
Increasing Student Learning Activities Through the Implementation of Interactive E-Modules in Science Tutorial Models on Elementary School Ecosystem Materials

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Abstract. The development of teaching materials requires educators to innovate in creating effective learning. E-module is one of the technology-based teaching materials developed to encourage students' natural science learning activities independently. This study aims to analyze the use of e-modules in increasing students' independent learning activities, especially in science subjects. This research is a quantitative type with 21 students in class V-A Madrasah Ibtidaiyah as the subject of the research. The data collection method is in the form of a learning activity questionnaire. The results showed that the use of e-module teaching materials can increase student learning activities by 44.74% with the most activity criteria being moderate (3-5 activities). This is because the density of extracurricular activities that must be followed at school makes children lack independent learning activities outside the school environment. With this teaching material, it is hoped that it will be able to support students' independent learning activities outside the school environment comfortably and increase students' enthusiasm for learning.

Keywords: Learning Activities, E-Modules, Ecosystem Materials

Introduction

Technological developments in various aspects of life encourage people to be technologically literate and socially responsible, including in education (Mutmainnah et al., 2021). Education is the primary need of every individual. Through education, each individual can hone and develop his potential, to be actualized in his daily life (Aeni & Widodo, 2022). In education, technology allows the use of multimedia, animation, images, interactive videos, games, evaluations and others which are presented in a more interesting way and attracts the attention of students. This process can be supported by appropriate learning processes, training, teaching and development activities (Purnama et al., 2020). For this reason, the learning process is carried out in such a way as to promote character, interests, talents, and processes, so that learning objectives can be achieved (Laili et al., 2019). In practice, the learning process needs to be supported by teaching materials.

Teaching materials are designed learning materials that are structured to support the implementation of the teaching-learning process (Puspandari et al., 2019). The expansion of technology allows teaching materials to be enriched with various and up-to-date content so that they can attract the attention of students. Plus, the ease of accessing various educational resources such as e-books, learning videos, subject matter and other

e-learning platforms. The existence of digital-based learning allows students to study independently, interact directly with learning materials, work on assignments online or flexibly (Garrido-Abia et al., 2023). Technology also makes it easy for teachers to innovate to create appropriate teaching materials to support the learning process. Teaching materials can be presented digitally, such as presentation slides, e-books, e-modules, learning videos or interactive games (Adipat et al., 2023).

Appropriate teaching materials support student learning activities not only in the school environment, but also cover the entire daily environment of students. The observation results show the activities of students who have been accustomed from an early age to be involved in various activities in the school environment. These activities include reading the *asmaul husna* and praying *dhuha* in congregation every morning. Extracurricular activities every Saturday, gathering activities, TPA and the obligation to keep the school clean. This adds to students' sense of responsibility and concern (Nasution et al., 2022). In line with that, educators play an important role in the successful implementation of the learning process in class and supporting activities outside the classroom. This is to instill awareness of individual values, social values, the attainment of knowledge and understanding in acquiring students' skills and abilities (Nasution et al., 2022).

The observation results also showed that students experienced a decrease in independent learning activities. This is due to the busyness of students at school from morning to evening. After the teaching and learning process is carried out, students continue activities outside the classroom. These activities are in the form of extracurricular sports, TPA, *hadroh* and many more. Each learner has the right to choose the activity he wants to carry out. Due to this, the independent learning activity of students outside the school environment has decreased. One of them was felt by the teacher of class V-A in the subject of natural sciences. Seeing this, the teacher tries to prepare teaching methods and materials to increase students' learning motivation at home. Nevertheless, there have been no significant changes.

Seeing the importance of the existence of teaching materials in the learning process, encourages educators to innovate and be creative according to needs. The existence of teaching materials in the learning process can increase students' interest in independent learning outside the school environment (Warkintin & Mulyadi, 2019). In this case, the teaching materials offered are in the form of interactive e-modules. Interactive e-modules are a form of learning modules that contain learning materials designed in a digital format and equipped with interactive features to allow students to interact directly with the content presented. The e-module used in this study is a tutorial model e-module for class V ecosystem material. The e-module has been equipped with a user manual, a brief explanation regarding ecosystem material, interactive games, learning videos that can be accessed via barcodes, independent project *worksheets*, final quiz and evaluation. The results of the study show that teaching materials can encourage students' independence in learning (Alperi, 2020). In addition, the existence of teaching materials can increase student learning activities (Suprihatin & Manik, 2020). The research also emphasized that the use of e-modules in the learning process not only improves learning outcomes, but also has an impact on learning outcomes (Yulaika et al., 2020).

