



# Development of E-module ESD Context Based on Flipped Classroom on Self-Awareness of Junior High School Students

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## Abstract

**Background:** Sustainable development has derivatives in the form of Education for Sustainable Development (ESD), one of the supporters of sustainable development. One of the competencies contained in ESD is self-awareness, which needs to be supplied to students. In terms of providing self-awareness to students in the field of Education, there needs to be appropriate media, one of which is e-modules. **Method:** This study aims to develop an e-module for the context of flipped classroom-based ESD on the self-awareness of junior high school students. The type of research is Research and Development using the development of the ADDIE model, with stages (1) Analysis, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation. The study subjects were 18 students of grade VIII A SMPN 1 Sukabumi. The instruments used in this study were validation sheets for material experts, media experts, and linguists, pretest and post-test questions, attitude scale sheets, and response sheets to determine the effectiveness of e-modules and self-awareness competencies in students. **Results:** From the results of this study, an analysis was obtained based on interviews that the e-module of the flipped classroom-based ESD context on the self-awareness of junior high school students so that the development of an e-module with validation results stated that the e-module was included in the very valid category with a percentage of 91.3%, testing the effectiveness of the calculation of the N-Gain value states that the e-module is in the medium category with an average N-Gain of 0.62, the attitude scale sheet states that students have high self-awareness competence, the positive attitude scale is at a percentage of 86.2% which is very good and the response test states that this e-module is suitable for use with a percentage of 93.63% Conclusion: Development of e-module using the ADDIE model is feasible to use for self-awareness in the learning process.

**Keywords:** E-module Development; ESD context; Self-Awareness Competence



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## Introduction

Sustainable Development Goals (SDGs) created by UNESCO (United Nations Educational, Scientific and Cultural Organization), is a program designed to realize the goals of achievement through Education (UNESCO, 2017). Several countries, including Indonesia, have agreed on sustainable development related to consumption and production levels based on responsibility. Sustainable development has 17 achievements that can support the success of sustainable development until 2030 (UNESCO, 2017).

Education for Sustainable Development (ESD) is an effort that supports the SDGs program in improving the quality of life of every individual to achieve sustainable development goals, one of which is through Education (UNESCO Education Sector, 2010). ESD is one of the educational movements aimed at enabling individuals to earn a living in environmental sustainability that can increase the possibility of a more sustainable future (Listiwati, 2011).

Education is a basis for illustrating the concept as an attempt to change human behavior towards the daily environment. This is consistent with the statements expressed (Mckeown et al., 2002), which is made clear by UNESCO (2005) that Education is a means to achieve goals in the Long term (SDGs). Ministry of National Education (2010), the concept of ESD as effective and functional Education and its objectives are to 1) development to be able to meet current needs without relying on resources for the future, 2) to have a better quality of life for every individual who lives in a better ecosystem carrying capacity, and 3) benefit every individual on earth related to humans and ecosystems now and in the future.

ESD also aims to develop the skills of individuals encouraged to carefully make decisions in their current and future social, economic, and environmental activities from a local, comprehensive, or global perspective (UNESCO, 2017). Just like the application of science in environments that have a relationship to environmental problems, this type of teaching and learning process that has a relationship environmental problems hopes that this type of teaching and learning process hopes that the learning process in schools will have a better experience and stimulation for students to think in the future and realize the nature of sustainable builders (self-awareness) (Sukini, 2019). The values contained in ESD are very good values when brought to the teaching and learning process. Segera (2015) stated that teaching the essence of sustainable development must be instilled in students from now on or from childhood so that students realize the nature of sustainability and support the preservation of the natural, social, and cultural environment.

UNESCO (2017) states that achieving the Sustainable Development Goals goals must be supported by one of the competencies, self-awareness competence. Things that can support, facilitate, and train quality thoughts, actions, and awareness in students are through Education, especially in Education for Sustainable Development (ESD). This self-awareness is the key to a person being able to fulfill his duties. This self-awareness is the belief that exists in a person to understand, accept, and control all possible future developments in life. Self-awareness is awareness to practice a sustainable lifestyle in living their lives so that sustainable development goals can be achieved (Amelia & Chandra, 2020). According to Fluereatin (2012), With the help of self-knowledge, a person seeks to know all aspects of life-related to his strengths and weaknesses. Understanding self-knowledge is a prerequisite that must be done before the start of an evaluation process to understand the character of others and have beliefs, attitudes, perceptions, or values. Suryati & Ika (2004) suggest that when we know ourselves better, we master ourselves with what we feel. The nature of self-awareness also helps manage all kinds of emotions.

