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Develop Website Pocket Book with PjBL to Enhance UI/UX Basic Competence

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Abstract. The advancement of information and communication technology has provided opportunities to develop innovative and interactive learning media. One of the main challenges in teaching UI/UX material to 11th – grade DKV student at SMK PGRI 2 Sidoarjo is how to deliver the material effectively so that student can master the basic competencies. A web-based pocketbook learning media with the Project Based Learning (PjBL) model is expected to be a solution to enhance studentd understanding of UI/UX subjects in the 11th-grade DKV class at SMK PGRI 2 Sidoarjo. This research employs the Research and Development (R&D) method using the ADDIE model. The result show that the use of a web-based pocketbook media with the PjBL model successfully improved students' basic competencies in UI/UX material. Student demonstrated improvement in their understanding of basic UI/UX concept, user interface design skill, and collaboration abillities. Additionaly, this media received positive feedback from both students and teachers, particularly in terms of accesibility, interactivity, and the availability of easily accesible material throught the web platform. The use of the web-based pocketbook learning media proved effective in improving student learning outcomes, especially in UI/UX material that requires a practical and interactive approach. The applied PjBL model provided students with the opportunity to learn through hands-on experience in working on projects, which ultimately enhanced their concepts and skills.

Keyword: Basic competencies; Learning media; Pocket Book; Project Based Learning; UI/UX

1. Introduction

Education is one of the most important things in a person's life. It is also a cultural endeavor that requires learners to continuously develop their creativity in order to survive in life. Therefore, an active and participatory attitude must always be present in learners. The right curriculum and education policies will not produce perfect results if learning practices in schools are still not optimal. One of the problems that exist in Indonesian education is the weak learning process. The implementation of learning, including the use of innovative and creative learning models, is closely related to the success of the learning process (Ismuwardani, Z. et al 2018)

The Indonesian government, particularly the Ministry of Education, Culture and Technology, faces significant challenges in improving the quality of education in the country. The Ministry is developing a more advanced and high-quality education system. The curriculum that the Ministry of Education, Culture and Technology is currently applying to education in Indonesia is the Merdeka Belajar Curriculum. One of the characteristics of the Merdeka Belajar Curriculum is project-based learning which aims to improve students' general skills according to the profile of Pancasila learners (Zakso, A. 2022).

In the current era of globalization, education and technology are prerequisites that must be met in order to increase educated and trusted human resources (HR). Education has an

important role in helping individuals live a better life, while technology will encourage humans to create a tool (Halean et al 2021). Educational experts continue to develop learning media by following the development of increasingly advanced technology.

SMK PGRI 2 Sidoarjo has several majors, one of which is DKV which studies the elements of design software which includes UI/UX Design material. In the learning process, this subject is divided into two activities, namely theory and practice. Based on observations with the teacher of class XI DKV SMK PGRI 2 Sidoarjo, it is known that most students do not understand UI/UX Design material.

In the implementation of this learning, the teacher still applies teacher centered learning methods that focus on the teacher as an active source of knowledge. Whereas in the current independent curriculum, students are required to be active in the learning process. These problems can affect the achievement of learning objectives. The use of books in the learning process is also not fully able to facilitate learning because students will tend to get bored. This can also have an impact on the difficulty of students to understand the subject.

Based on some of the explanations above, it is necessary to have a new innovation in improving the learning model and learning media that can support the learning process, where the media can help students to understand learning concepts related to the material being studied.

With these problems, researchers will prove that the use of teaching materials and interesting learning models can create teaching and learning activities that are not boring so that they can build an effective, interesting, interactive, and fun learning atmosphere that can increase student interest and learning outcomes through research entitled "Designing Learning Media Pocket Book with PjBL Learning Model on UI/UX Design Material for Class XI DKV".

2. Methods

2.1 Research Method

This type of research is using Research and Development (R&D) research with the ADDIE development model. This research method is used to make certain products and test the effectiveness of the products (Iskandar, M.F. et al 2022). The research design used is using the Posttest Only Control Group Design method.

