



## Development of Illustrator Software Assisted Clothes Design Learning E-Module for Vocational School Fashion Design Program

Dwi Kurnia Yunita<sup>1✉</sup>, Dwi Widjanarko<sup>2</sup>, Rodia Syamwil<sup>2</sup>

<sup>1</sup>SMK N 3 Kudus, Indonesia

<sup>2</sup>Pascasarjana, Universitas Negeri Semarang, Indonesia

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### Abstract

E-module learning media is learning media that provides innovation which can include videos, animations, and images in it using a Flipbook Maker application. The e-module learning media in this study were compiled using Adobe Illustrator software, while the purpose of creating e-module media is to help students better understand the contents of the material in it. The research aims to develop an e-module for learning clothes design assisted by the illustrator application software for eleventh grade students of Fashion Design Program at SMK Negeri 3 Kudus to improve learning outcomes.

The data analysis used in the present study was to determine the feasibility level of the interactive clothes design e-module; to determine the level of practicality of the interactive clothes design e-module, and to determine the effectiveness of the e-module to improve learning outcomes. Based on the feasibility test and the effectiveness test of the clothes design e-module which was developed and the responses given by media experts and material experts, namely senior teachers and academics (lecturers), the e-module obtained very feasible response criteria, from the practicality test, it obtained very practical criteria, and from the effectiveness test in the experimental class, the criteria are quite effective and significantly used by students to improve student learning outcomes.

✉ Correspondence:  
Jl. Babalan - Prawoto, Getas, Kalirejo, Kec. Undaan, Kabupaten Kudus,  
Jawa Tengah, Indonesia 59372  
E-mail: [dwikurnia.yunita@gmail.com](mailto:dwikurnia.yunita@gmail.com)

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## INTRODUCTION

Education plays an important role in improving the quality of human resources through the rapid development of science and technology. Based on Law no. 20 of 2003 concerning the national education system, education is a conscious and planned effort to create learning atmosphere and learning process so that students can actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and good skills which are needed by themselves, society, nation, and state.

Based on observations that were carried out directly on eleventh grade students of the Fashion Design Program, the media used so far in learning clothing design are job sheets and whiteboards. The ability of students to understand job sheets varies greatly, so the students cannot understand the material introduced by teacher properly. The teacher still uses the learning media, but due to the limitations of the media used, the media used to learn clothing design is less attractive, so the material is not as expected. Learning design is still manual rather than using a computer. In the 2018 revised 2013 curriculum, the clothing design subject listed Basic Competency (KD) for designing clothes digitally, one of which is KD 4.11, making a women's party dress design with manual and digital illustration proportions. KD designing clothes digitally has not been implemented due to a lack of willingness, knowledge, and teachers' lack of skill in managing learning, teachers also do not utilize technology-based media as a form of achieving learning objectives.

Based on interviews with teachers of clothing design subjects, it shows that women's clothing design practice subjects are usually taught in eleventh grade. Before taking this subject, students must pass the clothing design subject in tenth grade. It is expected that students will more easily master the competency of making women's clothing designs with better design results. However, based on score of clothing design subjects from 2018-2019, it shows that the scores of clothing design subjects for eleventh grade students on average 60% of 105 students can achieve the specified Minimum Completeness

Criteria (KKM), that is 75 and 40 % of 105 students have not reached the KKM. Indeed, 60% of students have reached the KKM limit, but the average student score is only slightly different from the specified KKM limit, which is in the range of 75-78. This is not in accordance with the expectations of the teacher. Based on the results of observations and interviews conducted, the problem is that the learning media used by the teacher is less complete, systematic, clear, interesting and accurate, students' KKM scores cannot be achieved, so students are able to learn and master the provided material.

The background of choosing to develop a clothing design learning e-module assisted by Adobe Illustrator software in the fashion design study program can significantly increase learning outcomes between those tested using the e-module learning media for clothing design assisted by Adobe Illustrator software and those who do not use the e-module learning media clothing design with the help of Adobe Illustrator software for eleventh grade students of Fashion Design study program at SMK N 3 Kudus. The product to be developed in this study is in the form of e-module learning media in the form of flipbooks in clothing design subject which is expected to improve student learning outcomes. The purpose of this research is to develop an e-module for learning clothing design assisted by Adobe Illustrator software for fashion study program which can significantly increase learning outcomes.

