



## The Effectiveness of Learning with the Team Based Project Method in the Decision Making Technique Course by Using the Product Oriented Module

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### Abstract

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The purpose of this study is (a) to identify learning using the team-based project method implemented in practical courses using product-oriented modules in vocational education. (b) to know the level of effectiveness of learning with the team-based project method implemented in practical courses using a product-oriented module in Vocational Education. This study used research related to this study, which were all students who were taking the Decision-Making Technique course. The number of research samples was 60 people (2 classes) of the 2018 Business Administration study program as a field test, 9 people as a small group test and 3 people for an individual test. The results showed that from the material expert, 4 aspects were assessed in the material expert test, namely the material aspect, the quiz question aspect, the linguistic aspect and the implementation aspect. The material aspect has a higher percentage value than the other three aspects, namely 85.45%, then the questions and quiz aspects and the implementation aspect have 80%, while the linguistic aspect has 60%. With this percentage value, the overall assessment of the material experts assesses that this learning media was considered "Eligible" to be developed. Based on the results of the t-test calculations, data obtained that  $t_{count} > t_{table}$  or  $5,868 > 2,0172$  or in other words  $H_0$  is rejected and  $H_1$  is accepted, it can be concluded that the learning outcomes using Learning Methods of Team Based Learning on practice course with Product-Oriented Module was higher than students who were taught without using Learning Method of Team Based Learning In practical courses with Product-Oriented Modules with the effectiveness of using Learning Methods of Team Based Learning In practical courses with Product-Oriented Modules of 88,5667% .

### Keywords:

Team Based Learning, Team Based Project, *Product-Oriented Module*, *Expert Matery*, *Students' Response*

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## INTRODUCTION

Vocational Education is again a concern of the Government of Indonesia at this time. This is evidenced by the Vocational Education revitalization program into one of the Government Education and Culture programs. Vocational



Education embodies the relationship and equality between the academic world and the world of business and industry. Vocational education can also be obtained by the community through formal channels in Higher Education but still lacks of support. This is evidenced by the absorption rate of vocational graduates around 40% (Moerdijat, 2020). The main problem faced by Vocational Education in Indonesia is the rapid change in science and technology so that it is necessary to support curriculum changes that are able to balance the competence of graduates with the needs of the world of work. The government's effort to solve this problem is to make changes to the curriculum standards, namely the 2013 KKNI to the MBKM KKNI. This is done to equalize the quality of national and international education so that the Indonesian people are able to compete globally as stated in the Decree of the Minister of Education and Culture Number 83/P/2020. 3 of 2020 concerning National Higher Education Standards set by KEMDIKBUD. There are several national education standards regulated in these regulations, one of which is the standard of the learning process. The standard of the learning process is the minimum criterion for the implementation of learning in the study program in an effort to obtain graduate learning outcomes, so it is important to be reviewed and evaluated periodically by the Quality Assurance Institution in higher education.

Learning process is the core of the educational process. Learning is a process that contains a series of actions between lectures and students on the basis of reciprocal relationships in educational situations to achieve certain goals. The problem of vocational education is that the absorption of vocational graduates is low, for that the government enforces a policy of independent learning on an independent campus with the hope that students will be more directly involved with the industry. Thus, to support the creation of MBKM, MBKM KKNI is applied where the learning process used is team based project.

There are many previous studies that have been carried out regarding the effectiveness of learning models (Syahra et al., 2020) (Usmeldi et al., 2017) (Almulla, 2020), Project teams are likely to work under a high degree of stress and interpersonal demands that usually diminish performance (Pavez et al., 2021), little research is being done on the development of integrated digital platforms to connect all project teams (Ezzeddine and García de Soto, 2021). However, no research has been conducted regarding the appropriate stages for the team based project learning method that is specifically applied in practical courses. For this reason, this research is very important to ensure the effectiveness of the team based project method in practical courses. In addition, the stage of implementation of team based project become the novelty of this project.

The standard of the learning process is a guideline for lecturers in carrying out learning to be able to measure the achievement of learning outcomes. The learning process greatly affects the success of student learning. In other words, the way lecturers teach when transferring knowledge greatly affects student learning outcomes. Through the KEMDIKBUD policy at the KKNI MBKM 2020, the government promotes the team-base project method in the learning process. This method is believed to be able to encourage students to explore, assess, interpret, and synthesize information to produce various forms of learning outcomes so that

they are in accordance with the characteristics of practical courses. However, there are no clear stages that can be implemented in learning.

