

## DEVELOPMENT OF WEB-BASED MATHEMATICS LEARNING MEDIA FOR STUDENT MATHEMATICS LEARNING OUTCOMES

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### Abstract

This study aims to: 1) Explain the process of developing Sevima Edlink web-based learning media, 2) Know the effectiveness of Sevima Edlink web-based learning media. This research has a background of problems in student learning outcomes in the post-pandemic that are unsatisfactory where the cause of this is the lack of student interest in learning provided by educators. This research is a 4-D model development research developed by Thiagarajan which was modified by the author into 3-D. This research was conducted on the object of research, namely class X high school students at the Islamic Center High School. This learning media is declared effective in improving students' mathematics learning outcomes as evidenced by the assessment results of experts: 1) Material expert validation obtained a score of 32 with an average score of 9.7 included in the Valid category with a percentage obtained is 80%, 2) Media expert validation obtained a score of 37 with an average score of 11.08 including the Very valid category with a percentage obtained is 92.5%, 3) Validation of education experts obtained a score of 78 with an average score of 23.33 including the Very Valid category with a percentage obtained was 97.5%, in addition to the practicality assessment by students who got an overall score of 1342 with an overall average of 33.55 included in the Very Practical category with a percentage of 83.87% and also the results of pretest and posttest conducted on students had an average increase of 6.77%.

**Keywords:** Learning Media Development, 3-D Model, Sevima Edlink, High School Student

### INTRODUCTION

Media is a tool to transfer knowledge to students. This is in accordance with Sadiman's statement (2010: 7) which states that, media is everything that is used to channel a message to the recipient, whose purpose is to stimulate the thoughts, feelings, attention and interest and attention of students so that the teaching and learning process occurs. Thus, it can be concluded that the media plays an important role in helping students in teaching and learning activities actively and independently. Along with the development of information and communication technology in this era, educators are required to be able to design and develop a media that supports the success of the learning process of students. Therefore, the development of learning media is needed to support learning in accordance with the four pillar recommendations initiated by UNESCO in Munir (2010: 2), namely 1) learning to know, 2) learning to do, 3) learning to live together, 4) learning to be.

Education at this time is very involved in the development of information and communication technology to be used as one of the tools for the implementation of the teaching and learning process anywhere and anytime effectively and efficiently. Therefore, learning plans and strategies are needed to deal with students who are passive during

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learning. Students who are passive in the learning process lead to unsatisfactory learning outcomes. One of the factors that causes this is the lack of student interest in the learning material learned so that there is no encouragement to carry out learning activities or have difficulty in learning learning material (Intan, 2020: 01). The technology created is very diverse in types that can help in the learning process. One of them is Sevima Edlink. The application is one of the applications created by the nation's children that has been used throughout Indonesia and is intended to be used by various levels of education. In this application there are several spaces in it, one of which is a room to have conversations between educators and students. This media is a learning innovation that we can call flexible because it can be accessed anywhere and anytime.

Based on the background of the problems previously described, researchers took the initiative to conduct research on "Development of Web-Based Mathematics Learning Media on Student Mathematics Learning Outcomes" on grade X students with Vector material at SMA Islamic Center Kota Tangerang.

## **METHODS**

The research method carried out in this study is research and development or *Research and Development* (R & D). In research and development methods, there are several types of models. The model used by the author is the development of a 4D model, the 4D development model (*Four D*) is a learning device development model. This model was developed by S. Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel (1974: 5) which researchers modified at the stages of their research where the modifications made by researchers were to simplify the stages from the initial four stages to three stages, namely: Define, Design, and Develop.

The defined stage includes five main steps, namely front-end analysis, learner analysis, concept analysis, task analysis and specifying instructional objectives. The second stage is design, which is the design, planning and action on the research to be carried out. There are 4 steps that must be passed at this stage, namely constructing criterion-referenced test (preparation of test standards), media selection (media selection), format selection (format selection), and initial design (initial design). The third step is Develop which is the stage to produce a development product. This stage consists of two steps, namely expert appraisal accompanied by revision and developmental testing.

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The type of data to be obtained in this research and development is in the form of quantitative and qualitative data. Quantitative data was obtained from the assessment of material experts, media experts, and questionnaires from grade X students. While qualitative data was obtained from input from material experts, media experts, and the results of interviews conducted with grade X mathematics teachers.