## METHOD

This study uses the Research and Development (R&D) research method by adapting the ADDIE research and development model. It is selected because in the development model there is an evaluation that aims to determine the knowledge competence of students before and after using the developed media. ADDIE is an instructional design model that is applicable to all types of education and even though ADDIE comprises the components of all other design models, it is a relatively simple model (Spatioti, Kazanidis, and Pange 2022).

The applied stages applied are the following:

1. Analysis Stage

The main activities are analyzing the needs of developing e-modules, analyzing learning components, analyzing learning outcomes and analyzing the environment. The development of the e-module begins with a problem in the e-module that has been implemented. Problems can occur because existing modules are no longer relevant to target needs, learning environment, technology, student characteristics, etc. (Mulyanitingsih, 2016).

2. Design Stage

The design of this e-module is still conceptual and will underlie the development process in the stage. E-module planning in the form of (1) material design, namely the research design for the development of e-module learning media based on Illustrator software in flipbook form; (2) media design, it covers the activity of compiling an outline of media content and making learning media designs.

3. Development Stage

At this stage, the previous learning media in the form of conventional modules were then developed into illustrator software-based e-modules in the form of flipbooks developed to encourage understanding of clothing design, then validated by learning material experts and learning media experts to get input and suggestions in development and product improvement in the form of e-modules before being tested on students.

4. Implementation Stage

This stage is the stage of using the e-module learning media with the help of the illustrator software in the form of a flipbook to be applied. Products that have been declared fit for testing by media experts and material experts are then tested on students. First, trials were carried out on students to obtain valid criteria.

5. Evaluation Stage

The evaluation stages are divided into 2 evaluations, namely formative evaluation and summative evaluation. Formative evaluation is related to media feasibility tests and summative evaluation is related to experimental design and media effectiveness testing. In the evaluation stage, the data obtained is analyzed to find out the deficiencies of the e-module media to be made, the evaluation results are in the form of suggestions

and input. The following is a product development flowchart.

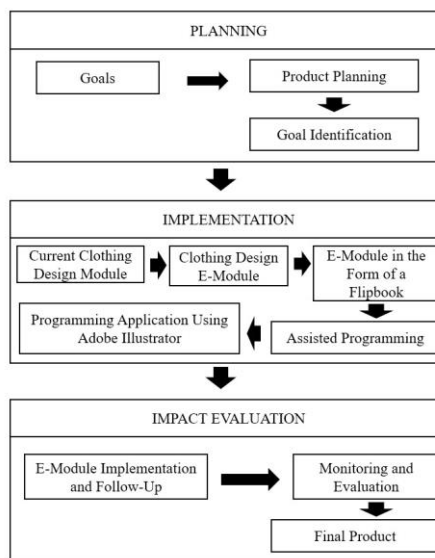


Figure 1. Product Development Flowchart

The instruments used in this study were (a) an e-module assessment sheet for learning clothing design assisted by Adobe Illustrator software; (b) the learning outcomes instrument from the use of the e-module for learning clothing design assisted by Adobe Illustrator software.

Data collection techniques in this study are described as follows:

Table 1. Data Collection Techniques

Data Types	Methods	Data source
Feasibility test	E-module	2 media experts and 2 material experts
	Assessment Instrument	
Practicality Test	E-module	3 teachers of fashion design and 30 students of XI fashion design 2 SMK N 3 Kudus
	Assessment Instrument	
Effectiveness Test	Question Items	Students XI Fashion Design 1 and Fashion Design 3 SMK N 3 Kudus

1. Instrument Validity and Reliability Test

To determine the validity and reliability or condition of the scale used in the present study, it is necessary to conduct prior testing of the instrument items used.

a) Test the Validity and Reliability of the Feasibility Assessment Sheet Instrument for the e-module for learning clothing design assisted by Adobe Illustrator software.

(1) Validity

Validity with the type of answer in the form of Likert scale scoring, the formula for calculating the CVR instrument for the feasibility assessment sheet of the electronic journal is as follows.

$$CVR=(2ne/n)-1$$

Description:

CVR = Content Validity Ratio

ne = Number of validation experts who provided scoring (important/relevant)

n = The number of all validating experts

(Source: Tuherni, et al 2019)

(2) Reliability

The formula of the Cohen's Kappa coefficient is

$$K = \frac{\sum_{i=1}^I \pi_{ii} - \sum_{i=1}^I \pi_{i+} \pi_{+i}}{1 - \sum_{i=1}^I \pi_{i+} \pi_{+i}}$$

$\sum_{i=1}^I p_{ii}$  = The total proportion of the main diagonal of the observation frequency.

