copying the video link. After collecting the material, the next step is the creation of the E-Module. This stage is the process of creating the e-module using the Canva application to obtain a valid E-Module. After designing it in Canva, it will then be uploaded to Google Drive and a link will be copied to create an electronic E-Module.

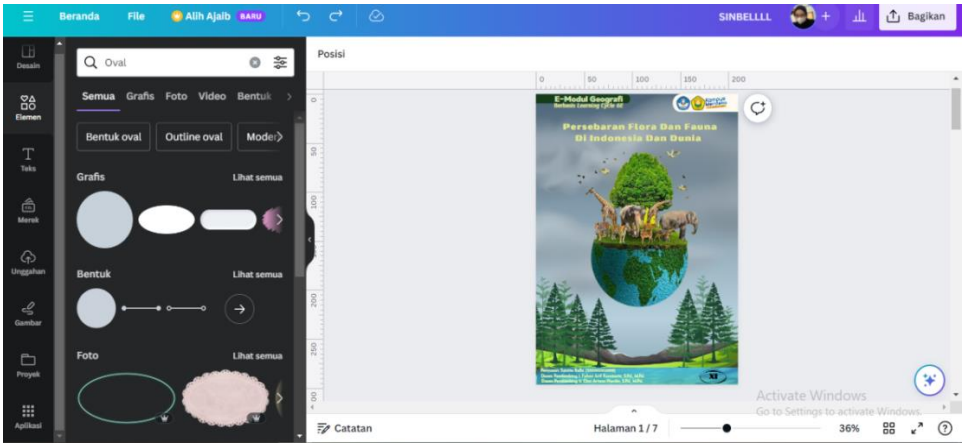

Figure 2. Editing E-Module Cover

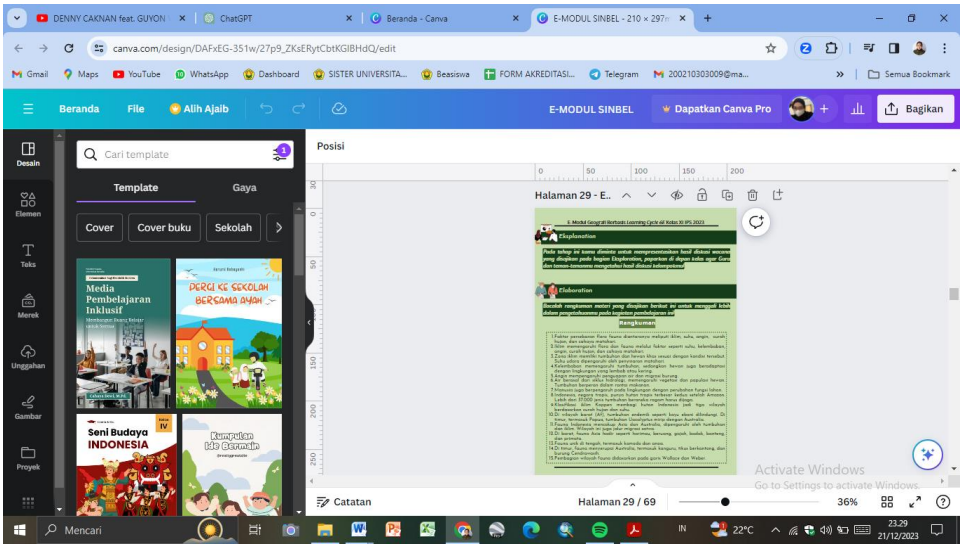

Figure 3. Development of the Learning Cycle 6E Model

After editing the cover and developing the Learning Cycle 6E E-Module model through Canva, it is then downloaded in PDF format and uploaded through Google Drive. The link is then copied to facilitate access by expert validators and students.