The characteristics of practical courses are identical to research-based and/or project-based learning models. Project based learning helped student to mainly improve interpersonal relationships and social skills, followed by positive interdependence and individual accountability (Aranzabal et al., 2022). However, lecturers often find it difficult to carry out learning according to the targeted implementation time (Wijaya et al., 2019) and other difficulties in the facilities, infrastructure, and costs needed to be able to complete certain research (Suryaningsih and Nisa, 2021) in an effort to foster an innovator spirit. To overcome this problem, this research uses learning module that directed and oriented to (*product-oriented module*) product. Based on previous research, it is stated that the Product oriented module is very suitable to be used by engineering students in an effort to improve cognitive abilities and innovation skills (Wijaya et al., 2021) (Wijaya, 2017), teaching-learning process (Idris et al., 2020), learning methods that focus on what students can do (Siti et al., 2021), innovation (S. Salmiah, Ana Rusmardiana, Andi Desfiandi, Aswin Aswin, Febrianty Febrianty, Andi Reni, Abdul Nesser Hasibuan, Iswandi Idris, 2020).

This study analyzes the effectiveness of the team-based project method learning carried out in practical courses using a product-oriented module.

## METHODS

This research was conducted at Politeknik LP3I Medan on Business Administration Study Program. The practical course devoted to this research is the Practical Decision-Making Technique course. The research was conducted for 10 meetings. The research sample related to this study were all students who were taking the Decision Making Technique course. The number of research samples was 60 people (2 classes) of the 2018 Business Administration study program as a field test, 9 people as a small group test and 3 people for an individual test. This type of research was research and development (R&D). The development model used is the Instructional Development Institute (IDI) model. The IDI model has been developed by the University Consortium for Instructional development and Technology (UCIDT) in America. This model used three stages, namely:

1. Limitation (Define), identification of problem begins with a need assessment to find differences between existing and ideal conditions. It is necessary to limit the main priorities of the problems to be solved, given the many needs in the learning process.
2. Development (Develop). It begins with an analysis of the instructional objectives to be achieved, both general and specific instructional. Next, choose the appropriate instructional method to achieve course learning outcomes.
3. Assessment (Evaluate), Furthermore, at the assessment stage, trials are carried out to determine the weaknesses and strengths, efficiency and effectiveness of the developed program. Evaluation can use instruments and tests/questions to measure validity, practicality, and/or effectiveness.

### Technique of Data Analysis

The data analysis technique used is qualitative and quantitative descriptive data analysis techniques and experimental data analysis. Analysis of qualitative and quantitative descriptive data was used to analyze the validity of the stages of the team-based project method using questionnaires and expert judgment methods. Experimental data analysis was used for the validity and reliability of the tests used and the t-test to see the difference in results between the experimental class and the control class statistically.

### Validity Analysis of Team-Based Project Method

The analysis of the validity of this research product was carried out using Aiken's V statistics. Aiken's V formula to calculate the content-validity coefficient based on the assessment of the expert panel of n people (Azwar, 2012:113). Assessment is done by giving a number among 1 to 5 on the assessment questionnaire sheet. Where the number 1 represents very irrelevant until the number 5 represents very relevant.

$$V = \frac{\sum S}{[n(c - 1)]}$$

Description :

$$S = r - lo$$

lo = the lowest validity rating score

c = the highest validity rating score

r = number provided by validator

The value of V is in the range of 0 to 1.00 then the number 0.677 can be interpreted as a fairly high coefficient and can be called valid, otherwise if it is not in that range it is called invalid.

