Case-Based Interactive E-Module: an Alternative Supplement to Increase Student Learning Motivation

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A B S T R A K

Pembelajaran dirancang untuk meningkatkan partisipasi mahasiswa dalam proses pmeblajaran dengan menghadirkan permasalahan yang nyara untuk dipecahkan oleeh mahasiswa. Penelitian ini bertujuan untuk mengidentifikasi kelayakan dan keefektifan penggunaan e-module interaktif berbasis case method dalam meningkatkan motivasi belajar mahasiswa. Jenis penelitian ini yaitu pengembangan. Metode yang digunakan dalam mengembangkan produk yaitu ADDIE. Teknik pengumpulan data menggunakan angket, wawancara, observasi dan hasil pretest-postest. Instrumen yang digunakan untuk mengumpulkan data yaitu kuesioner. Teknik analisis data menggunakan statistik parametrik dengan uji paired sample t-test dan independent t-test. Hasil penilaian oleh ahli menunjukkan bahwa e-module interaktif berbasis case method layak digunakan dalam proses pembelajaran. Berdasarkan hasil uji statistik, menunjukkan bahwa H1 diterima, sehingga terdapat perbedaan yang signifikan rata-rata motivasi belajar mahasiswa antara kelas eksperimen dan kelas kontrol. Dengan demikian, e-module interaktif berbasis case method terkonfirmasi efektif digunakan dalam pembelajaran Ekonomi Mikro dan dapat dikembangkan untuk mata kuliah lain dengan beberapa penyesuaian teknis.

A B S T R A C T

Learning is designed to increase student participation in the learning process by presenting real problems to be solved by students. This study aims to identify the feasibility and effectiveness of using an interactive e-module based on the case method in increasing student learning motivation. This type of research is development. The method used in developing the product is ADDIE. Data collection techniques using questionnaires, interviews, observation, and pretest-posttest results. The instrument used to collect data is a questionnaire. Data analysis techniques using parametric statistics with paired sample t-test and independent t-test. The assessment results by experts show that the interactive e-module based on the case method is feasible to use in the learning process. The results of statistical tests show that H1 is accepted, so there is a significant difference in the average student learning motivation between the experimental and control classes. Thus, the case method-based interactive e-module has been confirmed to be effective in teaching Microeconomics and can be developed for other courses with some technical adjustments.

1.   INTRODUCTION

The digital era has a big influence on changing the pattern of human life. Changes that are clearly visible are technological advances which are marked by changes in the need for skills and qualifications for individual needs, especially in the field of education. The education system has undergone significant changes, especially in the learning process (Gayatri, 2020; Sindiani et al., 2020; Sumardi et al., 2021). The application of digital technology in the learning process requires educators to adapt quickly. Mastery of technology can facilitate and encourage learning to be given to students (Archer et al., 2014; Chauhan, 2017; Scherer et al., 2020). It will spur creativity and innovation in the world of education, especially in learning (Ivanović et al., 2018; Muhtadi et al., 2018; Times, 2015).

In line with increasingly advanced digital developments, the world of Health and education is faced with the COVID-19 pandemic situation which is a problem for people around the world (Cahyawati & Gunarto, 2020; Meng et al., 2020; Toquero, 2020). This has disrupted the education sector which is an important determinant of a country's future (Jena, 2020). To break the chain of virus spread, governments around the world make policies to maintain physical distance (Bennardo et al., 2020; Quinn et al., 2020). The policy is considered effective in reducing the spread of COVID-19 (Amir et al., 2020). The impact of this policy on education is that the learning process is carried out online. Online learning is learning that uses the internet network with accessibility, connectivity, and flexibility (Elzainy et al., 2020; Kristanto et al., 2021). The research found an impressive fact in

Chinese middle schools, including: first, online classes improved students' performance in their exam session during the pandemic; second, online videos produced by high quality teachers has a positive impact on students' exam score; and third, almost all students, except the extraordinary ones, performed better in online learning (Clark et al., 2021).