The calculation of the final value data of validation is analyzed by giving a score to the statement with a Likert scale of 1-4 then determining the average total validation using a validity formula modified by Riduwan (Naziyah, 2014).

$$Average\ Score = \frac{Number\ of\ scores\ obtained}{Maximum\ number\ of\ scores} \times 100\%$$

**Table 1. Validity Assessment Classification**

No	Interval (%)	Category
1	0% - 20%	Not valid
2	21% - 40%	Less valid
3	41% - 60%	Quite valid
4	61% - 80%	Valid
5	81% - 100%	Highly Valid

Riduwan (2009)

The practical test data for the use of web-based learning media was analyzed by giving a score to the statement with a Likert scale of 1-4, then determining the total average using a modified formula from Sulistyani & Retnawati (2015) below:

$$Average\ Score = \frac{Number\ of\ scores\ obtained}{Maximum\ number\ of\ scores} \times 100\%$$

**Table 2. Practicality Assessment Classification**

No	Interval (%)	Category
1	0% - 20%	Impractical
2	21% - 40%	Less Practical
3	41% - 60%	Quite Practical
4	61% - 80%	Practical
5	81% - 100%	Very Practical

The effectiveness analysis in this study was carried out using pre-test and post-test question sheets and comparing the overall average results obtained with the Minimum Completeness Criteria (KKM) in the school where the researcher conducted the study. The KKM at the Islamic Centre High School for mathematics subjects is 75. The provision of web-based learning media is declared effective if the post-test results are greater than the pre-test

and >75% of students' scores are above KKM. The analysis stage is to add up the indicators of the observed learning outcomes and then calculate the percentage of the learning process that takes place with the formula:

$$\frac{\text{Observation score}}{\text{Total score}} \times 100\%$$

The data that has been obtained from the results of data analysis in the form of observation sheets is then converted into percentage value categories

**Table 3. Evaluation Results Score Category**

Value	Category
93-100	Very Good
84-92	Good
75-83	Enough
0-74	Less

Source: Ministry of Education and Culture, 2017

## RESULTS AND DISCUSSION

The result of this study is a web-based learning media product (*Sevima Edlink*) on student learning outcomes in Vector material mathematics lessons in grade X students of Islamic Center High School in even semester.

At the define stage, an analysis of student needs, tasks, concepts, and learning objectives is carried out so that results are obtained by analyzing core competencies and student needs. The development of web-based learning media (*Sevima Edlink*) is based on student learning outcomes. At the design stage, researchers designed a draft of web-based mathematics learning media (*Sevima Edlink*) in the form of flow charts, question grids, questions and answer keys, data collection instruments which were then validated by expert validators. At the develop stage is the implementation stage of a product to be developed. The results of development at the design stage are assessed for validity and practicality. The media draft was assessed for validity by 3 experts, namely (1) material experts, (2) media experts, and (3) education experts. Based on the results of validation by the 3 experts, it was obtained:

**Table 4. Material Expert Assessment**

No	Assessment Aspect	∑ Score	$\bar{x}$ Score
1	Content Eligibility Aspect	16	3,2
2	Linguistic Aspects	7	3,5
3	Presentation Aspect	9	3
∑ Overall Score		<b>32</b>	

$\bar{x}$ Overall Score	<b>3,2</b>
Max Score	<b>40</b>
$\bar{x}$ Every Aspect	<b>9,7</b>
Average Score (%)	<b>80%</b>
Category	<b>Valid</b>

**Table 5. Media Experts Assessment**

No	Assessment Aspect	$\Sigma$ Score	$\bar{x}$ Score
<b>1</b>	Software Engineering Aspects	15	3,75
<b>2</b>	Aspects of Learning Media Design	12	4
<b>3</b>	Aspects of Visual Communication	10	3,33
$\Sigma$ Overall Score		<b>37</b>	
$\bar{x}$ Overall Score		<b>3,7</b>	
Max Score		<b>40</b>	
$\bar{x}$ Every Aspect		<b>11,08</b>	
Average Score (%)		<b>92,5%</b>	
Category		<b>Highly Valid</b>	

**Table 6. Education Experts Assessment**

No	Assessment Aspect	$\Sigma$ Score	$\bar{x}$ Score
<b>1</b>	Content Eligibility Aspect	20	4
<b>2</b>	Linguistic Aspects	8	4
<b>3</b>	Presentation Aspect	10	3,33
<b>4</b>	Software Engineering Aspects	16	4
<b>5</b>	Aspects of Learning Media Design	12	4
<b>6</b>	Aspects of Visual Communication	12	4
$\Sigma$ Overall Score		<b>78</b>	
$\bar{x}$ Overall Score		<b>3,9</b>	
Max Score		<b>80</b>	
$\bar{x}$ Every Aspect		<b>23,33</b>	
Average Score (%)		<b>97,55%</b>	
Category		<b>Highly Valid</b>	

Based on the results of the assessment of web-based learning media (*Sevima Edlink*) is feasible to use without revision and the calculation results from validators obtain very valid results. After validation, the product is then subjected to limited trials and extensive trials.

