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Multimedia Development *E-Flashcard* in Class XI Vocational School Business Economics Subjects

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Abstract

Along with advances in technology, the use of learning media has become crucial, especially in Vocational High Schools (SMK). This research aims to develop multimedia e-flashcard as a means of learning Business Economics. Based on theory Edgar dale Regarding concrete experiences, learning that involves real activities is proven to be more effective in increasing students' understanding. The main focus of this research is to describe the product development and evaluation process to ensure its validity, practicality and effectiveness in improving student learning outcomes in class XI vocational school business economics subjects. The method used is a development model Borg and gall, which makes it possible to test and improve the product. The validation test results show that the average material validation score reached 5.00, including the "Very Suitable" category. The average media scores were 5.00 and 4.78, reflecting the category "Very Valid." The limited practicality trial showed a score of 4.66, while the broader practicality trial achieved 4.35, both of which were categorized as "Very Practical." Learning effectiveness is measured through N-Gain Score which reached 94.88%, was declared "Effective." These findings underscore that multimedia e-flashcard functions as a strategic medium, enriching the Business Economics learning experience, both in face-to-face and distance contexts, thereby improving the quality of business economics learning in class XI vocational schools.

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1. INTRODUCTION

Education has a crucial role in preparing the younger generation to face global challenges. Apart from functioning to improve basic abilities, education also contributes to the development of work, intelligence and skills [1]. In the era of globalization, increasingly rapid technological advances have a positive impact on the education sector by encouraging the creation of more creative and innovative teaching methods. Access to diverse information allows the teaching and learning process to take place more dynamically [2] .

This condition is increasingly relevant, especially for students at Vocational High Schools (SMK), who are faced with the demand to master technology to face the complexity of the world of work. Students are not only expected to develop information analysis and critical thinking skills, but also must be able to create innovative solutions in dealing with various problems. Therefore, the integration of technology in education is very important to answer these challenges and facilitate learning that is oriented towards developing the character and competencies of students. Even though there are views that state the negative impacts of using technology, students still have the right to

utilize technology in the learning process. This is important so that students can obtain the skills needed to achieve the potential for a better future [3].

A bright future for Class At this stage, implementing fun learning becomes very crucial. Teachers are required to orchestrate various resources and media that support optimal learning goals [4] .By utilizing a variety of media and learning resources, students' learning experiences can be designed to be more interesting and varied.

Furthermore, the use of learning media not only functions to convey information more clearly, but also plays a role in increasing students' motivation during the learning process [5] . Therefore, the application of effective learning media is very important to improve learning outcomes in class. The combination of creative approaches and technology in learning will produce students who are more prepared, skilled and innovative.

However, observations carried out on September 7 2024 revealed that students showed a passive attitude, reflected in irrelevant activities that occurred during the teaching and learning process. This passive attitude has a negative impact on academic results, where only 40 out of 101 students managed to achieve the Minimum Completeness Requirement (SKM) of 80 in the Business Economics subject. Meanwhile, 61 other students are still below this score, this creates significant challenges in the learning process.

To dig deeper into this problem, observations and interviews were conducted with Business Economics teachers on September 9 2024. The results of the interviews showed that students had difficulty remembering theoretical material, which further reduced students' involvement in the classroom. A field study involving 20 respondents in class This difficulty can cause low learning outcomes, because a lack of in-depth understanding hinders students' ability to apply the material in a practical context.

Even though schools have provided adequate facilities, including access to learning materials and stable internet connections, utilization of these facilities is still not optimal. This is evident from the results of the questionnaire which shows that the Business Economics learning process is still too dependent on printed books and PowerPoint presentations which tends to be monotonous and dominated by text. Therefore, more effective strategies are needed to utilize available technology to better support the teaching and learning process. Technology has an important role in digital learning in the current era, making it more efficient and flexible [6] . The use of technology not only helps students hone their skills, communication, motivation and critical thinking, but is also an important factor in improving the overall quality of learning.