$\sum_{i=1}^I p_{i+} p_{+i}$  = The total marginal total proportion of the observation frequency.

**Table 2.** Kappa Statistical Value Evaluation

Kappa	Interpretation
< 0	Poor agreement
0.0 – 0.20	Slight agreement
0.21 – 0.40	Fair agreement
0.41 – 0.60	Moderate agreement
0.61 – 0.80	Substantial agreement
0.81 – 1.00	Almost perfect agreement

Source: Pérez, at all. (2020)

b) Test the Validity and Reliability of the Practicality Assessment Sheet Instrument for Electronic Journals

(1) Validity

The formula for calculating the biserial point correlation coefficient instrument practicality assessment sheet of the journal is as follows:

$$rpbi = \frac{Mp - Mq}{St} \sqrt{pq}$$

Description:

rpbi= biserial point correlation coefficient;

Mp= the number of respondents who answered correctly;

Mq= the number of respondents who answered incorrectly;

St= standard deviation for all items;

p= the proportion of respondents who answered correctly;

q= the proportion of respondents who answered incorrectly.

(Nurbaiti. 2020)

(2) Reliability

Reliability is used to show that a questionnaire can be trusted to be used as a data collection tool because the practicality of the questionnaire is good. The formula used is as follows:

$$KR_{20} = \left( \frac{n}{n-1} \right) \left( \frac{St^2 - \sum pq}{St^2} \right)$$

Description:

KR20 = overall test reliability;

p = the proportion of subjects who answered the item correctly;

q = the proportion of subjects who answered the item incorrectly;

$\sum pq$  = the number of products multiplied between p and q;

n = number of items;

St2 = Standard deviation of the test (standard deviation is the root of the variance).

Meanwhile, the variance formula used to calculate reliability is as follows:

$$St^2 = \frac{\sum x^2 - \frac{(\sum x)^2}{N}}{N}$$

Description:

St2 = The variance is always written as a square, because the standard deviation is squared;

$(\sum x)^2$  = The square of the total score obtained by students;

$\sum x^2$  = The sum of the squared scores obtained by students;

N = The number of test takers.

Source: (Matondang, 2009)

**Table 3.** Classification of Reliability Scores

Reliability Index	Response	Criteria
<0.2		Very low
0.2-0.4		Low
0.4-0.5		Fair
0.5-0.8		High
0.8-1		Very high

1. Categorical Feasibility of E-Module

Calculates the overall average score and each aspect with a formula:

$$\bar{x} = (\sum X)/n$$

Description:

$\bar{x}$  = Average Score,

$\sum X$  = Total Score,

N = Number of Indicators

**Table 4.** Criteria for Converting Scores to a Scale of Five

Score	Formula	Range	Classification
5	$\geq X + 1.8 S$	4.21 – 5.00	Very Feasible
4	$X + 0.6 S \leq < X + 1.8 S$	3.41 – 4.20	Feasible
3	$X - 0.6 S \leq < X + 0.6 S$	2.61 – 3.40	Less Feasible
2	$X - 1.8 S \leq < X - 0.6 S$	1.81 – 2.60	Not Feasible
1	$< X - 1.8 S$	0 – 1.80	Not Very Feasible

2. E-Module Practicality Category

The data from the analysis of the practicality of the media in the form of a questionnaire on the results of the student validator's data, then calculated the score of the reproducibility coefficient (Kr) and the scalability coefficient (Ks) to determine whether each aspect is practical with the following formula:

$$Kr = 1 - \frac{e}{n}$$

Description:

Kr = Reproducibility coefficient

e = Number of errors = 0

n = Number of questions x number of respondents  
= 10 x 2 = 20

Once Kr is known, the scalability coefficient (Ks) is calculated using the following formula:

$$Ks = 1 - \frac{e}{k}$$

Description

Ks = Scalability coefficient

e = Number of errors = 0

k = The expected number of errors or  $c(n - T_n)$  and c is the probability of getting the correct answer. Because the answer is "Yes" "No" c = 0.5

In order to interpret qualitatively the average score of the questionnaire (%) practicality test of the whole media and each aspect. The following criteria are used.