This provides an illustration of how important the developed teaching materials have an impact on the learning process. Ecosystem material was chosen because the ecosystem is very close to the students' environment. Material that is close will be easy to understand independently, plus learning resources that utilize the surrounding environment as a direct medium. This teaching material is based on information and communication technology tutorial model. This study aims to analyze the use of e-modules in increasing students'

independent learning activities, especially in science subjects. Thus, the existence of this research can certainly encourage independent learning that involves students actively and provides good solutions for improving the learning process.

Methods

The implementation of interactive e-module tutorial models in natural science subjects on ecosystem material is a series of stages from previous research (R&D) which have produced products in very valid categories according to the assessment of material and media validators on substance aspects. These aspects consist of material substance, learning design, display (visual communication) and software utilization. This research is included in the quantitative research method. This research was conducted at one of the Islamic Elementary Schools which is located at Cendrawasih Street no. 001, Pringwulung, Condongcatur, Depok District, Sleman Regency, Yogyakarta Special Region. Based on the results of initial observations and discussions with several teachers, the research was conducted in class V-A with a total of 21 students. This class was chosen because the results of observations showed that independent learning activities, especially in science subjects, had decreased, because all students were very active in extracurricular activities.

E-modules can be accessed by students easily, as long as the device used is connected to the internet. The class teacher will share the e-module link through the class group on the WhatsApp application. After that, the teacher will direct students to access the e-module via the shared link. Students just need to tap once, then the e-module can be used. The e-module consists of a cover section, table of contents, materials, quizzes, learning video links, games at the end of each material, practice questions and final evaluation. All of them can be accessed by students easily. Students only need to follow the directions by recognizing the 'back' and 'continue' signs, so they can access learning videos, practice questions, interactive games until the final evaluation.

This research began with observations through the whatsapp application with one of the teachers. Then carry out direct observations to the school. The results of the initial observations are used to determine the learning activities of students before using interactive e-modules. Collecting data in this study using a questionnaire. The student learning activity questionnaire instrument consists of 5 activities and 8 indicators (Sofyan et al., 2023).

Table 1. Categories of student learning activities

No	Student learning activities	Activity Indicators
1	Visual	- Listen to the material contained in the e-module - Listen to the learning videos contained in the e-module to review lessons outside school hours - Complete interactive games
2	Oral	- Explain what has been learned from using the e-module
3	Listen	- Listen to learning videos in e-modules
4	Write	- Write important material - Doing evaluation questions
5	Mental	- Complete practicum independently

The criteria for learning activities are categorized into 3, namely, low (1-2 activities), moderate (3-5 activity) and high (6-8 activity) (Sofyan et al., 2023).

Table 2. Criteria for learning activities

No	Criteria for learning activities	Number of activities
1	Low	1-2 activities
2	Currently	3-5 activities
3	Tall	6-8 activities

Results and Discussion

The use of interactive e-modules in science subjects on ecosystem material shows the result that there is an increase in student learning activities. This is shown from the results of the questionnaire collected by students. Next will be discussed student learning activities on each indicator. The following is data on indicators of student learning activities in Table 3.

Table 3. Visual category student learning activities

No	Activity Indicator	Score	Maximum amount	Value of student on visual category (%)
1	Listen to the material contained in the e-module	21	21	100
2	Listen to the learning videos contained in the e-module to review lessons outside school hours	18	21	85.7
3	Complete interactive games	15	21	71.4
Amount		54	63	257.1
The total number of presentations				85.7

Based on the Table 3, the visual indicators consist of 3 activity indicators. A score of 21 was obtained out of a maximum of 21 with a percentage of 100% for the indicator of listening to the material contained in the e-module. Score 18 out of a maximum of 21 with a percentage of 85.7%. For indicators, watch the learning videos included in the e-module to review lessons outside school hours. Score 15 out of a maximum of 21 with a presentation of 71.4% for completing the interactive game. The total score is 54 of the maximum number of 63 and the presentation is 257.1%. Based on these data, the total percentage is 85.7%.

Table 4. Learning activities of students in the oral category

Activity Indicator	Score	Maximum amount	Value of student on oral category (%)
Explain what has been learned from using the e-module	11	21	52.3

Based on the Table 4, the verbal indicators consist of 1 activity indicator, which explains what has been learned from using the e-module. Obtained a score of 11 out of 21 the maximum number with a percentage of 52.3%. So that the total number of presentations remains 52.3%.