Responding to the problems expressed by students, researchers conducted a field study using a questionnaire to explore students' expectations of learning media in the context of Business Economics. The results of the analysis show that students want media that is more interactive and interesting. There are two categories of expectations expressed by students, namely related to the nature of the media and media features. Students hope that the media used is not only easy to understand, but also equipped with additional features, such as music, videos, quizzes and animation. By meeting these expectations, it is hoped that the learning process can be more interesting and effective, thereby increasing student engagement and learning outcomes.

In line with these findings, multimedia development e-flashcard proposed as the right solution. Multimedia e-flashcard offers an interactive way of learning that allows students to repeat material and strengthen memory of important concepts. Besides that, e-flashcard can be adapted to various learning styles and supports independent learning practice. Characteristics of Business Economics subjects, which require repetition of information, make e-flashcard very relevant to improve student understanding [7] .

This development provides the latest by combining conventional and digital media. There are various types of cards with different functions, including; material cards, question cards, music cards, multimedia cards, and information cards, which allow students to interact directly with

learning material and improve students' learning experience which not only overcomes learning boredom but can also improve the quality of learning.

This research is supported by previous research by [8] entitled "Media Effectiveness Flashcard to increase understanding of students' learning independence." Their findings suggest that media use of flashcards significantly increases students' understanding and learning independence, as well as contributing to increased academic achievement in the classroom. The implications of the results of this research include utilization of flashcards as an effective tool for delivering material, creating a more interesting and interactive learning process. Thus, this media not only helps speed up the learning process, but also improves the overall quality of students' learning. Integration flashcards in teaching methods can be an effective strategy in supporting a better learning experience.

Based on the considerations above, researchers are interested in carrying out research entitled "Multimedia Development E-flashcard in Class XI Vocational School Business Economics Subjects" with the hope of making a positive contribution to a more effective and interesting learning process.

2. MATERIALS AND METHOD

Flashcard, according to [9] ,is a visual-based learning media, initially in the form of black and white paper and only presenting writing. *Glenn* And *Janet Doman* also records usage *flashcards* in written form without pictures. *Flashcard* designed to develop language skills: listening, speaking, reading and writing. *Flashcards* with illustrations such as pictures or graphs are more effective because they help connect concepts and make abstract ideas more concrete. This research focuses on developing flashcards in digital form with multimedia content to remember terms in the field of business economic [10] .

This research falls into the category *Research and Development (R&D)* which aims to design, develop and validate innovative educational[11] . By adopting the model Borg and Gall which has been simplified by [12] , this research provides flexibility for researchers to adapt research steps to specific needs, as well as considering time and funding limitations which often become challenges in the research process [13] .

This research process is divided into three systematic and integrated phases including; preliminary studies, product development trials, and final product tests. This research aims to develop multimedia e-flashcard to improve student learning outcomes in Class XI Vocational School Business Economics subjects and to determine the level of validity, practicality and effectiveness of multimedia e-flashcard.

The test subjects in this research were students in class XI Accounting and Finance at SMK Negeri 3 Padang. The instruments used to collect data in this research include documentation, assessment forms, and questionnaires [14]. The type of data obtained consists of qualitative and quantitative data. Qualitative data was obtained from criticism and suggestions provided by media experts and material experts. This data was then compiled into one unit as material for evaluating the product being developed. Meanwhile, quantitative data was obtained from filling out questionnaires. The data is then processed in quantitative descriptive analysis, either through presenting the data in the form of tables, graphs or diagrams.

The questionnaire is the main instrument which contains statements to obtain information from students, teachers and lecturers, thus providing a comprehensive perspective [15]. The questionnaire used consisted of a material validation questionnaire addressed to Business Economics subject teachers at SMK Negeri 3 Padang, a media validity questionnaire given to two lecturers from the Department of Curriculum and Educational Technology, as well as a practicality questionnaire

distributed to students. Validity and practicality scores are calculated using empirical averages using the formula:

$$\underline{x} = \frac{\Sigma x}{n}$$

Information:
$\underline{x}$ = Average value
Σx = Number of values
n = Number of respondents
Source: [16]