However, the findings in Clark's study seems like just one of the few success stories during the pandemic. In many countries, the bitter fact shows that although balanced with technological developments, online learning models are something new among educators (Rigianti, 2020). This of course raises new problems where students and educators are not accustomed to online learning and also lack of mastery of technology (Aisyah & Kurniawan, 2021; Widodo & Nursaptini, 2020). Another problem is the availability of learning support infrastructure such as laptops, smartphones and internet quotas as the main key in accessing learning, especially if there are students who are in the lower classes (Asmuni, 2020; Fikri et al., 2021). In addition, it is difficult to choose the media used as a source of the online learning process. During the pandemic, learning loss is global and significant (Chen et al., 2021). Similar phenomena happen in Microeconomic classes in Faculty of Economics, Universitas Negeri Semarang. Reduction in studying time (Gr & Lipps, 2021), academic inequalities (Goudeau et al., 2021), inappropriate learning models (Yuliansyah & Mutiara Ayu, 2021) are experienced by students and lecturers. These obstacles seem to erode students' learning motivation. Based on the observation, many students tend to be less active during online classes, have a poor performance during presentation sessions, and give minimum effort in their assignments.

Efforts are being made to strengthen digital literacy for educators as an effort to develop knowledge in mastering digital technology. In addition to strengthening digital literacy, it is necessary to develop innovation in the learning process. One form of learning innovation is the development of teaching materials in the form of digital or electronic modules that can facilitate students in the learning process. E-Modules or electronic modules present independent teaching materials that are systematically arranged into the smallest learning units that are presented digitally and electronically (Cahyaningrum & Jaenudin, 2021; Nisa et al., 2020; Rahayu & Sukardi, 2021). The effectivity of interactive e-module has been studied several times in many diciplines (Erna, Anwar, et al., 2021; Rahmatsyah & Dwiningsih, 2021; Sari & Manuaba, 2021). However, most of studies developing this kind of e-module are concerning in math, biology and other typical science disciplines. The study about developing interactive e-module in social science, especially in Microeconomics is very limited. Therefore, the novelty of this study lies in the developed subject, which is Microeconomics for students of higher education institutions.

The development of an interactive e-module based on the case method is expected to increase student learning motivation and increase understanding of the material provided. By presenting various innovations in modules such as learning videos, and learning evaluations, the development of this e-module is also equipped with games that train case solving skills. This is what distinguishes the previous module which only focused on emphasizing the material without any additional features in it. This research can be a solution to the obstacles of online learning and innovation in similar research, especially in microeconomics courses. Furthermore, the e-module will be equipped with learning evaluations in the form of case studies and practice questions as well as interactive games that can train students' critical thinking skills. The application of the case method to this e-module is in accordance with the Decree of the Minister of Education and Culture Number 754/P/2020. Based on the results of research stated that there is a positive effect on the case method in increasing higher-order thinking skills, deeper learning, improving communication, the ability to ask questions and diagnose situations (Bergland et al., 2006; Noblitt et al., 2010).

This first objective of this study is to examine the feasibility of developed interactive e-module in Microeconomics by measuring the pre-test and post-test score in control class and experiment class of research subject. The second objective is to identify the effectiveness of the use of e-module based on the case method to increase students' learning motivation based on experts' evaluation and systematic judgment. This research can be a solution to the obstacles of online learning and innovation in similar research, especially in microeconomics courses. The development of e-modules based on the case method is a positive response to the needs of students in 21st century learning as an effort to improve digital literacy and higher order thinking skills.

2. METHOD

The type of this study is development research using ADDIE model. Technically, this model was used to build feasible and effective electronic module for learning Microeconomics digitally using integrative learning media. The ADDIE stands for Analysis, Design, Development or Production, Implementation or Delivery and Evaluation which was developed by (Dick & Carey, 1996). This model is versatile, simple and consistent, therefore it is possible to gain a valid result within a semester (Ryazanova et al., 2021). The detail steps in implementing ADDIE during this study is explained in Table 1.

Table 1. Implementation of ADDIE Model for Building Case-Based Interactive E-Module

Design Stage	Educational Outcome
Analysis	Researchers conducted both needs and curriculum analysis resulting in defining the research problem which has been the product development of cas-based interactive e-module.
Design	Researchers created development instruments, including: learning objectives, e-module draft design, e-module material flow, validation and evaluation instruments.
Development	Researchers designed e-module using Autoplay Media Studio 8, consulted to experts (material and media experts, and learning practitioner); conducted a quasi-experiment, analyzed the result and evaluated it.
Implementation	Researchers tested the module and analyzed the effectivity of it in increasing students' learning motivation.
Evaluation	Evaluating individual modules and the entire course, making edits, and getting feedback.