Table 5. Learning activities of student in the listening category

Activity Indicator	Score	Maximum amount	Value of student on listening category (%)
Listen to learning videos in e-modules	8	21	38.1

Based on the Table 5, the listening indicator consists of one activity indicator, namely listening to learning videos in the e-module. Obtained a score of 8 out of a maximum of 21 with a percentage of 38.1%. In order to obtain a total fixed percentage of 38.1%.

Table 6. Learning activities of student in the writing category

No	Activity Indicator	Score	Maximum amount	Value of student on writing category (%)
1	Write important material	5	21	23.8
2	Doing evaluation questions	15	21	71.4
Amount		20	21	95.2
The total number of presentations				47.6

Based on the Table 6, the writing indicators consist of 2 activity indicators, namely writing important material and working on evaluation questions. For important material writing activities, a score of 5 is obtained out of a maximum of 21 and a percentage of 23.8%. For the activity of working on evaluation questions, a score of 15 was obtained out of a maximum of 21 with a percentage of 71.4%. So that a total score of 20 is obtained, the maximum number is 21 and the total percentage is 95.2%. As for the total percentage obtained 47.6%.

Table 7. Learning activities of student in the mental category

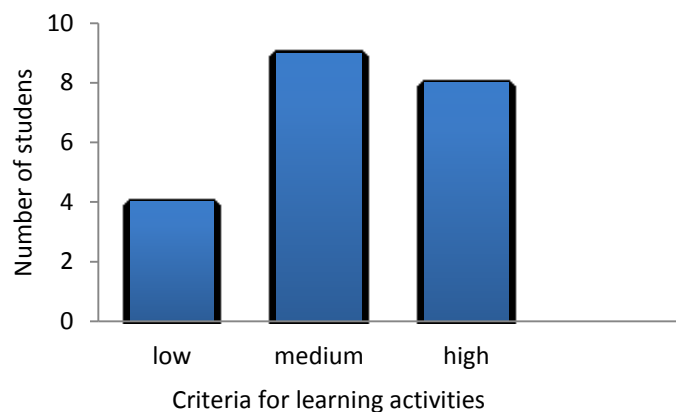
Activity Indicator	Score	Maximum amount	Value of student on mental category (%)
Complete practicum independently	0	21	0

Based on the Table 7, for the last indicator, namely mental, it consists of 1 activity indicator, namely completing practicum independently. Obtained a score of 0 out of a maximum of 21, so that the presentation is 0% and the total percentage is 0%. The percentage of the average number for each indicator can be seen in the Table 8.

Table 8. Percentage of student learning activities

No	Indicator	Amount (%)
1	Visual	85.7
2	Oral	52.3
3	Listen	38.1
4	Write	47.6
5	Mental	0
amount		44.74

Based on the Table 8, it can be seen that the percentage of visual indicators is 85.7%. The verbal indicator is 52.3%, the listening indicator is 38.1%, the writing indicator is 47.6% and the mental indicator is 0%. The average number of percentages is 44.74%. Based on these results, it can be concluded that the use of interactive e-modules for ecosystem material can lead to independent learning activities of students by 44.74 %. For students' learning criteria can be seen in Figure 1.

**Figure 1.** Criteria for students learning activities

Based on the Figure 1 of the student learning activity criteria diagram, the highest medium criterion is obtained. For low criteria there are 4 students, for medium criteria there are 9 students and for high criteria there are 8 students with a total of 21 students. It was concluded that the criteria for student learning activities after using interactive e-modules on ecosystem material were in the moderate criteria with an activity range of 3-5 out of 8 activities.

The use of teaching materials is certainly an important factor in learning (Krismayoni & Suarni, 2020). The existence of teaching materials will support the learning process, make it easier for teachers to deliver material in a systematic and practical manner, and be able to create a lively classroom atmosphere (Nurhikmayati & Jatisunda, 2019). Teaching materials can attract students' attention to the material and increase students' understanding (Sunami & Aslam, 2021). So it is hoped that with the teaching materials, students can achieve competency. As the results of previous research show that the use of teaching materials can help students achieve the desired competencies (Siswanti, 2019).