After the validity and practicality values are obtained, the next step is to categorize them based on the level of validity and practicality. Based on [17], the following are the criteria for the validity of learning media which are determined by the scores obtained:

Table 1. Validity score interpretation criteria

Mark	Range	Category
5	X > 4,01	Very Appropriate/Very Valid
4	3,34 < X < 4,01	Appropriate/Valid
3	2,26 < X < 3,34	Suitable enough/Fairly valid
2	1,19 < X < 2,26	Inappropriate/Invalid
1	X < 1,19	Very Inappropriate/Very Invalid

According to [17] the following are the criteria for the practicality of learning media based on the values obtained.

Table 2. Practicality score interpretation criteria

Mark	Range	Category
5	X > 4,01	Very Practical
4	3,34 < X < 4,01	Practical
3	2,26 < X < 3,34	Quite Practical
2	1,19 < X < 2,26	Impractical
1	X < 1,19	Very Impractical

After that, an effectiveness test was carried out to see the increase in students' abilities and achievements after using multimedia *e-flashcard*. One way that can be done to measure the effectiveness of multimedia *e-flashcard* is to see the difference in results of pretest and *posttest* students use formulas *N-gain* [18] . Nilai *N-gain* determined using the following formula:

$$N\ Gain = \frac{Score\ Posttest - Score\ Pretest}{Shoes\ Ideal - Shoes\ Pretest}$$

Note: The ideal score is the maximum (highest) score that can be obtained.

Table 3. Value criteria *N-Gain*

Percentage (%)	Interpretation
< 40	Ineffective
41-55	Less Effective
56-75	Quite Effective
>76	Very Effective

Sumber: [19]

3. RESULTS

a. Preliminary Study Phase

Preliminary studies play a crucial role in this research, with the main aim of identifying problems, collecting data, and formulating the theoretical basis needed to develop effective learning solutions. This process includes several stages, namely literature study, field study, product drafting, product validation and revision.

1) Literature Study

This research examines theories relevant to multimedia development *e-flashcard* as a learning medium. In this context, research refers to the theory of the cone of experience *Dale*, which emphasizes the importance of real experience in the learning process. *The E-flashcard* that was developed was adapted from physical format to digital, with additions of QR Code for multimedia access, so it is hoped that it can create a more interesting and interactive learning experience, especially in Business Economics subjects at Vocational Schools.

2) Field Study

Field studies were carried out to collect data on students' needs through needs analysis questionnaires and data on student learning outcomes obtained from Business Economics subject teachers. The results of observations and discussions with Business Economics teachers show that there is a need for learning media that is able to attract students' attention and encourage active participation in the learning process. This data is relevant to the implementation of the Independent Curriculum at SMK Negeri 3 Padang, where the material will be used in multimedia *e-flashcard* specified in the MSME planning material.

3) Preparation of Product Draft

Preparing a product draft includes the stages of design development and product manufacture. Design is done by making a storyboard which was developed based on the results of literature studies and field studies. After that, product creation is carried out by producing a prototype, which functions as a real or functional version of the product *storyboard.* This prototype can be used for further testing and evaluation. The product draft in this development consists of 37 physical cards measuring 6 cm x 9 cm, which include 8 material cards, 25 question cards, 1 music card, 2 multimedia cards, and 1 information card which focuses on MSME planning material. Development *e-flashcard* done by using the application *Plotagon* and *Canva*, as well as uploaded to the platform *YouTube* and *Google Drive* for easier access. *Website* Other supporters, namely *Luvvoice* and *Song Generator* which is also used in the development of multimedia content, including animation, background music, and material explanation videos.