**Tabel 4.1.** Eligibility Conversion Guidelines

No	Interval Skor	Nilai	Kategori
1	Percentage $\geq 81$	A	Very good
2	$61 \leq$ Percentage $\leq 80$	B	Good
3	$41 \leq$ Percentage $\leq 60$	C	Good enough
4	$21 \leq$ Percentage $\leq 40$	D	Bad
5	Percentage $\leq 20$	E	Very bad

### Research Test Data

In this study, the data will be obtained is the learning outcomes of students from the experimental class and the control class. The data analysis technique used is descriptive and inferential techniques. Descriptive technique is a statistical technique used to analyze data by describing the data that has been collected as it is without intending to make conclusions that apply to the public or generalizations. For example, presenting data using tables, graphs, pie charts,

pictograms, mode calculations, medians, mean, deciles, percentiles, averages, standard deviations, percentages, correlations, and regressions without significance testing. Inferential technique is a statistical technique to analyze data sample data and the results are applied to the population that is the probability of error and truth. The steps of data analysis techniques, are:

**a. Mean and Standard Deviation Test**

To determine the average value calculated uses the formula:

$$\bar{X} = \frac{\sum X}{n}$$

To find the standard deviation uses the formula:

$$SD = \sqrt{\frac{n \sum x^2 - (\sum x)^2}{n(n - 1)}}$$

**b. Normality test**

To test whether the sample is normally distributed or not, the normality test can be used with the test criteria, namely:

- a. Arrange student scores from the lowest to the highest score
- b. Observe  $X_1, X_2, \dots, X_n$  to be standard number  $Z_1, Z_2, \dots, Z_n$  by using the pattern :

$$Z_1 = \frac{X_1 - \bar{X}}{S}$$

Description :

$\bar{X}$  = Average value

S = Standard deviation sample

- c. Calculate the opportunity F ( $Z_1$ ), by using standard normal distribution list.
- d. Calculate proportions  $Z_1, Z_2, \dots, Z_n$  used by S( $Z_1$ ), so S

$$S(z_1) = \frac{\text{the number of } z_1, z_2, \dots, z_n \text{ that } \leq z_1}{n}$$

- e. Calculate the difference of F ( $Z_1$ ) – S ( $Z_1$ ) then take the absolute value.

Take the absolute price which is the largest among the absolute prices of the difference t. Sudjana (2005:466) said “The test criteria accept that the hypothesis is normally distributed if  $L_0 < L_{\text{tabel}}$  for real level  $\alpha = 0,05$  and if  $L_0 > L_{\text{tabel}}$  sample is not normally distributed”.

**c. Homogeneity Test**

The homogeneity test of the data is used to see whether the two samples have homogeneous variance or not, for this reason, the F test is carried out using the formula (variance using the F test) as follows:

$$F = \frac{\text{largest variance}}{\text{smallest variance}} \text{ or } F \frac{S_1^2}{S_2^2}$$

Description:

$S_1^2$  = largest variance  
 $S_2^2$  = smallest variance  
 Test Criteria :  
 If  $F_{count} < F_{table}$  = homogeneous  
 If  $F_{count} > F_{table}$  = inhomogeneous

**d. Effectiveness Analysis / Hypothesis Testing**

Analysis of the effectiveness of research products obtained from learning outcomes in the cognitive, affective, and psychomotor domains. Preparation for the assessment of cognitive aspects is compiling items. This study used a question bank that has been developed previously in previous studies. Furthermore, the results of the assessment of the three aspects were analyzed using the t test. This test can be carried out by distributing data on the value of competence in the two research classes, namely the control class and the experimental class. To calculate the difference test, the following formula is used:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

S is the combined variance calculated by the formula:

$$S^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{(n_1 + n_2) - 2}$$

Where:

- t : the value of education result
- $\bar{X}_1$  : The average value of each aspect in learning model experimental class of Prorised
- $\bar{X}_2$  : The average value of each aspect in the control class
- $n_1$  : Number of experimental class students
- $n_2$  : the number of control class students
- $S_1^2$  : variance on experiment class
- $S_2^2$  : variance on control class
- $S^2$  : combination variance

The criteria for testing significance,  $t_{count} > t_{table}$ , means that there is a change in student learning outcomes and if  $t_{count} < t_{table}$ , there is no change in student learning outcomes. In this study, the t-test was carried out using the SPSS software tool. The different test assessment criteria if the significant value (2 tailed)  $< 0.05$ , then  $H_a$  is accepted.

**Research Instruments of Learning Method for Team Based Learning**

The Validation Sheet for Material Experts is used by the Material Expert Validator (Table 1) for the assessment of the RPS for Learning Methods of Team Based Learning at course. Practice with Product-Oriented Module.