Therefore, it is used to build social relationships and self-control to understand the needs in everyday life; therefore, there is an opportunity to achieve and resolve any conflict (Wafa et al., 2021). According to Yolanda et al. (2021), self-awareness is also useful for controlling various forms of feelings that can be used in various social interactions and individual control that can meet the daily needs to have a success rate in resolving various conflicts.

The teaching and learning process in the field of science based on ESD can train students to have a sustainability awareness attitude that can be viewed from various aspects, namely from their environment, socio-cultural, and economic life. Sustainability awareness must begin to be carried out on students from the start of sitting in school. This is done by students when thinking about improving their quality of life to be more sustainable and always protecting the environment, respecting cultural diversity, and developing an independent economy (Clarisa et al., 2020).

One of the efforts that can be made to facilitate the application of ESD in science subjects is to develop teaching materials that contain ESD. Students can use this ESD context teaching material as a learning resource in science class. Learning tools are an important element of teaching and learning activities. Learning tools in teaching and

learning facilitate and improve the teaching process (Budiastra, 2020). Learning media with good teaching materials and the times and circumstances of students can cause more fun learning and increase students' interest in learning. (Kurniawan & Syafriani, 2021). Continuous learning principles by ESD can be applied using learning media in the form of e-modules. Modules are teaching materials for independent study (Ministry of Education, 2018). The development of teaching materials is an important effort to improve the quality of learning to be more effective and efficient, train students to learn independently, and increase self-awareness competence (Setiyadi, 2017). Learning activities are influenced by himself with his motivation and desire to learn (Fatimah et al., 2013)

E-module is a teaching material modified to make it easier for students to access using a computer or mobile phone. Kimianti's research (2019) revealed that e-modules are appointed as shortcuts for effective and efficient learning tools used unlimitedly on everyday material. E-modules developed and used in this learning process can be effective because they are more interesting. In addition to efficiency, this e-module can optimize continuous learning because it can be used anywhere and anytime with the completeness of text, images, animations, and audio available. This e-module can make it easier for students to master the material because this e-module is easy to use and does not know distance or time (Suarsana & Mahayukti, 2013). Previous research has shown that using teaching media as e-modules in the learning process can improve student learning outcomes (Wenno, 2010).

Based on the results of interviews (observations) during the preliminary study, the school has never used teaching materials in the form of e-modules, and learning has not been directed at continuous learning to face the 21st century. In addition, the learning methods commonly used in science learning are lecture and discussion methods. Therefore, researchers developed teaching materials in e-modules in ESD based on flipped classrooms on the self-awareness of junior high school students.

The teaching and learning process uses the flipped classroom learning model to extend learning with technology beyond class time. There is a term called inverted class, a learning method using asynchronous, meaning it can be done indirectly and, synchronously or directly (Sams & Washington, 2012). A flipped classroom is one of the learning models where, in its implementation, the material is taught on the sidelines and the reverse task. The flipped classroom learning model has several advantages. According to Berrett (2012) includes: 1) students have more time to learn the material independently outside the classroom before the learning process is carried out, 2) students can understand subjects in a pleasant atmosphere during the process of receiving material, 3) students get the teacher's full attention when you have difficulty understanding tasks or exercises, 4) students can learn from various types of good learning content In addition, The teacher deepens or deepens the material that has not been understood during discussions or unanswered questions. According to Morar & Peterlicean (2012), the impact of increasing knowledge, expertise, motivation, and growing a sense of responsibility by utilizing natural resources through the participation of students in shifting issues of global problems.

## Methods

The research method used is quantitative. As for the type of research conducted using RnD (Research and Development) research and development, this type of research is based on the development of Dick and Carry 1996 or also called ADDIE (Analyze, Design, Development, Implementation, and Evaluation). The type of ADDIE research has five stages, including 1) Analysis (Preliminary Study to see product needs), 2) Design (Designing products to be tested), and 3) Development (The product is finished and will be assessed by experts). 4) Implementation (the product will be tested on samples), and 5) evaluation (the product will be seen for its usefulness and improvement). Self-awareness competency indicators used based on UNESCO (2017) include 1) being able to

present their role to the community and society, 2) being able to evaluate and motivate more deeply towards self-health, and 3) being able to handle one's feelings and desires.

