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Software Development Based Learning *E-Learning* Course In Differential Calculus Students Learn To Grow Independence

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Abstract. The development of e-learning devices to faster self-reliance of students on differential calculus with office 365 support the expected increase student learning individually or teamwork. Learning by using office 365 featuring maple program steps into sway online with One Note online feedback is expected to help the student learn self-reliance. Therefore, this study using a modified development model of sugiyono, dick and carey, ADDIE (Analysis, Design, Development, Implementation and Evaluation). This research has been conducted at the Computer Laboratory of Mathematics Education and Teacher Training of IKIP PGRI Madiun. The subjects are students who have been throught the first semester. The validation result of the expert obtained 87,50%, which means it has high rate of viability, from materials experts 89,67%, which means a high degree of feasibility, the test of products obtained 88,89% which means a hiigh level of eligibility, and test user response gets 93,67% which means a very high level of feasibility. In addition, the value of student learning independence conventional response is 79,57% after the given e-learning tools increased by 96,73%. So, the e-learning device on the differential calculus can be decleared eligible.

INTRODUCTION

Prospective teachers at Mathematics Study Program, University of PGRI Madiun, calculus is a subject that must be taken by all students in mathematics education. In the course curriculum, guidelines outlined Mathematics Education course is divided into calculus Calculus I, Calculus II and advanced calculus. Judging from the portion given to subjects calculus, while the calculus is a subject that is very important and must be controlled by the student, because of course, the calculus is ideal as a course prerequisite for the course next, such as Equations Differential, Statistics Mathematics, Vector Analysis, Numerical Analysis, Value beginning and Term limits, Mathematical Economics.

Students who master calculus course will be very helpful in following the subsequent course because the calculus must be mastered by students. Students who have not mastered the concept of calculus course will hinder the learning process because the lecturer must repeat the material that should have been controlled by students in the previous semester. Conceivably the number of subjects that require subjects to be mastered calculus students there are still many students who do not master the concepts of calculus. Surely it would have an impact on the ability of students' understanding on the next course.

One effort to overcome this difficulty is to develop a learning that is able to attract, motivate independent learning and fun by using the mathematical software as a learning medium. [1] the use of the computer as a medium of learning of which is has advantages in presenting graphics and images as a visual form that can be observed and studied college students, also can calculate perbagai problems in calculus. Therefore, it is reasonable if education researchers state that the computer can potentially be enabled to improve the quality of learning, especially math.

Forms of learning devices in this study using e- learning. E-learning by [2] means that learning to use the services with the help of electronic devices such as audio, videotapes, satellite transmissions or computer. The device e-learning with implementing Office 365 featuring step program maple into the sway of online feedback Student with OneNote online, is expected to help independent learning of students, According Printrich [3], self-regulated learning (SRL) is defined as a constructive process when students set learning goals at the same time

trying to monitor, manage, and control the observation of motivation, and behavior that is limited to the learning objectives and environmental conditions.

Expected development of devices based learning e-learning on the subject of differential calculus by using mathematical software is expected to increase the independence of student learning Teachers' Training College students PGRI Madiun.

EXPERIMENTAL

Method

The development of media in this study using a development approach that Dick and Carey ADDIE is an extension of the Analysis, Design, Development, Implementation, and Evaluation. Analysis, related to the analysis of the employment situation and the environment in order to discover what products need to be developed. Design, a product design activities as required. Development activity using the product, and Evaluation is an activity to assess whether each step of activities and products that have been made are in accordance with specifications or not. [4]. Sugiyono put forward to create a product creative means making new products that have added value and has never existed. Original means there is no other person who makes it. [4] In this case, the researchers have been checked for devices based learning e-learning course on differential calculus no one has to apply.
Tested, empirically means the product quality through a variety of field testing. Step-by-step development of the media used to follow the ADDIE development model that is shown in the following schematic drawings.