**Table 1.** Instrument / Validation Sheet for Material Expert

No	Aspect	Indicator	Statement
1	Material	Suitability of Material with Purpose	The suitability of the material with basic competencies
			The suitability of the material with the indicators
			The suitability of the material with the learning objectives
		Material Depth	The material discussed in the full media
		Systematic, Coherent, Clear Logic	The material presented is systematic
			The material presented is clear
			The material presented is in an attractive way
			The material presented is easy to understand
			Practical Activities are arranged as attractive as possible with Product-Oriented Modules.
			Practical activities are carried out actively with Product-Oriented Modules.
Practical activities are in accordance with learning with Product-Oriented Modules.			
2	Exercise/Quiz	Exercises / Quizzes are arranged using the Project Based Learning method	Exercises are clearly formulated using the Project Based Learning method
			Exercises in the media complete with the Project Based Learning method
			Exercises according to theory and concepts with the Project Based

			Learning method The answer key is in accordance with the exercises using the Project Based Learning method Evaluasi konsisten dengan tujuan pembelajaran dengan metode <i>Project Based Learning</i>
3	Language	Language Communicative	The language used is communicative The terms and questions used are appropriate and appropriate
4	Execution	Team Involvement in Project Based Learning	The material presented can motivate students to learn Students are more active in doing learning activities

source: (Wahono, 2021)

The student response instrument (Table 2) was used during the development test. This questionnaire is used to determine student responses to the RPS Learning Method of Team Based Learning at course. Practice with Product-Oriented Module.

**Table 2.** Instrument / Student Response Sheet

No	Aspect	Indicator	Statement
1	Material	Suitability of Material with Purpose	The suitability of the material with basic competencies
			The suitability of the material with the indicators
		The suitability of the material with the learning objectives	
		Material Depth	The material discussed in the full media
2	Testability	Systematic, Coherent, Clear Logic	The material presented is systematic
			The material presented is clear
			The material presented is in an attractive way
			The material presented is easy to understand

			Practical Activities are arranged as attractive as possible with Product-Oriented Modules.
			Practical activities are carried out actively with Product-Oriented Modules.
			Practical activities are in accordance with learning of Product-Oriented Modules.
3	Team Involvement in Project Based Learning	Exercises / Quizzes are arranged using the Project Based Learning method	Exercises are clearly formulated using the Project Based Learning method
			Exercises in the media complete with the Project Based Learning method
			Problems according to theory and concepts with the Project Based Learning method
			The answer key is in accordance with the questions using the Project Based Learning method
			Evaluation is consistent with learning objectives with the Project Based Learning method
			The terms and questions used are appropriate and appropriate
	Activity	The material presented can motivate students to learn	
		Students are more active in doing learning activities	

source: (Wahono, 2021)

### Learning Outcomes Instrument

Student test sheets are used to measure students' understanding of the practical material that has been given. There are two sheet tests given to students, namely the pretest sheet and the posttest sheet.