Table 1 Research Design

Group	Treatment (X)	End
K_1	Pocket Book learning media with Project Based Learning model	O_1
K_2	Teacher centered learning method	O_2

(Source: Sugiyono, 2011: 206)

Description:
K_1 = Experiment Class 1
K_2 = Experiment Class 2
X = Treatment
O_1 and 0_2 = Posttest

This research procedure refers to the ADDIE development model developed by Robert Maribe Brach (2009) with the stages of Analysis, Design, Development, Implementation, Evaluation. The development design in this study is illustrated by the flowchart in Figure 1.

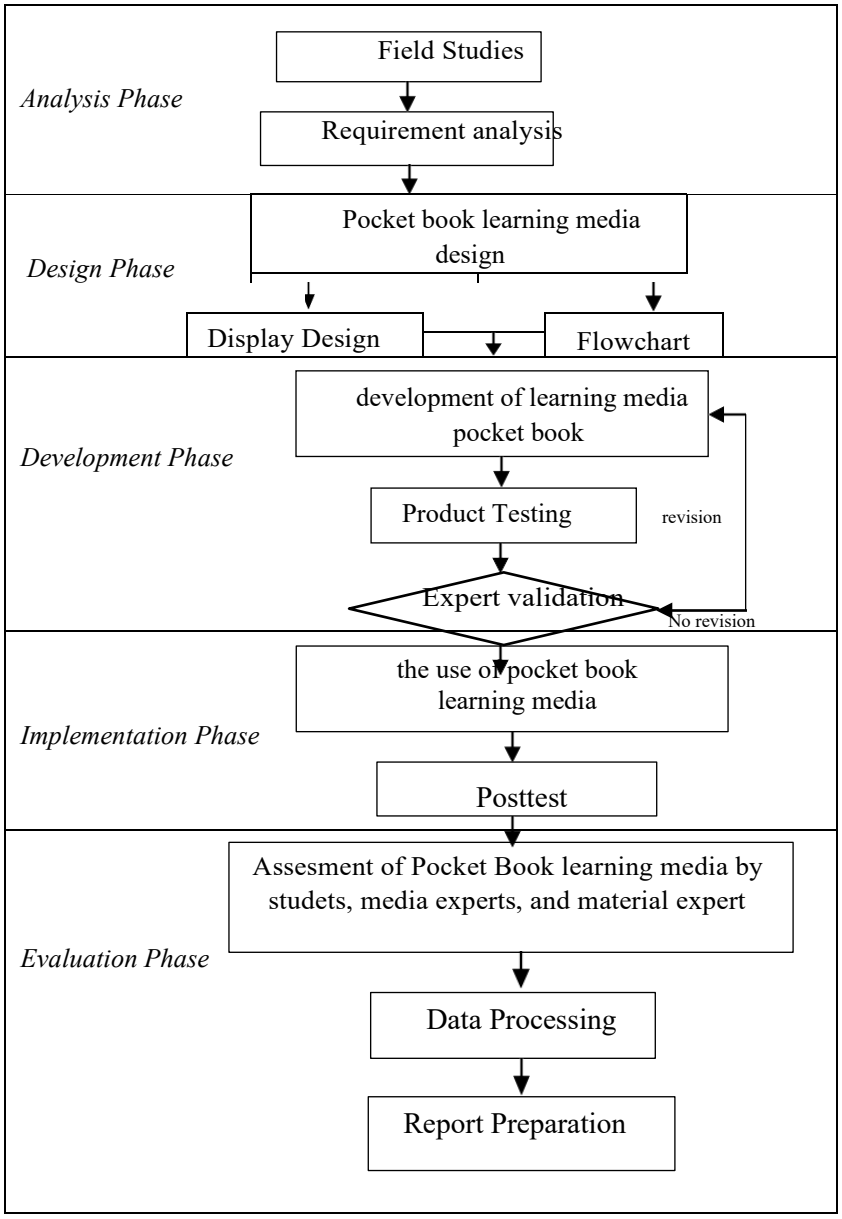

Figure 1 Flowchart Development Design

The research process comprises several stages: Analysis, Design, Development, Iplementation, and Evaluation. In the analysis stage, the research observed classroom activities, focusing on the learning model applied by the teacher. Observations were also conducted on UI/UX Design materials, which were then selected as content for the pocketbook learning media using samples from class XI DKV. At the design stage, the researcher began creating the application design using the Unified Modeling Language (UML) approach.

During the development stage, the learning media was produced according to the established format. This stage involved several steps, including interface creation, application

testing, and expert validation. The following stage, implementation, was carried out by testing the media with users. Finally, the evaluation stage aimed to identify user feedback and responses toward the developed learning media.

2.2 Data Analysis Technique

The validation data were examined through descriptive precentage analysis. The percentage value was determined by comparing the total scores from validators with the predetermined standart criteria. In addition, the result of the questionnaires completed using the Likert scale served as the basis for the analysis.

2.2.1 Validation Assessment Analysis

The data that has been collected is then calculated using the formula applied to get the value of the validation results as follows:

$$interpretation\ of\ scores(\%) = \frac{number\ of\ scores\ obtained(xi)}{maximum\ score(x)} \times 100$$

Abadi, R.F., et al (2024)

The resulting score is then interpreted with the criteria for the percentage of validity of learning media in the following Table 2.

Table 2 Criteria for Media Validity Precentage

Precentage Range	Category
81% - 100%	Highly valid
61% - 80%	Valid
41% - 60%	Fairly valid
21% - 40%	Less valid
0% - 20%	Not Valid

Abadi, R.F., et al (2024)

2.2.2 Analysis of Student Response Assessment