Practicality assessment is obtained from student response assessment instruments to see the practicality of web-based learning media (*Sevima Edlink*). The practical assessment developed was obtained from a student response instrument conducted on 40 students of Islamic Center High School class X-MIPA.

**Table 7. Student Response Questionnaire Assessment**

No	Assessment Aspect	$\Sigma$ Score	$\bar{x}$ Score
<b>1</b>	Convenience Aspect	269	6,72
<b>2</b>	Attractiveness Aspect	540	13,5
<b>3</b>	Help ability Aspect	399	9,97

<b>4</b>	Troubleshooting Aspects	144	3,35
	$\Sigma$ Overall Score		<b>1342</b>
	$\bar{x}$ Overall Score		<b>3,355</b>
	Max Score		<b>1600</b>
	$\bar{x}$ Every Aspect		<b>33,55</b>
	Average Score (%)		<b>83,87%</b>
	Category		<b>Very Practical</b>

Based on the results of the practicality assessment of the questionnaire, student responses to web-based learning media (*Sevima Edlink*) are very practical. Through the trial activities carried out, it was found that students were interested in this web-based learning media (*Sevima Edlink*) and the interest and motivation for learning using this product was considered very high.

Assessment of the effectiveness of web-based learning media (*Sevima Edlink*) can be obtained by looking at student learning outcomes with treatment before and after using web-based learning media (*Sevima Edlink*) after using web-based learning media (*Sevima Edlink*) which is then called Pre-Test and Post Test.

**Table 8. Results of Effectiveness Test Analysis**

Class	Number of Students	Attendance Percentage	Average Grades		Percentage Increase
			Pre Test	Post Test	
<b>X MIPA 1</b>	40	100%	79,74	80,00	0,33%
<b>X MIPA 2</b>	40	100%	84,00	89,50	6,55%
<b>X MIPA 3</b>	39	100%	82,05	93,08	13,44%
Average Increase					<b>6,77%</b>

Based on the results of the analysis of the effectiveness of web-based learning media (*Sevima Edlink*) Pre-Test and Post Test, it was found that this media was effective because when viewed from the assessment results there was an increase in student scores.

## CONCLUSION

### Conclusion

Based on the results of research and discussion that the researcher has described in this study, it can be concluded as follows:

1. The development of web-based learning media (*Sevima Edlink*) was developed with a 3-D model, namely *Define*, *Design*, and *Develop*. At the define stage, it is carried out to find out student learning media and analyse student learning media. Furthermore, at the *design* stage it is carried out as a first step to create learning media that suits school needs and then at the development stage it is carried out to develop products by

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testing the validity and practicality of the products developed by involving material experts, media experts, education experts and grade X students of SMA Islamic Center Kota Tangerang. Through these stages, web-based learning media (*Sevima Edlink*) is produced.

2. The application of web-based learning media (*Sevima Edlink*) is effective because it can attract students' interest in improving learning outcomes in mathematics lessons. In this case, it is evidenced by the assessment of student responses who get an overall score of 1342 with an overall average of 33.55 included in the Very Practical category with a percentage of 83.87%. In addition, it is also proven by the effectiveness of web-based learning media (*Sevima Edlink*) which is shown from the pretest and post-test scores which have an average increase of 6.77%, this test is carried out in the form of description questions with a total of 4 questions. The average score of students on the pretest which before the use of web-based learning media (*Sevima Edlink*) was 79.74 for class X MIPA 1, 84.00 for class X MIPA 2 and 82.05 for X MIPA 3 which on average had reached the minimum completeness criteria (KKM) limit of 75, but after the use of web-based learning media (*Sevima Edlink*) Students at SMA Islamic Centre improved with an average score of 80.00 for class X MIPA 1, 89.50 for X MIPA 2 and 93.08 for X MIPA 3.

### **Suggestion**

Based on the research that has been done, the following suggestions can be submitted:

1. Web-based learning media (*Sevima Edlink*) that is developed will be more interesting if the material in it is also included in the form of videos, both in animated and virtual forms, so that it cannot only be read but can also be seen and heard, being effective for students to use when learning independently.
  2. This web-based learning media (*Sevima Edlink*) is to be further developed according to the needs and technological developments.
  3. It needs to be expanded in the use of web-based learning media (*Sevima Edlink*) with further material and expand more learning space to make it easier for students to carry out a more varied learning process so that students do not feel bored faster, with various other features students can motivate themselves to further hone their abilities during learning.
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