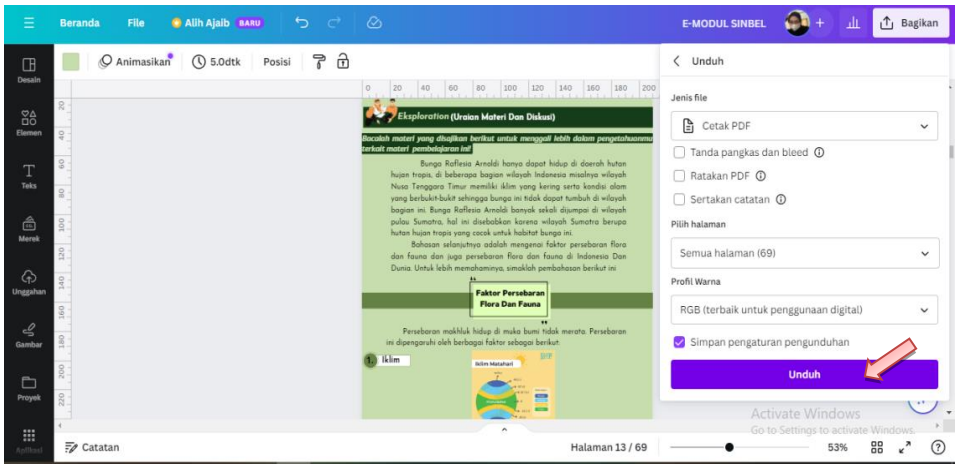

Figure 4. Downloading the E-Module

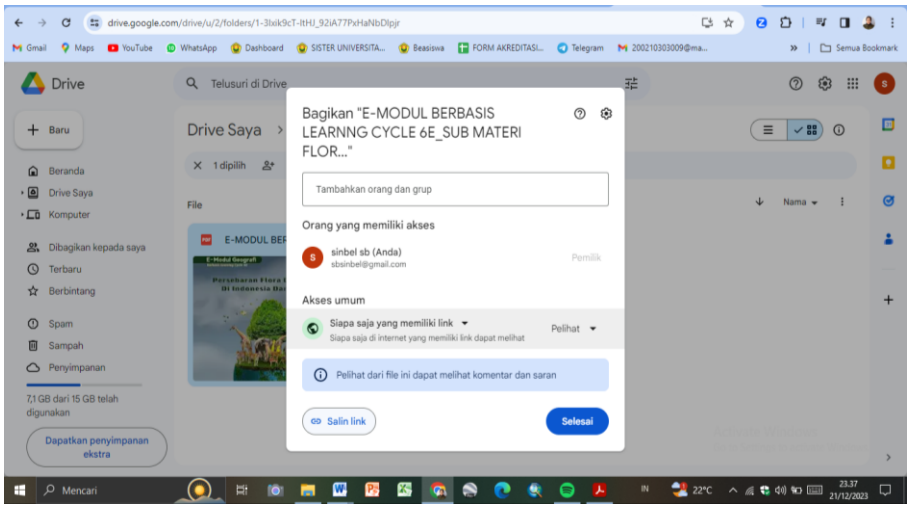

Figure 5. Uploading the PDF File and Copying the E-Module Link

After creating the E-Module, the next stage is distribution or testing with experts. Expert validators aim to evaluate the quality and feasibility of the Geography E-Module based on Learning Cycle 6E, sub-material distribution of flora and fauna, before implementing it to students in school. The validation of the E-Module product involves three expert validators, including an E-Module expert, a content expert, and a geography learning practitioner. The result of the E-Module expert validation reached 93.7%. This percentage indicates that the E-Module expert assessment is interpreted as highly valid and can be tested with revisions according to suggestions. In this validation, there are still errors that need to be addressed or revised. The three components that need improvement are the cover page, the font size of the Learning Cycle 6E subtitle should be reduced, the caption writing, which was originally size 15, should be reduced to 12, and the layout of the sub-chapter title area is slightly out of the E-Module sheet boundary. After making improvements, the process continues to the second stage of validation. The second-stage validation was conducted on September 5, 2023, with the result "valid for testing." Through this assessment, the E-Module expert validation results can be classified as highly valid and ready for testing.

The validation by the content expert is carried out by filling out a content expert validation sheet with 12 assessment indicators. Based on the decision-making according to (Ridha, 2021), the assessment of the E-Module product by the content expert is interpreted as highly valid with a score of 98%, concluding that there are no errors. In the comments and suggestions section, the content expert commented as follows:

"This E-Module can enhance students' motivation to learn and help students to learn independently. The exploration phase has guided and directed students with a well-organized and systematic material, supported by the latest data."

Thus, it can be concluded that the E-Module product developed by the researcher is valid and can be used for testing without revision. The last validation result is from the validation of geography learning practitioners, conducted by filling out a validation sheet with a total of 9 assessment indicators. Based on the decision-making according to (Ridha, 2021), the assessment of the E-Module product by

geography learning practitioners or geography teachers at MAN 2 Jember can be interpreted as highly valid with a score of 100%, classified as usable without revision. The assessment from the geography learning practitioner validator indicates no errors, so it can be concluded that the E-Module product developed by the researcher is feasible and can proceed to the student testing stage.

D. Implementation Stage

This stage involves testing the validated E-Module product with students of class XI IPS 4 at MAN 2 Jember. The testing involves 34 students divided into small and large groups. The small group, with 10 respondents, aims to explore student responses within a more limited scope. Meanwhile, the large group involves all 34 students to gain a broader understanding of their responses to the E-Module. The small group testing is conducted before the large group to measure positive or negative responses. Data collection of student responses was conducted on September 14, 2023, with students filling out a questionnaire containing 13 indicators and five answer categories.