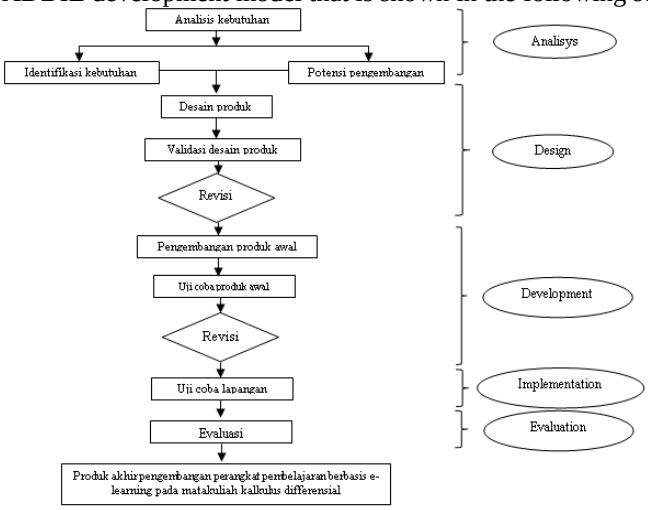

Figure 1. Flowchart Design Research

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Based On The Research and Development Procedure

Based on the research and development procedure above, testing device development based learning e-learning through three stages: materials and media expert validation, product testing and user trials. Product trials involving three students and trials involving the use of twenty-seven students. There are two types of data that should be collected, namely: qualitative and quantitative data. Instruments of quantitative data in the form of (1) questionnaire on media experts, subject matter experts, and students, (2) an assessment of learning independence. Qualitative data in the form of advice validator. Students increased learning independence if there is an increase that met (Percentage of> 70%) pre-test and post-test questionnaire questionnaire questionnaire .As for independent learning using five indicators according to Saiful Bahri Djamarah, [5], the five indicators including independent learning awareness of learning objectives, awareness of the responsibilities of learning, continuity of learning, active learning and learning efficiency.

Qualifying results of questionnaire responses [6]

$$\text{percentage of responses} = \frac{\text{total score}}{\text{maximum score}} x100\%$$

Qualification questionnaire responses according to the following table 1 and table 2.

Table 1. Qualification Questionnaire Results Percentage Score

No	Range of percentage score obtained	Qualification
1	81% - 100%	very high
2	61% - 80%	high
3	41% - 60%	medium
4	21% - 40%	low
5	< 21%	very low

Table 2. Qualifying Results Percentage Score Questionnaire Response Students

No	Range of percentage score obtained	Qualification
1	81% - 100%	very high
2	61% - 80%	high
3	41% - 60%	medium
4	21% - 40%	low
5	< 21%	very low

RESULTS AND DISCUSSION

The results of this study is an e-learning course on learning device by applying the differential calculus office 365. E-Learning consists of the main page (WordPress), material (way online), evaluation (OneNote online), SAP and Syllabus (google drive).

The shape of the main page, the page content, evaluation, product validation results will be discussed as follows.

The main page will contain some charge subject is contained in link page WordPress, including that used in this study is the differential calculus.