Other research results also support the existence of teaching materials, especially e-modules in the learning process. Research states that e-modules have a potential effect on student learning activities and outcomes (Hendri, 2018). Research states that the use of e-module teaching materials is effective in increasing the activity and learning outcomes of participants in the subject of the human digestive system (Mutmainnah et al., 2021). 264 | JIPI (Jurnal IPA dan Pembelajaran IPA), 7(3), p.259-268, (2023)

The use of science e-modules containing online tests has been shown to be effective in significantly increasing students' science learning activities (Lestari & Parmiti, 2020). The development of e-modules can be a solution in overcoming problems in absorbing material experienced by students (Mufida et al., 2022). The use of e-modules based on information and communication technology that has been implemented is effective for use in the learning process (Octavianis et al., 2022). The use of character-based e-module teaching materials in history learning is effective in increasing student learning outcomes (Nasution et al., 2022). This review further supports the existence of e-module teaching materials in the learning process. Not only said to be effective but also can increase student learning activities. In this case, learning activities outside the environment also increase and affect learning outcomes.

The use of interactive game-based e-modules and learning videos as independent teaching materials encourages students to more actively review the knowledge they have received at school independently and interactively (Kadioğlu-Akbulut et al., 2023). This can develop students' attitudes and knowledge as well as learning activities according to their respective abilities, thus providing more meaningful and enjoyable learning for students. The use of tutorial-based learning materials with several supporting features such as interactive games can make the independent learning process more interactive (Dakabesi & Luoise, 2019). There was an increase regarding the motivation, interest and learning activities of students. Basically, increasing student learning activities can affect learning outcomes. Of course it is supported by the availability of appropriate teaching materials. Besides that, learning by utilizing information and communication technology based on a tutorial model trains students to learn and find out the knowledge they want to know without coercion but on the basis of self-awareness (Bayu & Savira, 2021).

The results showed that the percentage of activity was 44.74 % with the highest activity criteria being moderate criteria (3-5 activities). This shows that the use of teaching materials in the form of interactive e-modules for ecosystem materials only increases 44.74 % of student learning activities. In the implementation process, the use of the e-module ran smoothly, no students complained about problems with use. Nevertheless, the results of the study showed low activity, below 50%. This proves that the use of digital-based e-modules, interactive games, learning videos, appropriate materials, independent practicum instructions, quizzes and evaluations has not guaranteed a significant increase in student activity. Based on the results of interviews with impressions and messages on the use of e-modules on students, it was found several reasons why the use of interactive e-modules that was applied was not very significant in increasing student learning activities, but was classified as low below 50%.

First, the schedule of activities provided by the school is quite tight, namely 07.00-15.00 for grade 5 MI. Coupled with activities outside of prime hours such as listening to, TPA to extracurricular activities. This gives a little space for children to study independently or just repeat the material that has been taught. Most of the children answered that it was better to rest or play with friends than to repeat the material again, unless they got homework. Second, the learning process is not supervised and not directly guided by parents or family members. Children are considered to be independent or able to complete school assignments. So that without guidance or supervision the children can complete their assignments on time. Finally, the low motivation of students in using digital teaching materials. Although digital teaching materials are considered more flexible in terms of time and place of use. In fact, children prefer teaching materials in print rather than digital form. This is based on the fact that not all students have personal devices, are not given free permission to use devices even though they are to access learning and most children who obtain permission to use devices are actually used to play digital games.

These three reasons form the basis for the conclusion why the use of teaching materials in the form of interactive e-modules only increases activity by 44.47%. An increase in activity will basically have an impact on the process and learning outcomes of students. The higher the interest and learning activities of students, the higher the learning outcomes of students (Wiradarma et al., 2021). Other research states that the higher the students' science learning activities, the higher the science learning outcomes obtained (Sidiq et al., 2020). So, it can be said that students' learning activities will have a positive effect on their learning outcomes (Andira et al., 2022). Nevertheless, in this study, the use of e-modules could not significantly increase learning activities but 44.74%. In line with that, student learning activities will grow if learning is facilitated by appropriate teaching materials, a supportive environment and appropriate space for students.

Conclusion

The results showed that the use of e-module teaching materials can increase students' independent learning activities in natural science subjects with a percentage for visual 85.7%, verbal 52.3%, listening 38.1%, writing 47.6% and verbally Overall, there was an increase of 44.74% with the most activity criteria being moderate (3-5 activities). This is due to the density of activities at school so that children do not have time to repeat the lessons that have been taught. Student learning activities will grow if learning is facilitated by appropriate teaching materials, a supportive environment and appropriate space for students.

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