**Table 5.** Practicality Test Scoring Data by Teachers and Students

No	Practicality Score (%)	Classification
1	75 – 100	Very practical
2	50 – 75	Practical
3	25 – 50	Less practical
4	0 – 25	Not practical

3. E-module Effectiveness Analysis

The obtained data then tested using normality and homogeneity tests, after it is known that the data is normally distributed and homogeneous, the next step is to determine the N-Gain of the data to determine the effectiveness of the journal. The final step is to test the N-Gain using an independent test T-test to determine whether the average N-Gain is significant for the experimental class and the control class.

Calculation of the normalized gain score (N-Gain) can be expressed in the following formula:

$$N - Gain = \frac{\text{Post Test Score} - \text{Pre Test Score}}{\text{Ideal Score} - \text{Pre Test Score}}$$

The N-Gain score grouping category can be determined based on the N-Gain score in the form (%) as follows:

**Table 6.** N-Gain Score Category

N-Gain Score	Category
$g > 0.7$	High
$0.3 \leq g \leq 0.7$	Medium
$g \leq 0.3$	Low

The N-Gain score category (%) will later be interpreted into several categories according to the following criteria.

**Table 7.** N-Gain Score Interpretation

Percentage (%)	Interpretation	Group
<40	Ineffective	1
40-55	Less effective	2
56-75	Effective enough	3
>76	Effective	4

The T test independent test is as follows.

$$T_{\text{count}} = \frac{X_1 - X_2}{\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \left( \frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

Description:

$X_i$ : the average score of group  $i$

$N_i$ : number of respondents of group  $i$

$s_i^2$ : Score variance of group  $i$

With the provision that if the  $t_{\text{count}}$  is higher than  $t_{\text{table}}$  then there is a significant difference between the two data, in other words the e-module increases learning outcomes. If  $t_{\text{count}}$  is smaller than  $t_{\text{table}}$  then there is no significant difference between the two data.

## RESULT AND DISCUSSION

### 1. Implementation of Development with the ADDIE Model

#### a) Analysis

At this stage, what is done is to analyze the need for e-module development, analyze the feasibility and requirements for e-module development such as (1) analyzing the need for e-module development, before analyzing the need for developing e-modules used in the field, first there have been students problems with the e-module that was currently being used; (2) analyzing learning components, after analyzing the needs, the next step is to analyze the learning components; (3) Analyzing learning outcomes, based on results of observations on learning outcomes, it can concluded some of the characteristics of students in mastering the competencies of clothing design subjects; (4)

Environmental analysis, the results of observations on environmental analysis, it can be concluded that several facilities and infrastructure support the development of the e-module for learning clothing design.

#### b) Design

The second stage of the ADDIE development model is the design or planning stage. The design stage is carried out to make it easier to design the media to be built. The design stage includes material design and media design. (1) Material design, research design for the development of e-module learning media based on Illustrator software in the form of flipbooks on clothing design material; (2) Media design, including compiling an outline of media content and designing instructional media, which includes the initial appearance of the e-module, preface, table of contents, instructions for using the e-module, position map of the e-module;

#### c) Development

The third stage of the ADDIE development model is the development stage. This stage aims to see how far the feasibility of the media that has been designed. As the follow-up to the design that has been carried out in the design stage, the following development steps are carried out: (1) validation by learning media experts, this stage is carried out to determine the feasibility of the media being developed; (2) material expert validation, this stage is carried out to determine the feasibility of the material being developed. The material feasibility test is carried out to obtain suggestions and input from the validator on the product being developed. It was evidenced by the results of filling in the validity instrument which shows the feasibility of the material to be used in the present study.

#### d) Implementation

The fourth stage of the research and development of the ADDIE model is the implementation or application stage. (1) pre-test in the experimental class and control class, the first application stage is giving pre-test in the experimental class and control class which aims to determine the initial state of the respondents before being given treatment; (2) conditioning, the conditioning stage in this study the conditioning of the respondents (experimental class and control class) after being given a pre-test. The conditioning

of these respondents was to provide treatment in the form of using the e-module media for clothing design learning assisted by Adobe Illustrator software currently being developed for students of class XI TB 1 after being given a pre-test as the experimental group. Students of class XI TB 3 served as the control group in this study was not given treatment in the form of providing e-module learning media for clothing design assisted by Adobe Illustrator software; (3) posttest in the experimental class and control class, the final stage in testing the effectiveness of the e-module learning fashion design media assisted by Adobe Illustrator software is to give a post test.