The feasibility of Website-based Pocket Book media was assessed by analyzing student responses collected through questionnaries administered after the media was used.

$$assessment\ percentage = \frac{\sum T}{\sum ST} \times 100\%$$

Auliya, L., & Lazim, N. (2020)

Description:

$\sum T$ = Total Score

$\sum ST$ = Number of Highest Scores

The results of the analysis produce a percentage which is then interpreted into the criteria score in the following Table 3.

Table 3 Criteria score

Presentase	Assesmen
81% - 100%	Very good
61% - 80%	Good
41% - 60%	Good enough
21% - 40%	Not good
0% - 20%	Very not good

2.2.3 Analysis of Student Learning Outcomes

In this study, the analysis of student learning outcomes was used to determine whether there were differences in scores between the control class and the experimental class. Therefore, researchers will conduct normality tests, homogeneity tests, and hypothesis tests in this analysis. Hypothesis testing uses an independent sample t-test with the following criteria:

a) When the significance level of the t-test exceeds 0.05, H0 is accepted while Ha is rehected, indicating no significant effect of the independent variable on the dependent variable.
b) Conversely, if the significance value of the t-test is below 0.05, H0 is rejected and Ha is accepted, meaning that the independent variable significamly influences the dependent variable.

3. Results and Discussion

3.1. learning media results

Presented below are the stages of making pocket book learning media:

3.1.1 Analysis

At this stage, a needs analysis is carried out which includes analyzing field conditions and collecting various references that support research and media design. The results of information about the learning process obtained when carrying out PLP are the lack of learning media facilities and ineffective learning models in UI/UX Design subjects.

3.1.2 Design

At the design stage, researchers began the application design process with the Unified Modeling Language (UML) model including Use Case Diagram, Activity Diagram, and Class Diagram.

3.1.3 Development

During the development phase, the researchers began to build educational media. Development is carried out starting from interface development, expert validation, and testing.

1) Interface development

The figure illustrated the design of pocket book learning application designs that were developed.

a) Login Page

When starting the application, the login page will appear. In the pocket book website there are two users, namely teachers and students. The login page can be seen in Figure 2.