Results of Student Response Test for Small and Large Groups. The large group testing is the next step after the small group testing and involves a larger number of students. The following is a summary of student responses, including both small and large groups, available in Tables 6. and 7. below:

Table 6. Recapitulation of Small Group Student Response Results

No.	Indicators	Score				
		1	**2**	**3**	**4**	**5**
1.	Module is more easily accessible and user-friendly	0	0	0	4	**6**
2.	Attractive module appearance	0	0	0	3	**7**
3.	The material is presented systematically	0	0	0	5	**5**
4.	The geography module on the Distribution of Flora and Fauna in Indonesia and the World based on Learning Cycle 6E is convenient for learning materials	0	0	0	2	**8**
5.	The text in the geography module on the Distribution of Flora and Fauna in Indonesia and the World based on Learning Cycle 6E is easy to read	0	0	0	4	**6**
6.	Instructions in the geography module on the Distribution of Flora and Fauna in Indonesia and the World based on Learning Cycle 6E are clear	0	0	0	4	**6**
7.	Images and maps available in the module facilitate the learning of the material	0	0	0	5	**5**
8.	The language used in the module is easy to understand	0	0	0	4	**6**
9.	The module helps in understanding the concept of the material on the Distribution of Flora and Fauna in Indonesia and the World based on Learning Cycle 6E because the presentation is in line with the surrounding environment	0	0	0	6	**4**
10.	The geography module on the Distribution of	0	0	0	3	**7**

	Flora and Fauna in Indonesia and the World based on Learning Cycle 6E is easy to learn because it contains pictures, maps, and related summaries.					
11.	The geography module on the Distribution of Flora and Fauna in Indonesia and the World based on Learning Cycle 6E is used to identify the types of flora and fauna in a region.	0	0	0	2	**8**
12.	The geography module on the Distribution of Flora and Fauna in Indonesia and the World based on Learning Cycle 6E provides additional knowledge.	0	0	0	4	**6**
13.	The module helps students to have more motivation to learn.	0	0	1	2	**7**
Total Score		**600**				
Percentage (%)		**92,3%**				
Interpretation		**Very Practical**				

Source: Data Processing, (2023)

Based on the results obtained from the calculation of the average total response of the small group of students, the overall average score reached 92.3%, and after conversion into Ridha (2021), the score of 92.3% falls within the range of 80.1%-100%, thus meeting the criteria of "**Very Practical**."

Table 7. Recapitulation of Results of Large Group Student Responses

No.	**Indicators**	**Score**				
		1	**2**	**3**	**4**	**5**
1.	Module is more easily accessible and user-friendly	0	0	0	14	**20**
2.	Attractive module appearance	0	0	0	14	**20**
3.	The material is presented systematically	0	0	0	18	**16**
4.	The geography module on the Distribution of Flora and Fauna in Indonesia and the World based on Learning Cycle 6E is convenient for learning materials	0	0	0	8	**26**
5.	The text in the geography module on the Distribution of Flora and Fauna in Indonesia and the World based on Learning Cycle 6E is easy to read	0	0	1	11	**22**
6.	Instructions in the geography module on the Distribution of Flora and Fauna in Indonesia and the World based on Learning Cycle 6E are clear	0	0	0	11	**23**
7.	Images and maps available in the module facilitate the learning of the material	0	0	0	12	**22**
8.	The language used in the module is easy to understand	0	0	0	13	**21**
9.	The module helps in understanding the concept of the material on the Distribution of Flora and Fauna in Indonesia and the World based on Learning Cycle 6E because the presentation is in line with the surrounding environment	0	0	0	15	**19**

10.	The geography module on the Distribution of Flora and Fauna in Indonesia and the World based on Learning Cycle 6E is easy to learn because it contains pictures, maps, and related summaries.	0	0	0	9	**25**
11.	The geography module on the Distribution of Flora and Fauna in Indonesia and the World based on Learning Cycle 6E is used to identify the types of flora and fauna in a region.	0	0	0	12	**22**
12.	The geography module on the Distribution of Flora and Fauna in Indonesia and the World based on Learning Cycle 6E provides additional knowledge.	0	0	0	8	**26**
13.	The module helps students to have more motivation to learn.	0	0	1	6	**27**
Total Score				**2055**		
Percentage (%)				**93%**		
Interpretation				**Very Practical**		

Source: Data Processing, (2023)

Based on the results obtained through the calculation of the average total response score of the large group of students, the overall average score reached 93%, and after conversion according to Table 3.9 based on Ridha (2021), the score of 93% falls within the range of 80.1%-100%, thus meeting the criteria of "**Very Good**."