#### e) Evaluation

The last stage in this research and development is the evaluation stage, at this stage improvements will be made to a better system by processing the data that has been obtained from the previous stages. This evaluation is carried out after the four previous stages in the ADDIE model have been completed. (1) This formative evaluation stage aims to determine the feasibility of the media being made and to find out how far the e-module that is designed can take place, as well as identify obstacles, by knowing the obstacles and things that cause the e-module to not run smoothly, early decision making can be made for the improvements that support the smooth achievement of research objectives (Sulistyaningrum, Wibawanto, and Purwanti. (2022). (2) This summative evaluation stage aims to determine the effectiveness of the use of the e-module for clothing design learning media assisted by Adobe Illustrator software. Summative evaluation leads to a decision regarding the statement of achievement of the e-module learning media for clothing design assisted by Adobe Illustrator software to improve learning outcomes (Setyawan, Rubai, and Yudiono. 2021). Summative evaluation is also used to determine the continuation of research, stopping or continuing research, adoption and so on.

#### 2. E-Module Feasibility Assessment Sheet

The e-module feasibility assessment sheet instrument in this study adopted the BSNP questionnaire which has proven its validity so there is no need to test the response items again.

**Table 8.** Overall Scoring Data on Each Aspect of the Validator

Criteria	Average	Category
Graphic Feasibility Aspects	4.38	Very Feasible
Content Feasibility Aspects	4.40	Very Feasible
Presentation Feasibility Aspects	4.30	Very Feasible
Language Feasibility Aspects	4.20	Feasible
Contextual Assessment Aspects	4.00	Feasible
$\bar{x}$ Expert Overall Average	4.26	Very Feasible

Based on the data above, it can be seen that the overall average is 4.26 with very feasible criteria, thus the clothing design e-module assisted by the Adobe Illustrator application is declared to be valid and very feasible. Based on the results of this validation, it can be concluded that the clothing design e-module assisted by the Adobe Illustrator application is valid with revisions and does not require significant overhaul and is suitable for use as an e-module for clothing design subjects.

#### 3. E-Module Practicality Test

This stage is carried out to determine the practicality of the developed e-module. The practicality test of the clothing design e-module assisted by the Adobe Illustrator application was carried out by 3 clothing design subject teachers and 30 students to obtain evidence from the results of filling in the response instrument which showed that practical e-modules were used in the present study.

**Table 9.** Data Analysis of Practicality Test by Teachers and Students

Response Indicator	Average (%)	Category
Interest	92	Very Practical
Material	98	Very Practical
Language	94	Very Practical
Competence	90	Very Practical
$\bar{x}$ Rata-rata	93	Very Practical

Based on these results (93%), because the overall average score when matched with the tabulation in table 3.22, user responses are between 75% -100%, which means the practicality of this e-module media with very practical criteria.

4. E-Module Effectiveness Test

The results of the normality test for the pre-test and post-test data for the experimental class and the control class are as follows:

**Table 10.** E-Module Effectiveness Instrument Normality Test

Class		Sig. Kolmogorov-Smirnova	Sig. Shapiro-Wilk
Pre Test	Experiment	.190	.139
	Control	.136	.101
Post Test	Experiment	.166	.109
	Control	.082	.091

Based on the table above, the results of the normality test for the competence of graduate students have a significance score (Sig.) as in the table, which shows a score of Sig. > 0.05, it can be concluded that the data is normally distributed.

The results of the homogeneity test of the experimental class and the control class are in the following table

**Table 11.** E-module Effectiveness Instrument Homogeneity Test

Class		Levene Statistic	Sig.
Pre Test	Based on Mean	1.469	.230
	Based on Median	1.295	.260
	Based on Median and with adjusted df	1.295	.260
	Based on trimmed mean	1.451	.233
Post Test	Based on Mean	2.217	.142
	Based on Median	1.841	.180
	Based on Median and with adjusted df	1.841	.180
	Based on trimmed mean	2.186	.145

Based on the table above, the homogeneity test on the Pre-Test based of mean shows a significant 0.230, which means data > 0.05, so it can be concluded that the data is homogeneous.