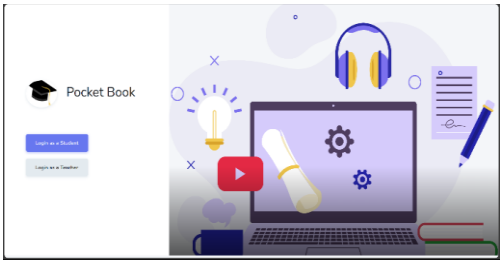

Figure 2 Login Page

b) Student Home Page

After successfully logging in as a student, it will switch to the dashboard page. The following figure 3 is an image of the student dashboard page.

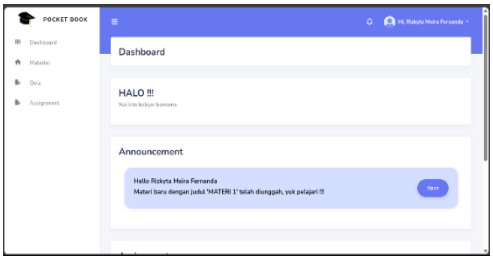

Figure 3 Student Home Page

c) Teacher Dashboard Page

After successfully logging in as a teacher, it will switch to the dashboard page. The following figure 4 is an image of the teacher dashboard page.

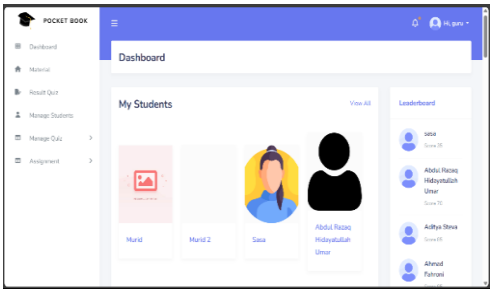

Figure 4 Teacher Dashboard Page

d) Student Material Page

In the following figure there is an image of the student material page which contains material that has been inputted by the teacher.

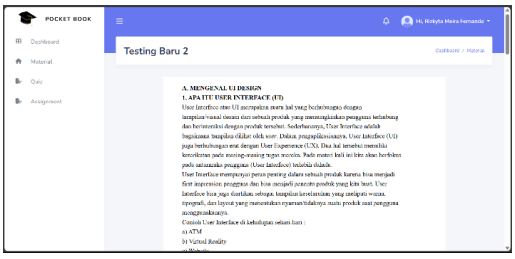

Figure 5 Student Material Page

e) Quiz Page

In the following figure there is a picture of the quiz page of the pocket book website.

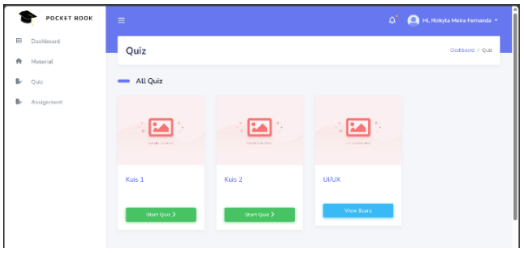

Figure 6 Quiz Page

f) Task Collection Page

In the following figure is the task collection page by students

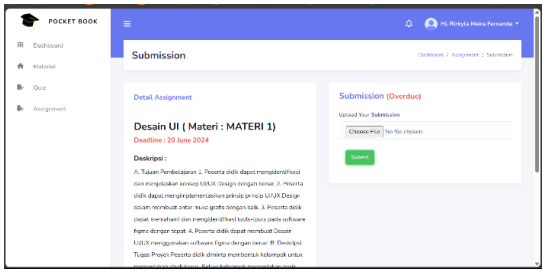

Figure 7 Task Collection Page

g) Material Manage Page

In the following figure is the material upload page by the teacher

Figure 8 Material Manage Page

3.1.4 Implementation

The implementation phase refers to the process of using pocket book learning media with the PjBl learning model in learning activities. Before the insttructional media is applied, validation is conducted to test its feasibility in the learning process. The pocket book media and PjBl model are applied within the instructional process in order to prove that the media and learning model can enhance students academic achievment, diidk participants' interest as well as encourage student engagement during the learning.