**Sample or Participant**

This research was conducted on grade VIII students at SMPN 1 Sukabumi in the even semester of the 2022/2023 academic year. The subjects of this research and development are 18 students of grade VIII.

**Instrument**

The instruments used in this study are as follows: 1) knowing the feasibility or level of product validity made material, media, and language expert validation sheets, 2) the effectiveness of e-modules using effectiveness tests with the N-Gain score formula, 3) self-awareness competence is measured using attitude scales, and 4) user or student responses are measured using response sheets. Analysis of validity test data based on questionnaires given to experts and reference criteria for student responses. According to (Shobrina et al., 2020) namely:

$$\text{Validity Value} = \frac{\text{Average Score}}{\text{Highest Score}} \times 100\%$$

Validity criteria (%) with reference:

**Table 1.** Product Validity Criteria

Eligibility Value (%)	Criteria
0-20	Invalid
21-40	Less Valid
41-60	Quite Valid
61-80	Valid
81-100	Highly Valid

Based on Table 1. Products are declared in the valid category if the average obtained reaches 61-80% and in the very valid category when it is in the average of 81-100%. Analysis of effectiveness test data was carried out using Gain Score according to (Hake & Reece, 1999) with the following formula:

$$g = \frac{(Sf - Si)}{(St - Si)}$$

Information:

- g = Gain score
- Sf = Average post-test score
- Si = Average pretest Score
- St = Average ideal score

**Table 2.** N-Gain score calculation criteria

Average	Criteria
$g > 0,7$	High
$0,3 \leq g \leq 0,7$	Medium
$0 \leq g \leq 0,3$	Low
$g \leq 0$	Fail

Based on Table 2. E-module can be said to be effective in the medium category if the average value is  $0.3 \leq g \leq 0.7$  and high if the average value of  $g$  is  $> 0.7$ .

- a. Calculate the number of column scores.

The number of column scores is calculated under the following conditions:

**Table 3.** Attitude Scale Sheet Score

Item	SS	S	N	TS	STS
Attitude Scale	5	4	3	2	1

Information:

Statement

Number of scores = (number of learners answering SS x 5) + (number of learners answering S x 4) + (number of learners answering N x 3) + (number of learners answering TS x 2) + (number of learners answering STS x 1).

- b. Determine the percentage (%) of all student statements.

Based on Table 4. It is known that the attitude scale tested positive if at a percentage of 51%-75% good and at a percentage of 76%-100%, which is very good.

$$\%Score = \frac{\text{Number of Student scores}}{5 \times \text{Number of Student}} \times 100\%$$

**Table 4.** Attitude scale category

Percentage	Category
0%-25%	Very Not Good
26%-50%	Bad
51%-75%	Good
76%-100%	Excellent

### Data collection

Data collection was carried out in two different places. Expert validity test data was collected at the University of Muhammadiyah Sukabumi in May 2023 through three experts: material experts, media experts, and linguists. The second place was conducted at SMPN 1 Sukabumi to obtain results from product effectiveness, attitude scales, and responses in June 2023.

### Procedure

In the first stage, research was carried out by analyzing the need for media and looking at the level of self-awareness competence in students at SMPN 1 Sukabumi. This stage entered the analysis stage, the second stage. From the analysis results, the design process was carried out by looking at several aspects regarding the need for media, materials, and self-awareness competencies and then adjusted product design with the analysis results. This stage is called the design stage. In the third stage, expert validation tests are carried out using ready-made e-modules assessed by material experts, media experts, and linguists. If parts need improvement, they will be corrected before implementation. The fourth stage, an effectiveness test, is carried out by giving pretest and post-test questions to students during the implementation of learning. In addition to the pretest and post-test, an attitude scale sheet is also given to determine students' self-awareness competence. This stage is called the implementation stage. The fifth stage is giving students a response sheet to determine the product's usefulness.

### Data analysis

The data analysis technique carried out in this study used a validity test by three experts, namely material experts, media experts, and linguists. An effectiveness test was carried out for the e-module, which was carried out on products that had been developed to measure the success rate of the product—the self-awareness attitude scale using the

Likert scale for attitude measurement or assessment of questionnaires with predetermined criteria. The final stage uses responses to gauge whether or not the e-module is worth using.

**Result**

Data that have been taken from the learning process, namely, effectiveness tests, attitude scale assessments, and response tests given to students, produce the following data.