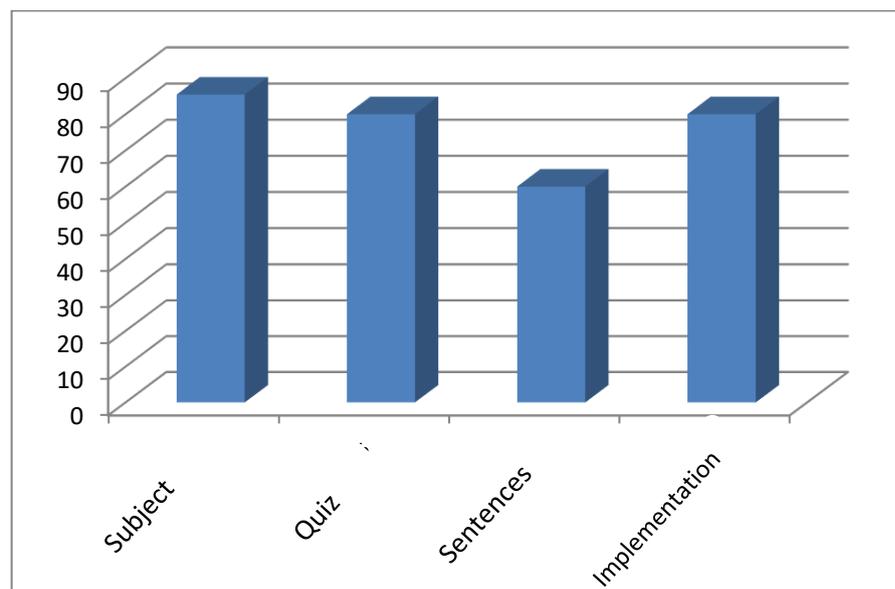
## RESULTS & DISCUSSION

### Results

#### Material Expert Validation

Material validator on the RPS assessment of Team Based Learning Learning Methods at course. Practice with Product-Oriented Module. The material expert is a validator who is considered an expert in this learning method. The goal is to measure the level of accuracy and quality of the RPS presented in the form of RPS. Team Based Learning Learning Method at the Constitutional Court. Practice with Product-Oriented Module.

The material expert instrument uses 4 aspects which are developed into several indicators for each existing aspect. From Figure 1, it can be seen that there are 4 aspects that are assessed in the material expert test, namely the material aspect, the quiz question aspect, the linguistic aspect and the implementation aspect. The material aspect has a higher percentage value than the other three aspects, namely 85.45%, then the questions and quiz aspects and the implementation aspect have a percentage value of 80%, while the linguistic aspect has a percentage value of 60%. With this percentage value, the overall assessment of the material experts assesses that this learning media is considered "Eligible" to be developed.



**Figure 1.** Material Expert Assessment Results

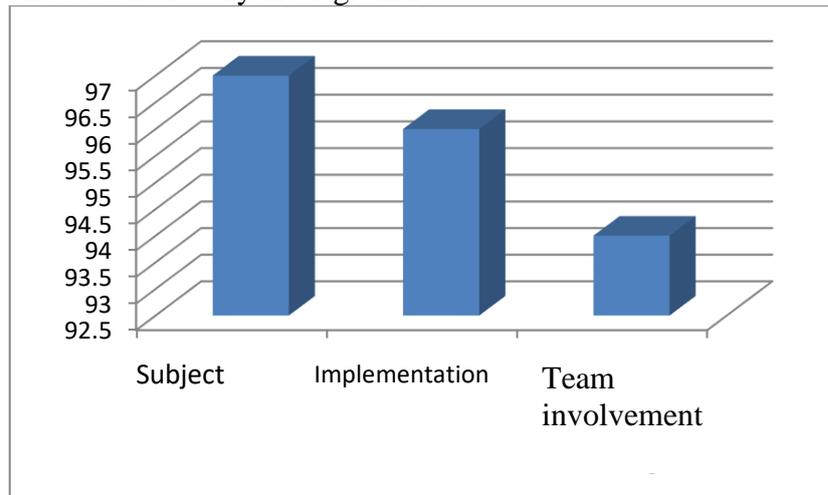
### **Test Result Data for Phase II Individual Trial**

Individual trials were conducted in the 2018 Business Administration Study Program Class. Individual trials were conducted on 3 students of class AB.18.01 consisting of 1 student with high achievement, 1 medium achiever and 1 low achiever. The purpose of this individual trial is to identify the shortcomings of the learning method that will be developed after being reviewed by experts. The assessment and input from this trial is about the presentation of the RPS for the Team Based Learning Learning Method at course. Practice with Product-Oriented Module. covers several aspects, namely:

- a. Material
- b. Execution
- c. Team Involvement in Project Based Learning

The results of individual trials in the form of an assessment score on the development of android-based interactive learning media using 4 question items. Based on the results of individual trials, aspects of Team Involvement in Project

Based Learning were considered very well by students with a percentage value of 94%. Based on the assessment table of the results of individual trials by 3 students on these three aspects, it can be concluded that the RPS Learning Method of Team Based Learning on course. Practice with the Product-Oriented Module is very suitable for small group trials according to the recommended revision. The overall average score of the three aspects is 96 which is qualitatively categorized as “very decent” (X 81%). The results of the individual trial assessment on the three aspects can be seen visually in diagram 2.