The research and development carried out is based on a preliminary study of students of the Department of Economics Education, especially those who are taking microeconomics courses through interviews with lecturers and students as well as observing the collection of information to develop an interactive e-module based on a case method. After the e-module draft is compiled, an evaluation is carried out by experts including media and material experts and practitioner to obtain an assessment of the case method-based interactive e-module that has been developed. The expert's assessment of the interactive e-module based on the case method was analyzed descriptively quantitatively to judge the validation. Validation is a process to test the suitability of the e-module with the competencies that are the learning targets (Daryanto, 2011). The score obtained based on the assessment of the experts is converted into a range of values, which is very good (75% < score < 100%) with appropriate information without revision, good (50% < score <75%) with appropriate information without revised, sufficient (25% < score < 50%) with less appropriate information, not good (0% < score < 25%) with inappropriate information (Riduwan, 2018).

This study has 90 students in Department of Economics Education, Faculty of Economics Universitas Negeri Semarang as the research subjects. They are all in the second semester and were divided into 2 groups for each 45 students, namely: experimental group and control group. During the online classes, the experimental group was equipped with the developed case-based interactive e-module, while the control group used the regular module. Before the treatment was carried out, the module draft was evaluated by the material expert, the media expert and a practitioner to ensure the feasibility of using the developed product. The grid of the case-based interactive e-module product development evaluation instrument is presented in Table 2, Table 3, and Table 4.

Table 2. The Grid of Media Expert Evaluation Instrument

No.	Variables	Indicators	Items
1.	Interface Eligibility	1. Appearance attractiveness and the fitness of background 2. Appropriateness of letter size, use of capitalization, spacing, and typeface 3. Attractiveness of background and layout design 4. Image placement suitability	12
2.	Technical Eligibility	1. The developed media is easy to use and simple in operation 2. The developed media can be used anywhere and anytime 3. The developed media can help students in self-study 4. Ease of operation of navigation buttons 5. The developed media can be run on available devices. 6. The media developed is free of advertisements and there are instructions for use.	8

Table 3. The Grid of Material Expert Evaluation Instrument

No.	Variables	Indicators	Items
1.	Content Eligibility	1. Coverage of material 2. Material accuracy 3. Up-to-date and contextual 4. Compliance with laws and regulations	11
2.	Presentation Eligibility	1. Presentation technique 2. Supporting material presentation 3. Completeness of presentation	13

Table 4. The Grid of Practitioner Evaluation Instrument

No.	Variables		Indicators	Items
1.	Content Eligibility	1.	Learning objectives compatibility	
		2.	Material Accuracy	
		3.	Supporting Learning Materials	11
		4.	Material Update	
2.	Presentation Eligibility	1.	Presentation Technique	
		2.	Material Presentation Support	15
		3.	Learning Presentation	
3.	Learning Approach	1.	Learning Orientation	12
		2.	Lecturer Activities	
4.	Benefit	1.	Ease of Learning	
		2.	Interest in Using Media	6
		3.	Increased Learning Motivation	

Apart from experts' validation, the developed case-based interactive e-module also needs improvements based on student perspectives. Therefore, this study tried to facilitate students' opinion about the module using a questionnaire presented in Table 5.

Table 5. The Grid of Students Questionnaire

No.	Variables		Indicators	Items
1.	Media Eligibility	1.	Content clarity and accuracy	
		2.	Accuracy and clarity of product appearance	6
		3.	Language accuracy	
2.	Effectivity	1.	Practicality in use	
		2.	Media products can be used over and over again	
		3.	Accuracy in the use of language	
		4.	The ability of media products to generate interest in student learning	8
		5.	The ability of the product to explain and make it easier for students to learn	
		6.	The use of the product allows students to learn independently according to their abilities and interests	
3.	Learning Motivation	1.	Perseverance in learning	
		2.	Tenacious in facing adversity	
		3.	Interest and sharpness of attention in learning	15
		4.	Achievement in learning	
		5.	Independent in learning	

Data collection in this study used instruments in the form of questionnaire, observation sheets, and documentation developed independently based on relevant theories. Data analysis consists of two stages. First, descriptive statistical analysis to describe the research results based on the obtained data to determine the feasibility of the developed case method-based interactive e-module including the results of expert validation data analysis and questionnaire obtained data. Second, inferential statistical analysis to determine the effectiveness of the case method-based interactive e-module. First, the data eligibility is identified using prerequisite tests, namely normality and homogeneity tests. Second, if the data is normally distributed, then the test is continued using the paired sample t-test and the independent sample t-test to measure the difference before and after treatment and to determine the effectiveness of using case-based interactive e-modules. The tools used in the analysis of research data are using IBM SPSS 25 software.