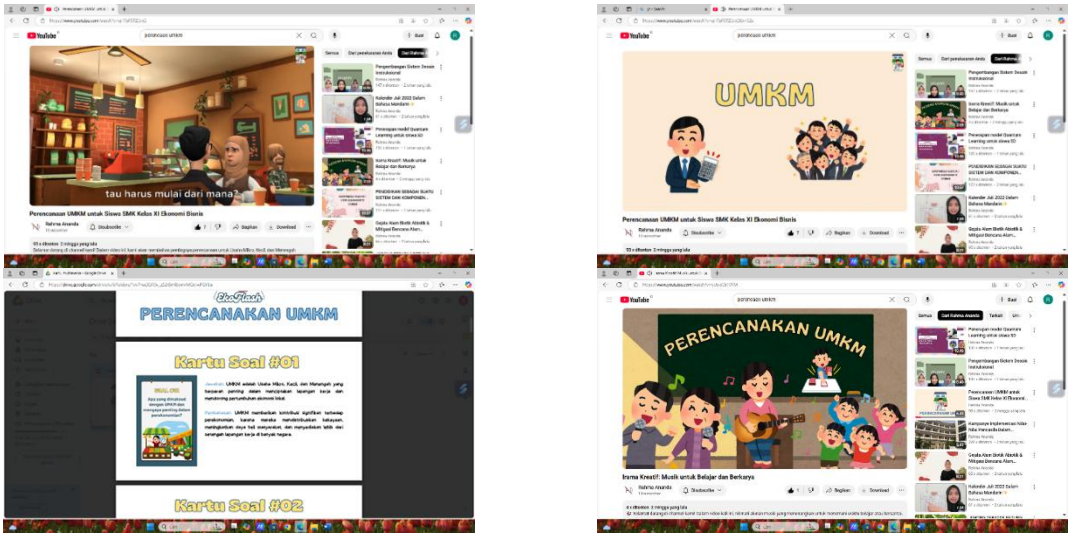

Figure 1. Product Development Results

4) Material Validation

Material validation is carried out by assessing the draft by experts in the field, aiming to ensure the accuracy and suitability of the multimedia content *e-flashcard*. The assessment was carried out through a questionnaire given to Business Economics teachers in class XI Phase F at SMK Negeri 3 Padang. The validation results showed that the suitability of the material obtained an average score of 5.00, which was categorized as "Very Suitable." This indicates that the material is a deep *e-flashcard* suitable for use in the learning process. Details of the validation scores are presented in the following table:

Table 4. Results of material validation assessment

Aspect	Indicator	Assessment	Aspect Average
Content Eligibility	1	5	5
	2	5	
	3	5	
Linguistic Aspect	4	5	5
	5	5	
Presentation Aspects	6	5	5
	7	5	
	8	5	
Amount		**40**	
Rate-Rata		**5,00**	

5) Media Validation

Media validation aims to evaluate the media elements in the product so that they suit user needs. This process is carried out by media experts, namely lecturers from the Educational Technology and Curriculum Study Program. The results of media validation show that the average score obtained from Validator 1 was 5.00, which is in the "Very Valid" category, while Validator 2 gave an average score of 4.78, also in the "Very Valid" category. After going through a validation process by experts and carrying out revisions based on input and comments received, it can be concluded that multimedia *e-flashcard* meet the validity criteria and are suitable for application in a learning context. The results of the media validation assessment can be seen in the following table:

Table 5. Media validation assessment results

Aspect	Indicator	Assessment		Variable Average	
		Validator 1	Validator 2	Validator 1	Validator 2
Appearance	1	5	5		
	2	5	5	5	5
	3	5	5		
Design and Layout	4	5	5		
	5	5	5		
	6	5	5	5	5
	7	5	5		
	8	5	5		
Audios and videos	9	5	4		
	10	5	5	5	4,33
	11	5	4		
Amount		**55**	**53**	**15,00**	**14,33**
Rate-rate				**5,00**	**4,78**

6) Product Revision

The revisions made include replacing the voice of the narrator who previously used voice *AI (Artificial Intelligence)* to be a real human voice.

b. Product Development Trial

This trial includes two stages, namely a limited trial and a more extensive trial which aims to measure the level of multimedia practicality of an e-flashcard. This limited practicality trial involved 16 students from class XI. The results of limited trials show that multimedia *e-flashcard* developed obtained an average score of 4.66, which falls into the category of "Very Practical." The results of the limited trial can be seen in the following table:

Table 6. Trial results are limited

Aspect	Item	Average of Each Aspect	Category
Appearance	1-5	4,55	Very Practical
Audio and Video	6-9	4,63	Very Practical
Design and Layout	10-13	4,72	Very Practical
Ease of Use	14-15	4,81	Very Practical
Presentation of material	16-18	4,56	Very Practical
Usefulness	19-20	4,69	Very Practical
Rate-rate		4,66	Very Practical

Next, a wider trial was carried out involving 48 students from class XI who had not been involved in limited testing. The results of this trial show that multimedia *e-flashcard* earned an average score of 4.35, which is also in the "Very Practical" category. Based on assessments from product development trials, it can be concluded that multimedia *e-flashcard* practical for use in learning.

Table 7. The test results are more extensive

Aspect	Item	Average of Each Aspect	Category
Appearance	1-5	4,20	Very Practical
Audio and Video	6-9	4,25	Very Practical

Design and Layout	10-13	4,43	Very Practical
Ease of Use	14-15	4,38	Very Practical
Presentation of material	16-18	4,40	Very Practical
Usefulness	19-20	4,44	Very Practical
Rate-rate		4,35	Very Practical

c. Test the Final Product

Final product testing is carried out to measure product effectiveness. Effectiveness measures the extent to which media achieves the desired targets, assessed by quality, quantity and time (Zagoto & Yarni, 2019). The process starts with a pre-test to measure the initial abilities of participants. After interacting with the e-flashcard, do a *post-test* to assess changes in knowledge and skills. Questions contained in the question *pretest* and *posttest* are the same. Effectiveness in learning includes the success and efficiency of learning objectives, by comparing grades *pretest* and *posttest*. This trial involved 35 students in class XI. Following is the test results data *N-gain* of value *pretest* and *posttest*:

Table 8. Effectiveness test results

CALCULATION *N-GAIN SCORE*							
No	**Initials**	***Pre-test***	***Post-test***	**Post-Pre**	**Skor ideal (100-for)**	***N-Gain Score***	***N-Gain Score* (100%)**
1	WE BUY	35	90	55	65	0,85	84,62
2	ANP	50	90	40	50	0,8	80
3	ASP	75	100	25	25	1	100
4	AN	75	100	25	25	1	100
5	AP	80	100	20	20	1	100
6	THIS	70	100	30	30	1	100
7	CTF	70	100	30	30	1	100
8	THAT	85	100	15	15	1	100
9	IS	75	90	15	25	0,6	60
10	FAAT	70	95	25	30	0,83	83,33
11	FB	80	100	20	20	1	100
12	FH	85	100	15	15	1	100
13	GCK	85	100	15	15	1	100
14	KZ	65	100	35	35	1	100
15	KVS	70	95	25	30	0,83	83,3
16	MOM	75	100	25	25	1	100
17	MPP	50	100	50	50	1	100
18	MF	65	85	20	35	0,57	57,14
19	MGR	80	100	20	20	1	100
20	MVPS	80	100	20	20	1	100
21	NZ	75	95	20	25	0,8	80
22	NS	80	100	20	20	1	100
23	E.G	75	100	25	25	1	100
24	NHF	85	100	15	15	1	100
25	OGP	70	100	30	30	1	100
26	RZW	70	100	30	30	1	100
27	SH	35	95	60	65	0,92	92,31
28	SSR	75	100	25	25	1	100

29	SNA	75	100	25	25	1	100
30	SO	55	100	45	45	1	100
31	SM	85	100	15	15	1	100
32	SL	85	100	15	15	1	100
33	SE	80	100	20	20	1	100
34	TM	70	100	30	30	1	100
35	YMN	85	100	15	15	1	100
MEAN		72	98,14	26,14	28	0,95	**94,88**

Based on table 8 above, the results of the effectiveness test show an average score of 94.88%, which is included in the "Effective" category based on the criteria *N-gain* which is triggered by Hake (1999) so it can be concluded that the use of multimedia *e-flashcard* effective in improving student learning outcomes in class XI Vocational School Business Economics subjects.

d. Discussion

Multimedia development *e-flashcard* as an innovative learning media that integrates conventional and digital media to improve students' memory of learning material through real, concrete experiences. This approach is in line with the theory of Edgar *Dale* which shows that real experience achieves 90% efficiency in the learning process. *E-flashcard* aims to improve understanding of the material by providing easy access to interactive content, encouraging student engagement, and facilitating independent and collaborative learning.