**Figure 2.** Bar Chart of Individual Trial Assessment Results

Based on the diagram above, the larger material aspect has a presentation value of 97% and is higher than the implementation aspect, which is 96% and the team involvement aspect in Project Based Learning is 94%.

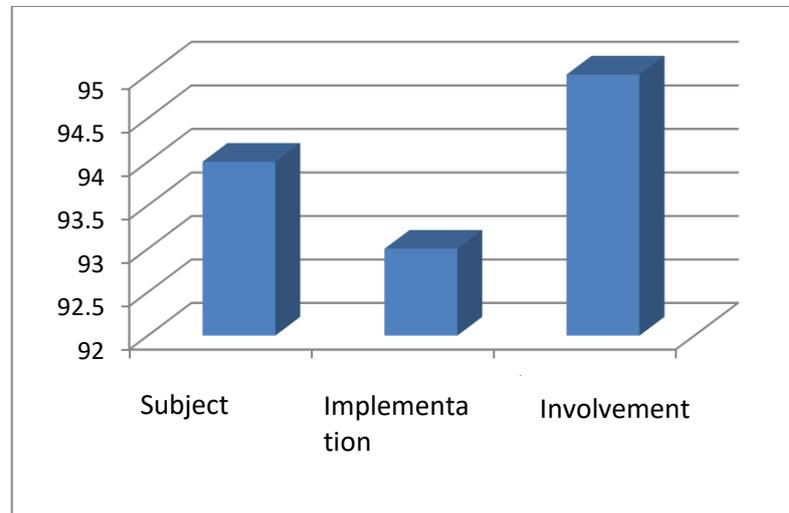
### **Test Result Data for Phase III Small Group Trial**

Small group trials were conducted in the 2018 Business Administration Study Program Class. Individual trials were conducted on 9 students of class AB.18.01 consisting of 3 students who had high achievements, 3 students who had moderate achievements and 3 students who had low achievements. The purpose of this individual trial is to identify the shortcomings of the learning method that will be developed after being reviewed by experts. The assessment and input from this trial is about the presentation of the RPS for the Learning Method of Team Based Learning at the Constitutional Court. Practice with Product-Oriented Module covers several aspects, namely:

- a. Material
- b. Realization
- c. Team involvement in *Project Based Learning*

The results of individual trials in the form of an assessment score on the development of android-based interactive learning media using 4 question items. Based on learning, it is considered very well by students with a percentage value of 93%. The results of individual trials by 9 students on these three aspects can be concluded that the learning method is very feasible to use for small group trials in

accordance with the recommended revision. The overall average score of the three aspects is 96% which is qualitatively categorized as “very decent” (X 81%).

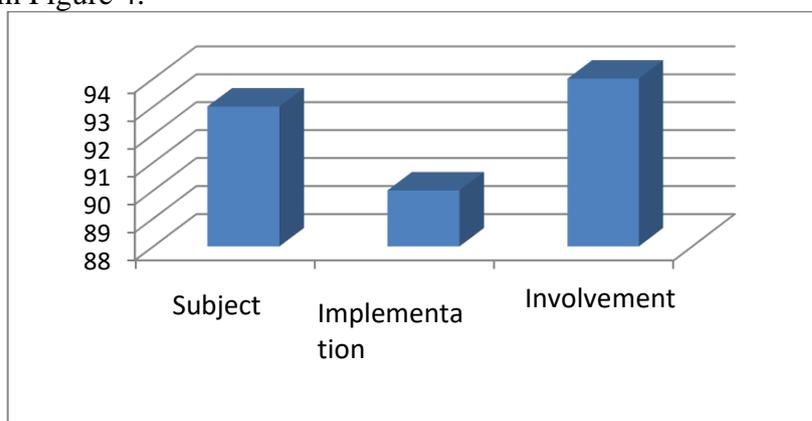


**Figure 3.** Bar Chart of Small Group Trial Assessment Results

Based on the diagram above, the aspect of team involvement in the base learning project has a greater percentage than the material and implementation. This means that in this aspect, it is considered very feasible with a percentage of 94%.

### Test Results Data for Phase IV of Field Trials

Field trials were also conducted in the 2018 Business Administration Study Program Class, which consisted of 2 classes totaling 60 students. Field trials produce data that will later measure the feasibility of the learning method developed, as well as to find out how the benefits of the product are for the user. The results of the individual trial assessment on the three aspects can be seen visually in Figure 4.