3. RESULT AND DISCUSSION

Result

This study examines the effectiveness of an interactive e-module based on a case method to increase student learning motivation. In the development process, this research uses the ADDIE approach which is arranged in 5 stages, namely, Analyze, Design, Develop, Implement, and Evaluate. First, analysis, At the analysis stage, several stages were carried out, namely needs analysis and curriculum analysis. The development of the e-module was based on considering needs analysis, such as media selection, exploring students' initial motivation. In addition, curriculum analysis was carried out by investigating learning outcomes and graduate learning outcomes.

This is the main consideration to find out the problems experienced by students in the learning process and to develop case method-based interactive e-modules to suit student needs.

Second, design. The second stage is designing an interactive e-module is done by determining learning objectives, materials, supporting videos and learning evaluations. The following picture is some interfaces of the case method-based interactive e-module.

Figure 1. Case Method-Based Interactive E-Module User Interface

Third, development. The next stage is the development of the case-based interactive e-module. At this stage, product development has completed and validation tests can be carried out by material experts, media experts, practitioners and students. This validation test is used to determine the product that was developed before being treated to the experimental group. Results based on the test can be seen in Figure 3. The graph shows the results of product validation tests carried out by media experts, material experts, practitioners and students. In the media expert chart, the test score is 86 of 100, therefore the percentage is 86%. The material expert chart shows the acquisition of a score of 106 of 120 with a percentage of 88%. Furthermore, the practitioner validation has score 197 of 215 or 92%. Based on students' validation, a score is 64 of 70 so the percentage is 91%. Based on these results, it has been compared with the validation score tabulation developed. The validation results show "very good" criteria and are suitable for use without revision. With these results the developed product can be used for treatment of the observed students. Product Validation Results showed in Figure 3.
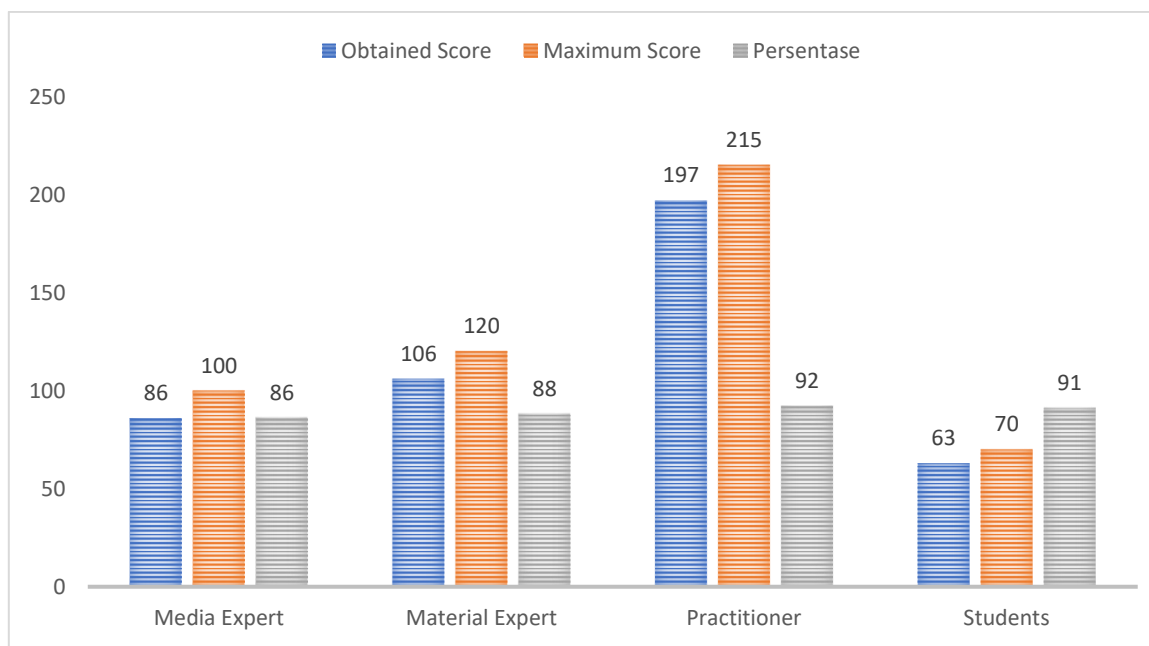

Figure 2. The Product Validation Results

Fourth, Implementation. The implementation was carried out by involving two groups consisting of 90 students who were divided into the experimental group (45 students) and the control group (45 students). The interactive e-module was applied to the experimental group as a comparison to the control group's learning process. After implementing the product, the students were given a learning motivation questionnaire. The questionnaire was used to measure the difference in impact before and after the use of case method-based interactive e-modules. The use of questionnaires was considered as a tool to test the effectiveness as well as to know the result of hypothesis testing of this study.