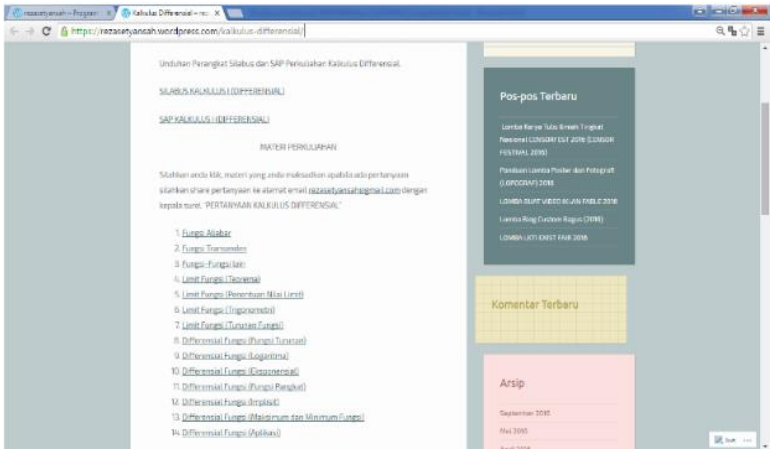

Figure 2. Home E-Learning

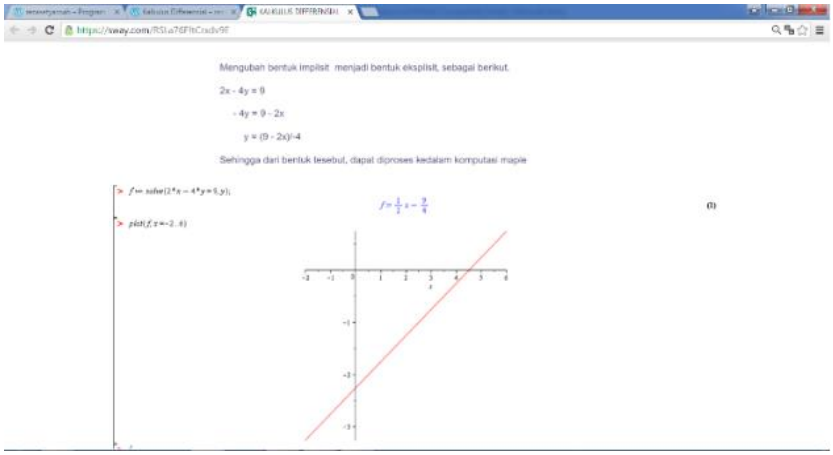

Figure 3. Page E-Learning Materials

Figure 4. Page E-Learning Evaluation

Based on the questionnaire media experts, Obtained by percentage of relevancy indicator of appropriateness, systematics grain, grain conformity with the demands of student-centered learning, language conformity with the rules of language Indonesia who is good and true, legibility and communicative. The results show the percentage respectively 87.50%, 87.50, 91.67%, 75.00%, and 87.50. So that the total percentage score of 87.50% eligibility media. Percentage of eligibility media content shown in Table 3.

Table 3. Results Validation Expert Media

No.	Indicators	Item Indicator	Value Validator	Percentage
1.	Relevance	1, 2, 3, 4	14	87,50%
2.	Systematic presentation	5,6	7	87,50%
3.	Conformity serving the demands of student-centered learning	7,8,9	11	91,67%
4.	Conformity with the rules of Indonesian language is good and right	10	3	75,00%
5.	Readability and communication	11,12	7	87,50%
	Number of total score level eligibility		42	87,50%
	Code Level Eligibility		very high	ST

Based on questionnaire material experts, Obtained by percentage indicator of the suitability of conformity with the hierarchy of the curriculum, conformity with the preparation of materials, conformity evaluation of materials, suitability of learners, compliance with facilities and infrastructure. The results show the percentage respectively 91.67%, 91.67, 93.75%, 83.33%, and 83.33. So that the total percentage score of 89.67% eligibility media. Percentage of eligibility media content shown in Table 4.

Table 4. Results Validation Expert Content

No.	Indicators	Item Indicator	Value Validator	Percentage
1.	Indicators Item Indicator Value Compliance with the hierarchy of the curriculum	1, 2, 3	11	91,67%
2.	Compliance with the preparation of the material	4, 5, 6	11	91,67%
3.	Suitability evaluation of materials	7, 8, 9, 10	15	93,75%
4.	Suitability learners	11, 12, 13	10	83,33%
5.	Compliance with the facilities and infrastructure Validator	14, 15, 16	10	83,33%
	Number of total score level eligibility		57	89,67%
	Code Level Eligibility		very high	ST

Based on the questionnaire testing the product, Obtained by percentage of the attractiveness and usefulness of the media for each student 85.42%, 87.50%, and 93.75%. So the percentage of the total score of the test product by 88.89%. The percentage of the feasibility test are shown in Table 5.

Table 5. Results of Trial Products E-Learning

No.	Indicator	Item Indicator	Percentage	Eligibility Code	Number of total	Percentage	Code Eligibility
1.	Perhatian (Attention)	1, 3, 6, 12	85,42%	ST	88,89%		Very high
2.	Kepercayaan Diri (Confidence)	2, 4, 8, 10	87,50%	ST			(ST)
3.	Kepuasan (Satisfaction)	5, 7, 9, 11	93,75%	ST			

Information
Scores ideal point indicator attention (attention) is 432
Scores ideal point indicator of confidence (confidence) is 432
Scores ideal point indicator of satisfaction (satisfaction) is 432
Scores ideal indicators point total is 1296

Based on the questionnaire testing the use of the product, obtained by percentage of the attractiveness and usefulness of the media for all students, 93.06%, 93.06%, and 94.91%. So the percentage of the total score of the trial use of the product amounted to 93.67%. Percentage feasibility trial use of the product is shown in Table 6.