**Table 5.** Quantitative Data Acquisition Validation of Material Experts, Media Experts, and Linguists

No	Expert	Aspect	Score	Validity
1	Material Expert	Learning Material	82,6	Very Valid
2	Media Expert	Display	97,7	Very Valid
3	Linguists Expert	Linguists	89,4	Very Valid
<b>Average</b>			<b>89,9 ± 7,56</b>	<b>Very Valid</b>

The e-module used has been validated before being applied to students. The validation test on the e-module contains ten questions consisting of 3 aspects, namely aspects of learning material, appearance, and language. The data from the validation stage carried out by material experts, media experts, and linguists shows that the e-module is very valid for use.

**Table 6.** Acquisition of Effectiveness Test Results Data

No	Indicator	Pretest	Average Posttest	N-Gain
1	Able to present their role to the community and society	45,1	75	0,53
2	Able to evaluate and motivate more deeply toward self-health	43,1	75,7	0,57
3	Able to handle one's feelings and desires	44,4	73,6	0,50
<b>Average</b>		<b>44,2 ± 1,01</b>	<b>74,8 ± 1,07</b>	<b>0,53 ± 0,04</b>

Based on the results of the e-module effectiveness test that has been carried out with self-awareness competency indicators on 18 students with an average N-Gain score of 0.53.

**Table 7.** Recapitulation of Attitude Scale Assessment Results

No	Indicator	Average
1	Able to present their role to the community and society	83,9% ± 1,57
2	Able to evaluate and motivate more deeply toward self-health	87,2% ± 0,78
3	Able to handle one's feelings and desires	80,6% ± 2,92
<b>Average</b>		<b>83,9% ± 3,33</b>

Based on [Table 7](#) of the results of the attitude scale assessment above, indicator one obtained a percentage with an average of 83.9%; indicator 2 obtained a percentage with an average of 87.2%. Then, in indicator three, a percentage was obtained with an average of 80.6%. Based on the attitude scale category developed by [Sugiyono \(2016\)](#), 75%-100% is in the very good category. Self-awareness is a process or stage carried out by individuals to sort and choose their behavior and that of others so that a positive personality is formed in each individual ([Andrawan, 2016](#)). Self-understanding is a necessary condition before starting the process of understanding others.

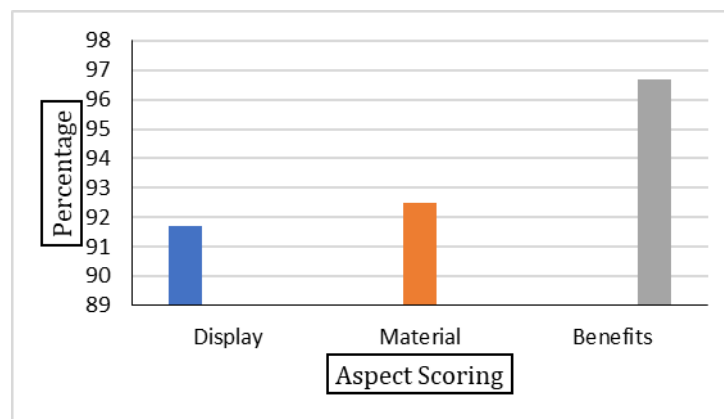
Furthermore, self-awareness needs to be possessed by every student, both in large and small domains. Self-awareness can be used to increase creativity, train intellectuals,

and develop a high tolerance for differences. Students are directed to have an attitude of empathy and sympathy, respect differences, and be able to understand individuals and their environment. Starting from the realm of family, Education, and society from early level education and universities, students can bridge various individual differences with their environment. Self-awareness falls into the attitudinal or affective domain, but its manifestation involves cognitive and psychomotor. The cognitive realm is directed so that each individual can understand the concept of himself and his environment. The psychomotor realm deals with the actions performed by the individual as an indicator that the individual already has self-awareness.

**Table 8.** Obtaining Student Responses

No	Aspect	Indicator	Average
1	Display	Able to present their role to the community and society	91,7 ± 3,43
2	Material	Able to evaluate and motivate more deeply toward self-health	92,5 ± 4,29
3	Benefits	Able to handle one's feelings and desires	96,7 ± 5,94
<b>Average</b>			<b>93,63 ± 2,69</b>

Based on Table 8. The average percentage was 93.63 from 18 students. In the display aspect, there is an average of 91.7%, the material's content aspect is 92.5%, the expediency aspect is 96.7%, with an overall average of 93.63%. The percentage of student responses is 75%-100%, with criteria worthy of use.