Test the effectiveness as well as test the hypothesis in this study using the t-test. Hypothesis testing with t-test is used to test the effectiveness of the case-based interactive e-module. The criteria used in making the hypothesis is the level of = 0.05. H0 is rejected if the probability significance (sig) < α (0,050) and if the probability significance level (sig) > α (0,050) then H0 is accepted. The results of the effectiveness test as well as the hypothetical test in this study showed in Table 6.

Table 6. T-Test Pretest Experiment Class and Control Class

	Class	N	Mean	Std. Deviation	Std. Error Mean
Mark	Pretest	45	32.42	6.258	0.933
	Posttest	45	35.33	6.296	0.939

Based on Table 6, it can be seen that the mean value or average value of the control class pretest is 32.42 and the mean or posttest average value of the control class is 35.33. This shows that there is an increase in the control class's learning motivation seen from the pretest and posttest scores, but to prove whether there is a significant difference between the pretest and posttest scores, it is necessary to pay attention to the results of the t-test using the following paired sample test. The results of the T-Test are presented in Table 7.

Table 7. T-Test (Paired Sample Test) Pretest-Posttest Control Class

		mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pretest – Post test	-2,911	8.415	1.254	-5.439	-0.383	-2.321	44	0.025

Based on Table 7, it can be seen that the significance value of the t-test is 0.025. The significance value is smaller than 0.05 which means that H1 accepts. This shows that there is a difference in the average learning motivation on the pretest and posttest scores. The results of the T-Test are presented in Table 8.

Table 8. Pretest-Posttest T-Test Experiment Class

	Class	mean	N	Std. Deviation	Std. Error Mean
Mark	Pretest	31.62	45	6.936	1.034
	Posttest	40.38	45	4.207	0.627

Based on Table 8, it can be seen that the mean or average value of the experimental class pretest is 31.62 and the mean or posttest average value of the experimental class is 40.38. This shows that the value of the posttest learning motivation results is greater than the pretest after being given treatment in the learning process, but to prove whether there is a significant difference in the experimental class learning motivation, in Table 9.

Table 9. T-Test (Paired Sample Test) Pretest-Posttest Experiment Class

		mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pretest - Posttest	-8.756	7.978	1.189	-11.152	-6.359	-7.362	44	0.000

Based on Table 9, it can be seen that the significance value of the t-test is 0.000. The significance value is less than 0.05 which means that H1 accepts. This shows that there is a difference in the average learning motivation in the pretest and posttest scores of the experimental class after using an interactive e-module based on the case method.

Furthermore, to determine the effectiveness of the developed media, namely an interactive e-module based on the cased method, it is necessary to carry out further testing using the Independent Sample Test by comparing the posttest results of the experimental class using an interactive e-module based on the cased method and the control class that was not given treatment or using conventional learning. The results of the T-Test (Paired Sample Test) are presented in Table 10.

Table 10. T-Test Pretest-Posttest Experiment Class and Control Class

	Group	N	mean	Std. Deviation	Std. Error Mean
Mark	Experiment Class	45	40.38	4.207	0.627
	Control Class	45	35.33	6.296	0.939

Based on Table 10, it can be seen that the mean or posttest average value for the experimental class is 40.38 and the mean or posttest average value for the control class is 35.33. This shows that the value of the posttest learning motivation result in the experimental class is greater than the posttest value in the control class. However, to prove whether there is a significant difference in the learning motivation of the experimental class, showed in Table 11.

Table 11. T-Test (Independent Sample Test) Posttest Experiment Class and Control Class

		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Mark	Equal variances assumed	8.838	0.004	4.469	88	0.000	5.044	1.129	8.838	0.004
	Equal variances not assumed			4.469	76.757	0.000	5.044	1.129	2.797	7.292

Based on Table 11, it can be seen that the significance value of the t-test is 0.000. The significance value is less than 0.05 which means that H1 is accepted and the t count is 4.469> t table, which is 1.987. This shows that there is a significant difference in the average student learning motivation between the experimental class and the control class. This shows that the use of learning media developed in this study is an interactive e-module based on a case method that is effectively used in learning compared to conventional models.