3.1.5 Evaluation

The evaluation phase is intended to identify the shortcomings and advantages in using pocket book educational media. The findings from this evaluation are presented within the research suggestions section.

3.2 Black Box Testing

To ensure that the system developed has met expectations, testing is performed through the Black Box method. The outcomes of the BlackBox testing conducted in this study are displayed in Table 4 below.

Table 4 Result of Black Box Test

No.	Test Case	Expected Result	Test Result	Status
1	Leave the login form blank, then click the login button	The message ‘please fill in your email and password’ will appear and the system will reject the login request.	Matches expectation	Verified
2	Fill in the login form with an unregistered email and password	Will display an error message	Matches expectation	Verified
3	Teachers add and delete materials	If the uploaded material is in accordance with the format it will succeed	Matches expectation	Verified

No.	Test Case	Expected Result	Test Result	Status
4	Teachers add and delete students	If you have filled in student data according to the format, it will succeed	Matches expectation	Verified
5	Teachers upload assignments	If the uploaded assignment is in accordance with the format, it will succeed	Matches expectation	Verified
6	Teachers upload and delete quiz questions	If the uploaded quiz questions are in accordance with the format, it will be successful.	Matches expectation	Verified
7	Students upload assignments	The uploaded assignment will succeed if it follows the predetermined format.	Matches expectation	Verified
8	Students do quiz questions	Display quiz questions along with the processing time	Matches expectation	Verified

3.3 Discussion of Validation Results

3.3.1 Validation Assessment Analysis

Based on the Table 5, it can be concluded that this study received a score of 92.5% for material validation with a very valid statement, for question validation it got a score of 96.25% with a very valid statement, 90% for lesson plan validation with a very valid statement, and 88.3% for media validation with a very valid statement. From these four aspects, the average value for the validation results was 91.76% with a very valid statement. The following score validity is presented in the Table 5 and figure 9 for validity graph.

Table 5 Score Validity

Aspect	Validity	Description
Material	92.50	Very Valid
Question	96.25	Very Valid
RPP	90.00	Very Valid
Media	88.30	Very Valid
Average	91.76	Very Valid

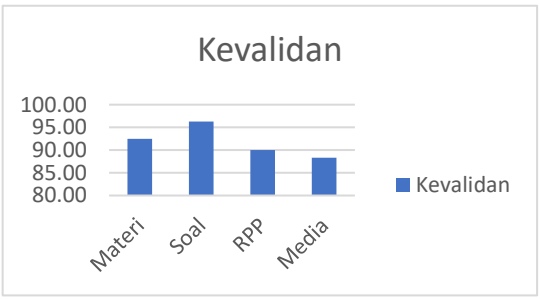

Figure 9 Validity Graphic

3.3.2 Student feedback assessment results

Student response data was collected through questionnaires distributed after the application of learning media. Referring to the outcomes of calculations that were conducted, student responses to pocket book learning media show a mean score of 87.82% which belongs to the very good response classification. The complete data is presented in the Table 6 below.

Table 6 Student Response Assesment Result

Sum of Score	Maximum Score	Presentase	Average
1449	50	2898	87.82

As shown in the table, it indicated that questionnaire finding indicated a very positive student response to pocket book learning media from experimental class students.

3.3.3 Analysis of Learning Outcomes

This section explains the posttest results obtained during the study. The following are the average posttest scores obtained by the experimental and control classes.

Table 7 Learning Outcomes

	Posttest Result	
	Experimental Class	Control Class
Average	88.48	64.70

From the Table 7, it can be concluded that the mean score of the experimental group posttest exceeds that of the control group. The experimental group obtained a mean score of 88.48 whereas the control group achieved an average of 64.70.