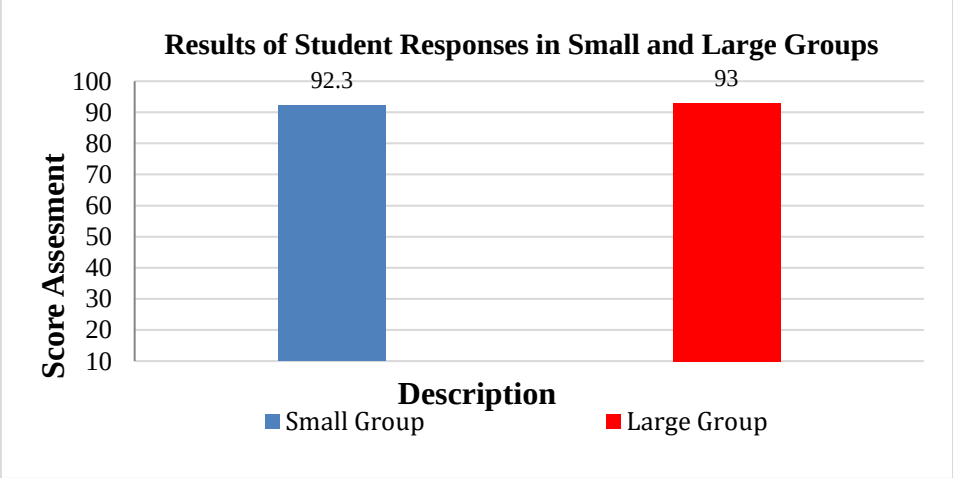

Figure 6. Graph of Student Response Results

The average student response assessment of the developed Learning Cycle 6E-based E-Module is rated as "Very Practical" according to Ridha (2021), with a percentage of 92.3% for the small group and 93% for the large group. Comments or feedback received from the trial are highly positive, leading to the conclusion that students accept the Geography E-Module based on Learning Cycle 6E, particularly on the sub-material of flora and fauna distribution. This is also supported by comments or responses from students, such as:

"I strongly agree because learning using the Learning Cycle 6E-based E-Module delivers the material very comprehensively, and the available images and maps make it

much easier to study. My suggestion is that this E-Module can be developed and made available in every school to facilitate students in understanding the material on the distribution of flora and fauna, especially for students in grade XI IPS" (Y, 17 years old).

"In my opinion, with this E-Module, I find it easier to study the material on the distribution of flora and fauna in Indonesia and the World. Additionally, students can easily access it because it's more practical, making students more interested in reading this E-Module" (F, 17 years old).

Regarding issues raised by students during the trial, there were some blurry images when zoomed in, and difficulties in accessing the E-Module link using the school's Wi-Fi. Many students preferred using their personal data packages. A suggested solution for the link accessibility issue is to use a barcode so that students can directly scan and access the E-Module link. The challenges encountered during the E-Module trial can serve as valuable feedback for the researcher in developing E-Modules and other teaching materials in future research.

E. Evaluation Stage

The evaluation stage is the final step in the ADDIE development model aimed at assessing the development process of the E-Module product. Some issues raised by students during the trial include the presence of some blurry images when zooming in and difficulties accessing the E-Module links when using school Wi-Fi, leading many students to prefer using their personal data packages. A solution to the problem of difficult-to-access links could be using barcodes so that students can directly scan the E-Module links. Challenges encountered during the E-Module trial can serve as evaluation material for researchers in the development of E-Modules and other teaching materials in future research. Evaluation also includes error corrections based on feedback from E-Module experts, subject matter experts, and learning practitioners, especially regarding writing style and example images. After revisions, the product is tested with small and large groups, and the trial results show a positive response. Therefore, this Geography E-Module on flora and fauna based on Learning Cycle 6E can be considered usable and disseminated as a learning resource for high school students in grade X or equivalent.

4. Conclusion

The results of this research conclude that the E-Module based on Learning Cycle 6E on the sub-material of the distribution of flora and fauna in Indonesia and the World, based on the assessment of E-Module experts, subject matter experts, and geography learning practitioners, is considered highly valid. E-Module expert validators provided an assessment percentage of 93.7%, subject matter expert validators 98%, and learning practitioner validators 100%. The assessments obtained from these validators fall into the category of highly valid. The E-Module also received very positive responses from students. Based on the recapitulation of the responses from 11th-grade IPS 4 students, the students' assessment of the E-Module is interpreted as highly practical, with a score of 92.3% in the small group test (10 students) and 93% in the large group test (34

students). "Therefore, the developed product is considered feasible and receives positive responses from students."

5. Reference

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