Discussion

The case-based interactive e-module developed in this research was designed using Autoplay Media Studio 8. Autoplay Media Studio 8 is a software for creating interactive multimedia by integrating various types of media such as images, sound, video, text and flash into a display, with the hope that the display of the material presented is more attractive and easier to understand for students (Irdianto et al., 2019). This e-module is portable and does not need an installation, instead of it can directly plug and play in the laptop or personal computer. Some similar research adopted this software shows the high feasibility of the media (Afrianti & Musril, 2021; Jannah et al., 2019; Sariani & Cahyana, 2021; M. Sofyan & Pradipta, 2021) and positive results in students, such as improving students' activities and learning outcomes (Bahri et al., 2018), significant skills improvement (Irdianto et al., 2019) and increasing communicative character of students (Erna, Irfandi, et al., 2021).

The initial display after logging in to this module contains learning objectives and a clickable menu including materials, quizzes, games and also learning support videos to strengthen the deepening of the material. Furthermore, there is a learning evaluation in the form of multiple choices questions to determine student learning outcomes. The results of the assessment from experts which all aspects are in "very good" criteria is *in line with the research of (Datta et al., 2018). Furthermore, research conducted stated that the results of designing interactive e-modules that had been developed in digital simulation subjects using project-based innovative learning models were successfully implemented and feasible to be implemented in the learning process (H. Sofyan et al., 2019; Winatha et al., 2018).* This shows that students are interested in learning to use *e-module* interactive *case-based method* in the learning process, because students can study independently or study in groups inside or

outside the classroom. In line with research the use of *e-module* Problem solving oriented will lead students to seek problem solving independently and this will provide a concrete experience in problem solving so as to grow and train higher order thinking skills including critical thinking skills (Darmaji et al., 2019; Suarsana & Mahayukti, 2013). Based on the eligibility criteria *e-module* interactive based on *case method*, the results of the assessment by the expert show that *e-module* interactive based on *case method* suitable for use in the learning process.

The implication of developing this module for microeconomics courses in this study is that it is confirmed that the interactive e-module is not only suitable to be a supplement material for particularly sciences and technical subjects, but also can be an alternative for social sciences subjects, especially for Microeconomics course. It implies that there is a possibility to develop this e-module in other courses with some adjustments according to the character of the course, especially in subjects that are very theoretical and require lots of illustrations and concrete examples so that students can easily find the relevance of the material to the reality.

The increase in the average value of learning economics motivation before (pretest) and after (posttest) using *e-module* case-based interactive method shows that e-module effective interactive increase student learning motivation. Use *e-module* case-based interactive method effectively increases student learning motivation (Farenta et al., 2016; Hadiyanti et al., 2021; Hafsah et al., 2016). To increase students' learning motivation, learning media need to be designed in many ways to stimulate students' interest in learning, one of them is by developing interactive media, (Rachmavita, 2020). During the online classes, the challenges could be even stronger in determining the appropriate media to support students independent learning activities at home. The product of this study, case-based interactive e-module tried to meet these challenges by designing a supplement to help students study Microeconomics independently. This e-module will continuously be upgraded, in terms of content and materials based on stakeholders' feedback to make it stay relevant with student needs and learning conditions. The closest adjustment that needs to be made is to design so that this module can be accessed by using a handphone to increase its flexibility and mobility for students. The development of an interactive e-module based on the case method has the advantage of improving student interactive conditions in the learning process. In addition, it trains students in dealing with real situations that require direct reasoning. Students will be accustomed to being trained to have critical thinking skills and higher order thinking. Furthermore, this development has come to product testing to determine the effectiveness of the product.

4. CONCLUSION

The results of this study indicate that increasing students' understanding in the learning process using e-learning is important and needs to be developed. The development of skills for students to understand lecture material can not only be done through face-to-face activities in class, but can also be done using other supporting activities. Limitations in the face-to-face teaching and learning process can be improved by using learning media developed in this study, namely the case-based interactive e-module. The main results of this study are the developed innovative product has been tested and validated by experts as an effective supplementary material in improving students' ability to understand Microeconomics course and students' learning motivation.

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