**Figure 1.** E-Module Eligibility

**Discussion**

The results of the development of learning media products with the development of the ADDIE model in the form of e-modules for Natural Sciences subjects in the excretory system material of class VIII even semesters at SMPN 1 Sukabumi were developed using online media in the form of e-modules and used in the online learning process. Students can access the link provided. When preparing the needs of e-modules tailored to KI and KD associated with ESD, the e-modules developed can train self-awareness.

E-module created in Figure 2. Regarding the cover or initial appearance of the e-module, then in Figure 3. The concept map contains the structure and function of the excretory system, diseases and disorders, and patterns of self-health. The validation results by learning material experts on the ESD context e-module with the ADDIE development model on the excretory system subject, which contains five aspects, obtained an average percentage of 82.6%, which means that the e-module made is very valid for use. Then, media experts gave a score to the e-module with an average percentage of 97.7%, which means that the e-module is very valid for use. Furthermore, the results of linguists' validation of the ESD context e-module with the ADDIE development model in Natural Sciences subjects excretory system material containing six

aspects were obtained on average a percentage of 89.4%, which means that the e-module is very valid.

The implementation results consist of an effectiveness test using pretest questions given before learning activities and post-test questions given after carrying out learning activities to know the effectiveness of products developed and validated by experts. Based on the results of self-awareness competence, indicator 1 obtained a percentage with an average of 83.9%, meaning that students can already represent their role in the community and society. Then, in indicator two, a percentage is obtained with an average of 87.2%, meaning that students can evaluate and motivate more deeply towards self-awareness, and in indicator three, a percentage is obtained with an average of 80.6%, meaning that students can handle feelings and one's desire so that an overall average of 83.9% is obtained. Therefore, students have self-awareness with very good criteria.

Based on the results of the response test questionnaire regarding the feasibility of the e-module using the Likert scale in the display results, a percentage result of 91.7% was obtained with a very valid category in the content of the material, a percentage of 92.5% was obtained, including in the very valid category, and the aspect of practicality, a percentage of 96.7% was obtained in the very valid category. It is produced from the questionnaire sheet of the acquisition response test with an average of 93.63% in the range of 75%-100% with very valid criteria for use in learning activities. This is by the assessment on expert validation, which states that this e-module is very valid for use.

The effectiveness test results on indicators 1-3 show the medium category, while on the attitude scale, indicators 1-3 show the very good category. So, students already have good self-awareness, but the use of e-modules is still in the medium category because students need time to adapt to new learning media in the form of e-modules that have not previously been applied in the school environment in the learning process.

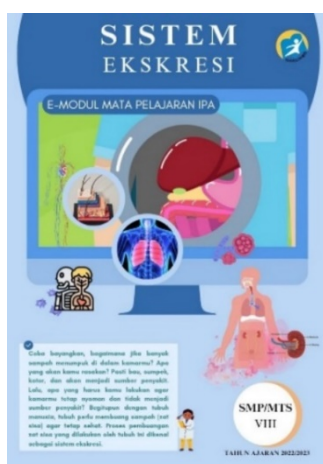


Figure 2. Cover E-module

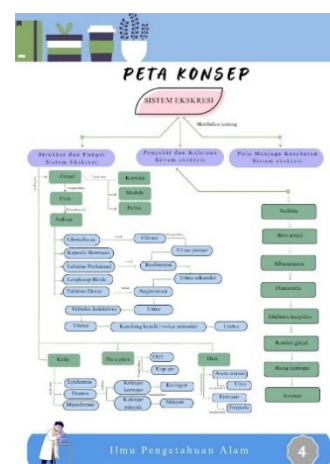


Figure 3. Mind Map

### Conclusions

Developing media in the form of an ESD context e-module based on flipped classrooms to determine the self-awareness of junior high school students that the development of this e-module is included in the very valid criteria for use, which is 89.9% at that percentage by the results of the three expert validations. Then, the effectiveness test results on using an e-module are included in the medium criteria with a percentage with a value range of 93.63%. The attitude scale questionnaire using the Likert scale obtained very good results. Therefore, students already have self-awareness competence. This can be proven in the results of student responses using response sheets that produce ESD context e-modules with very feasible and tested categories that already have a very suitable category for use in learning.



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## Declaration statement

The authors reported no potential conflict of interest

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