At the next stage, the data analysis of the results of student learning competencies will be tested which involves normality, homogeneity, and hypothesis testing.

1) Normality Test

The purpose of the normality test is to assess if the data follow a normal distribution. In this research, the Sapiro-Wilk test was applied to evaluated normality. The computed result of the posttest normality analysis are presented in Table 8.

Table 8 Outcomes of Normality Analysis

	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Posttest Result	Experimental Class	.127	33	.194	.943	33	.086
	Control Class	.124	33	.200*	.960	33	.263

*. This represents the lower limit of the actual significance level

a. Lilliefors Significance Correction

The significance level for the experimental group was 0.086, while for the control group it was 0.263. This indicates that the posttest results for both groups follow a normal distribution, since the significance levels exceed 0.05.

2) Homogeneity Test.

The homogeneity test server to check whether the sample variables share equal variance. The homogeneity test outcomes for the posttest data are displayed in Table 9.

Table 9 Result of Homogeneity Analysis

		Levene Statistic	df1	df2	Sig.
Posttest Result	Based on Mean	9.777	1	64	.003
	Based on Median	9.492	1	64	.003
	Based on Median with adjusted df	9.492	1	54.559	.003
	Based on trimmed mean	9.745	1	64	.003

As Shown in Table 9, it is evident that the significance level obtained fr both the experimental and control group was 0.003, indicating that the posttest results have a significant value <0.05. This means that both classes have heterogeneous abilities.

3) Hypothesis Test
Based on the statistical analysis test, the posttest data is normally distributed and has different variants. Therefore, statistical analysis can be carried out using the t-test in order to examine the hypothesis. The test criteria to decide whether H0 or Ha should be accepted or rejected are as follows.

When the sig. (2-tailed) value exceeds 0.05, H0 is accepted while Ha is rejected. Conversely, if the Sig. (2-tailed) value is below 0.05, Ha is accepted whereas H0 is rejected. Based on statistics, the findings of the hypothesis testing are presented in Table 10.

Table 10 Hypothesis Test Result

		Levene Test for Equality of Variances		t-test for Equality for Mean					95% Confidence Interval of the Diference	
		F	Sig	t	df	One-Sided p	Two-Sided p	Mean Diference	Std Error Diference	Lower	Upper
Posttest Result	Equal variances assumed	9.777	.003	8.631	64	<.001	<.001	23.7879	27.561	18.2820	29.2937
	Equal variances not assume			8.631	51.393	<.001	<.001	23.7879	27.561	18.2559	29.3199

The results of hypothesis testing (t test) in the table above show that the significant value is 0.001 which is smaller than 0.05, so Ho is rejected and Ha is accepted. So that with the acceptance of Ha, it shows that pocket book learning media with the pjbl model can improve student competency results.

Conclusions

1. The design of Website-Based Pocket Book Learning Media with a project-based learning model for class XI DKV SMK PGRI 2 Sidoarjo has been carried out in accordance with the basics of research and can be said to be very valid by getting a calculation value of 88.3% by media experts, 92.5% by material experts 96.25% by question experts and 90% by rpp experts. The design of pocket book learning media also received a good response through students by getting an average score of 87.82%.
2. “Develop Website Pocket Book with PjBL to Enhance UI/UX Basic Competence” has been proven to be able to improve students' basic competencies. This is proven through an independent sample t test with 2 treatments, namely the experimental class and the control class by applying a post-test. The experimental class uses website-based learning media. The results of hypothesis testing (t-test) show a significant value of 0.001, which means <0.05, so Ho is rejected and Ha is accepted. With the acceptance of Ha, this shows that pocket book learning media with the pjbl model can improve student competence.

Suggestions

1. Website-based pocket book learning media with project-based learning models are expected to be used optimally by teachers and students, and can create an interactive learning atmosphere in the classroom.
2. For future developers, it is hoped that they can develop learning media with other subjects besides UI/UX Design and add more up-to-date features.

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