The score on the Post Test based of mean shows a significant 0.142, which means data > 0.05, so it can be concluded that the data is homogeneous.

The results of the calculation of the N-Gain test with the help of the SPSS 23.0 program score in the form of a percentage (%) are in the N-Gain Score Test Output Table in the attachment. The output results are summarized in the following table:

**Table 12.** Journal Effectiveness Questionnaire N-Gain Score Test

Data	Experiment Class	Data	Control Class
	N-Gain Score (%)		N-Gain Score (%)
Average	70.29	Rata-rata	36.33
Minimum	46.00	Minimum	8.89
Maximum	92.19	Maximum	64.06

Based on the results of the calculation of the N-Gain score test, it shows that the average N-Gain score for the experimental class is 70.29 or 70% with a minimum N-gain score of 46% and a maximum N-gain score of 92%. Meanwhile for the control class it was 36.33 or 36% with a minimum score of 9% and a maximum N-gain score of 64%.

The results of the T Pre Test and Post Test for the following experimental and control classes:

**Table 13.** Results of the T Pre Test for Control and Experiment Classes

Data	Levene Statistic	T test	Significance Level
N-Gain Percentage	0.189	10.781	0.000

Based on the output table above, it is known that the significance score (Sig) on Levene's Test for Equality of Variances is 0.189 > 0.05, it can be concluded that the variance of the N-Gain data (%) for the experimental class and control class is the same or homogeneous. Based on the calculation results, the value of T count N-Gain Percentage = 10.781 with a T table score at (df(n-k) = 32; a = 5%) is 1.69389. Because T count is greater than T table, it can be concluded that before being given treatment using the clothing design e-module assisted by the Adobe Illustrator application for class XI Fashion Design 1 study program and class XI Fashion Design study program 3 SMK N 3



Kudus, the condition of the two classes is almost the same.

## CONCLUSIONS AND SUGGESTIONS

The final product of the development of clothing design e-module media with the help of the Adobe Illustrator application uses R&D development using the ADDIE model. The results of the feasibility test, after the average score had been counted, the e-module media validation results got an average score of 4.26 with very feasible criteria. Practicality test in the present study after the average score had been counted, got a score of 93% with very practical criteria.

Effectiveness test of the e-module media for clothing design with the help of the Adobe Illustrator application, based on data analysis that begins with the prerequisite analysis test first, the test results are obtained using SPSS version 23. It can be concluded that the experimental class and control class are normally distributed and the same or homogeneous. After doing analysis prerequisite testing, data analysis was carried out by carrying out the N-gain test to determine the effectiveness of the clothing design e-module media assisted by the Adobe Illustrator application, obtained an average N-gain score for the experimental class of 70%, while the average N-gain score control class 36%. After obtaining the N-gain percent score, before the t test is carried out, the N-gain score is tested once again using the normality and homogeneity tests, where the results have a minimum error rate for educational and social research standards of 5%, so the value of the test results normality and homogeneity must be  $> 0.05$ , after being proven to be normal and homogeneous, then an independent sample t test is tested to determine the significance of the clothing design e-module using the Adobe Illustrator application and a value of  $0.189 > 0.05$  is obtained. It can be concluded that the variance of the experimental class data and the control class are the same or homogeneous, while based on the significance of  $0.000 < 0.05$ , it can be concluded that there is a significant (real) difference in effectiveness between learning using the clothing design e-module assisted by the Adobe Illustrator application and conventional methods to improve learning outcomes in the subject of clothing design

grade XI TB SMK N 3 Kudus academic year of 2022-2023.

After conducting a series of tests, it was concluded that the clothing design e-module media assisted by the Adobe Illustrator application has become the final product, at the validation stage of media experts and material experts it can be concluded that it is very feasible to be used by students to improve learning outcomes. On the N-test gain, it was concluded that the e-module media fashion design assisted by the Adobe Illustrator application was quite effective to be used by students to improve learning outcomes. On the t test, it was obtained the conclusion that the clothing design e-module assisted by the Adobe Illustrator application was significantly used by students to improve learning outcomes.

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