Table 6. Results of Trial Use of E-Learning

No.	Indicator	Item Indicator	Values		
			Total Score	Percentage	Level Eligibility
1.	(Attention)	1, 3, 6, 12	402	93,06%	Very High
2.	(Confidence)	2, 4, 8, 10	402	93,06%	Very High
3.	(Satisfaction)	5, 7, 9, 11	410	94,91%	Very High
	Total number		1214	93,67%	Very High

Based on independent learning questionnaire, obtained the percentage of awareness of the purpose of learning, awareness of the responsibilities of learning, continuity of learning, active learning and learning efficiency. Percentage of independent learning pre-test results of 79.57% and 95.73% post-test, shown in Table 7.

Table 7. Results of Student Learning Independence Questionnaire Data

No.	Indicator	Item Indicator	Score Total	Percentage Pre-Test	Score Total	Percentage Post-Test
1.	Awareness of learning goals	1, 2, 3, 4, 5, 6, 7, 8, 9	789	81,17%	938	96,50%
2.	Awareness of the responsibility to learn	10, 11, 12, 13, 14, 15, 16, 17	681	78,82%	831	96,18%
3.	Continuity of learning	18, 19, 20, 21, 22, 23, 24, 25, 26	754	77,57%	940	96,71%
4.	Activity of learning	27, 28. 29, 30, 31, 32, 33, 34	678	78,47%	854	98,84%
5.	Learning efficiency	35, 36, 37, 38, 39, 40, 41, 42, 43	793	81,58%	929	95,58%
	Number of total score level eligibility			3695		4492
	Percentage Increase			79,57%		96,73%
	Code rate increase			high		very high

Information
Scores ideal point indicators awareness of learning objectives is 972
Scores ideal point indicators awareness of the responsibility to learn is 864
Scores ideal point of learning continuity indicator is 972
Scores ideal point indicator activeness Learning is 864
Scores ideal grain Learning efficiency indicator is 972
Scores ideal indicators point total is 4644

The results of the validation of learning tools developed obtained by percentage of 87.50% of media experts, which means a very high degree of feasibility, the percentage of material experts gained 89.67%, which means a very high degree of feasibility, the tests of products obtained by percentage 88.89 %, which means a very high rate of viability, and from the trial use of a percentage 93.67%, which means a very high level of feasibility. Percentage of eligibility modules are shown in Table 8.

Table 8. Results Percentage of Software Product Feasibility Study

No.	Indicator	Percentage	Classification Feasibility
1.	Percentage device eligibility	87,50%	Very High
2.	Percentage of eligibility material	89,67%	Very High
3.	Presentation of the feasibility of product trials	88,89%	Very High
4.	Percentage feasibility trial use of the product	93,67%	Very High

Indicators Percentage of increase of independent learning, independent learning questionnaire score indicated pre-test and post-test, there is an increased level of classification higher by 79.57% to the classification of the increase was very high at 96.73%.

Table 9. Results Percentage Improvement of Student Learning Independence

No.	Indicator	Percentage Pre-Test	Percentage Post-Test	Classification
1.	Awareness of learning goals	81,17%	96,50%	There Improved
2.	Awareness of the responsibility to learn	78,82%	96,18%	There Improved
3.	Continuity of learning	77,57%	96,71%	There Improved
4.	Activity of learning	78,47%	98,84%	There Improved
5.	Learning efficiency	81,58%	95,58%	There Improved
	Average Percentage Increase	79,57%	96,73%	

CONCLUSION

Learning Tool implementing e-learning using online sway views and feedback of students using OneNote tasks online. The results of the validation materials developed in the web page, OneNote, obtained 87.50% of the sway media expert, which means it has a high rate of viability, of materials experts 89.06%, which means a high degree of feasibility, the tests of products obtained by percentage 91, 67%, which means a very high level of feasibility and testing of user response gets a percentage of 93.67%, which means a very high level of feasibility. Additionally, response values student learning independence without the e-learning by 79.57% after the given e-learning tools increased by 96.73%, So much so that the learning device based e-learning on the student's course of differential calculus can be declared eligible.

ACKNOWLEGMENT

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