**Figure 4.** Bar Chart of Field Trial Assessment Results

Based on the diagram above, the aspect of team involvement in Project Based Learning has a greater percentage than material and implementation. This means that in this aspect is very feasible with a percentage of 92%.

**Student Learning Outcomes in Team Based Learning Methods at course. Practical Decision Making Techniques with Product-Oriented Module.**

Based on the research that has been done on the learning outcomes, the students' pre-test and post test learning outcomes are presented in table 3.

**Table 3.** Descriptive Statistical Data of Students Learned by Team Based Learning Methods at course. Practice of Decision Making Techniques with Product-Oriented Module.

Data	Pre test	Post test
<i>N</i>	30	30
<i>Mean</i>	75.37	88.57
<i>Median</i>	76	88.5
<i>Std. Deviasi</i>	3.61	4.63
<i>Varians</i>	12.998851	21.426437
<i>Minimum</i>	70	80
<i>Maximum</i>	82	96

Table 4 shew the pre-test data on learning outcomes, it was found that there were 15 people who had not reached the predetermined completeness score. While 15 other people passed the completeness score. On the results of the post test, all students are declared to have passed the agreed completeness score.

**Table 4.** Frequency of Student Learning Outcomes Taught by Team Based Learning Methods on course. Practical Decision Making Techniques with Product-Oriented Module.

Data Pre test				Data Post test			
No.	Interval	Freq.	%	No.	Interval	Freq.	%
1	70-72	7	23.3	1	80-83	5	16.7
2	73-75	8	26.7	2	84-87	9	30.0
3	76-78	9	30.0	3	88-91	7	23.3
4	79-81	5	16.7	4	92-95	7	23.3
5	82-84	1	3.3	5	96-99	2	6.7
	Total	30	100		Total	30	100

**Student Learning Outcomes Without Team Based Learning Methods on course. Practical Decision Making Techniques with Product-Oriented Module.**

Based on the research that has been done on learning outcomes with No Team Based Learning Learning Methods on course. Practical Decision Making Techniques with Product-Oriented Module.

**Table 5.** Descriptive Statistical Data of Students Who Learned Without Team Based Learning Learning Methods on course. Practice of Decision Making Techniques with Product-Oriented Module.

Data	Pre tes	Post tes
<i>N</i>	30	30
<i>Mean</i>	76.33	82.03
<i>Median</i>	76	82
<i>Std. Deviasi</i>	3.58	3.97
<i>Varians</i>	12.850575	15.757471
<i>Minimum</i>	70	75
<i>Maximum</i>	82	90

Table 6 shew the data for the pre-test results, it was found that there were 12 people who had not achieved the predetermined completeness score. Meanwhile, 18 other people passed the completeness score. On the results of the Pot test, all students are declared to have passed the agreed completeness score.

**Table 6.** Frequency of Student Learning Outcomes Who Learned Without Team Based Learning Methods on course. Practical Decision Making Techniques with Product-Oriented Module.

Data Pre test				Data Post test			
No.	Interval	Freq.	%	No.	Interval	Freq.	%
1	70-72	5	16.7	1	75-78	5	16.7
2	73-75	7	23.3	2	79-81	8	26.7
3	76-78	7	23.3	3	82-85	12	40.0
4	79-81	8	26.7	4	86-89	3	10.0
5	82-84	3	10.0	5	90-93	2	6.7
	Total	30	100		Total	30	100

**Testing Requirements Analysis**

**Data Normality Test**

Test the normality of the pretest and posttest data for the experimental and control classes using the Kolmogorove-Smirnov (K-S) test using SPSS. The results of the normality test of the pretest and posttest data for both classes are shown in Table 7.

**Table 7. Pretest Data Normality Test**

Class	Data	K-S	Sig.	Normal Criteria	Summary
Experiment	Pre-test	0,175	0,020	p>0,05	Normal
	Post-test	0,099	0,030		Normal
Control	Pre-test	0,138	0,014	p>0,05	Normal
	Post-test	0,111	0,030		Normal

Table 7 shew that the experimental class in the pretest data obtained a Kolmogorov Smirnov (K-S) value of 0.175 and a significance value of 0.02 which was smaller than 0.05. It was concluded that the pretest data in the experimental class was normal. In the experimental class, the posttest data obtained a Kolmogorov Smirnov (K-S) value of 0.099 and a significance value of 0.03 which was smaller than 0.05. It was concluded that the post test data in the experimental class is normal.