The development process utilizes various *platform* technologies, like *Canva, Plotagon, Luvvoice, Song Generator, YouTube, and Google Drive,* to create dynamic content. The development stage includes creating animations that illustrate key concepts and in-depth explanatory videos related to the material being taught. Apart from that, question cards and answer cards are also made as additional learning aids, equipped with *QR Code*. All digital components are combined and uploaded to *YouTube* and *Google Drive* to ensure high accessibility. With this way, *e-flashcard* be an efficient learning tool and create a fun and interactive learning experience. [20] stated that digitalization in a global society encourages changes in the learning process in schools, so teachers and students need to understand digital technology well. By integrating technology and providing instant feedback through quizzes, *e-flashcard* offers the flexibility of studying at various times and locations.

Multimedia development *e-flashcard* produced a product in the form of 37 physical flashcards measuring 6 cm x 9 cm, which aims to create an interactive learning experience in the Business Economics subject. Card components include material cards, question cards, music cards, multimedia cards and information cards, designed to increase student involvement and motivation. *E-flashcard* equipped with *QR Code* which provides direct access to animated videos and quiz discussions, enriching the learning experience with visual representations. The songs created add to the fun, temporary learning atmosphere *QR Code* on multimedia cards allows printing as needed, providing flexibility in material management. The information card also includes the researcher's contacts to help overcome barriers to use. *E-flashcard* supports various learning methods, both individual, pairs and groups, and can be accessed at home and school.

It is hoped that this interactive feature can increase students' interest and understanding, contribute to better learning outcomes and higher academic achievement. Multimedia development *e-flashcard* offers a relevant and effective approach to modern education, contributing to improving the quality of education in the digital era. The validity test involved one material expert and two media experts, resulting in an average score of 5.00 for material validity and 5.00 and 4.78 for media validity, the overall score was included in the "Very Valid" category. These results show that *e-flashcard* suitable for use in learning. The practicality test on

64 students showed an average score of 4.66 and 4.35, both in the "Very Practical" category. The effectiveness test shows an increase in student learning outcomes with an average score of 94.88%, concluding that *e-flashcard is effective* in improving learning outcomes in Business Economics subjects in Class XI Vocational Schools, especially in the Institutional Accounting and Finance program.

4. CONCLUSION

Research on multimedia development using a development model *Borg and Gall* produce multimedia *e-flashcard* which can help teachers in delivering learning material. Product validity test results *e-flashcard* which had been developed in the material aspect obtained an average score of 5.00 in the category "Very Suitable." The results of the media validity test which were tested by two media validators, obtained an average score from validator 1 of 5.00 in the "Very Valid" category and from media expert 2 of 4.78 in the "Very Valid" category. Based on this description, it can be concluded that multimedia *e-flashcard* have been valid for use in the learning process. Limited practicality test results of multimedia products *e-flashcard* that have been developed received an average score of 4.66 in the "Very Practical" category, and wider trials obtained an average score of 4.35 in the "Very Practical" category. Based on this assessment, multimedia *e-flashcard* which was developed practically for use in learning. The effectiveness test results show an average *N-Gain Score* of 94.88%, which is included in the "Very Effective" category. Based on this assessment, it can be concluded that the use of multimedia *e-flashcard* effective in improving student learning outcomes in Business Economics subjects in class XI Vocational Schools. Thus, the development of Multimedia *E-flashcard* proven to be an innovative tool and has great potential in increasing the effectiveness of Business Economics learning in Class XI Vocational Schools, providing a more dynamic and interesting learning experience for students in the digital era.

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