In the control class, the pretest data obtained a Kolmogorov Smirnov (K-S) value of 0.138 and a significance value of 0.014 which was smaller than 0.05. It was concluded that the pretest data in the control class was normal. In the control class, the posttest data obtained a Kolmogorov Smirnov (K-S) value of 0.111 and a significance value of 0.03 which was smaller than 0.05. It was concluded that the pretest data in the control class was normal.

Based on the normality test of the two classes above, it can be concluded that the entire population of research data was normally distributed. The full calculation can be seen in the attachment.

### Homogeneity Test

The homogeneity test of the pretest and posttest of the experimental class and the control class used the two-variance similarity test. The results of the calculation of the homogeneity test were shown in Table 8.

**Table 8. Pretest and Posttest Data of Homogeneity Test**

Data	Class	Variance	F	Sig. (p>0,05)	Summary
Pre-test	Experiment	66,06	1,084	0,302	Homogen
	Control	67,12			
Post-test	Experiment	6,363	1,438	0,420	Homogen
	Control	8,111			

Table 8 shew that the results of the homogeneity test on the pretest value for the experimental and control groups obtained an Fcount of 1.084 with a significance of 0.302 (p>0.05), it can be concluded that the experimental and control class pretest data had the same variance (homogeneous). The results of the homogeneity test on the post-test scores for the experimental and control groups obtained an Fcount of 1.438 with a significance of 0.420 (p>0.05), it can be concluded that the post-test data of the experimental and control classes had the same variance (homogeneous).

**Hypothesis test**

- a. Hypothesis 1  
Based on the assessment for the Team Based Learning Method on course. Practice with Product-Oriented Module
- b. Hypothesis 2  
Then the next for testing hypothesis 2 can use the Post-Test t-test. To see if there is a significant difference between learning outcomes with the use of android-based interactive learning media and without using android-based interactive learning media, it was done using a different test (t-test). The hypotheses of this research are as follows:
  - a. With the criteria of accepting  $H_0$  if  $t_{1-1/2\alpha} < t < t_{1-1/2\alpha}$ , if t value does not meet the equation, then the Team Based Learning Learning Method on course. The practice with the Product-Oriented Module is not effective, but if the other t values  $H_0$  is rejected, accept  $H_a$ , then the Team Based Learning Learning Method on course. Practice with Product-Oriented Module is not feasible.
  - b. Analysis of the effectiveness can also be concluded that the comparison of the total score obtained with the total score of all items multiplied by one hundred percent, the greater the percentage X, the effectiveness of the media used was better. In summary, the results of the hypothesis test calculations were listed in table 49 below::

**Table 9. Hypothesis Testing of Data Post test**

No	Data	Mean ± st.deviation	t <sub>count</sub>	t <sub>table</sub>	Summary
1	Experiment Class	88,5667+ 4,62887	5,868	2,00172	H <sub>a</sub> Accept
2	Control Class	82,0333+ 3,96957			

Based on the results of the t-test calculations, data obtained that  $t_{count} > t_{table}$  or  $5,868 > 2,0172$  or in other words  $H_0$  is rejected and  $H_1$  is accepted, it can be concluded that student learning outcomes using Team Based Learning Learning Methods on course. Practice with Product-Oriented Module d is higher than students who are taught without using the Team Based Learning Learning Method on course. Practice with Product-Oriented Module with the effective use of Team Based Learning Learning Methods on course. Practice with Product-Oriented Module is 88,5667%.

**DISCUSSION**

There were 4 aspects that were assessed in the material expert test, namely material aspects, quiz questions, linguistic aspects and implementation aspects. The material aspect has a higher percentage value than the other three aspects, namely 85.45%, then the questions and quiz aspects and the implementation aspect have 80%, while the linguistic aspect has 60%. With this percentage value, the overall assessment of the material experts assesses that this learning media was considered "Eligible" to be developed. Based on the assessment table of the results of individual trials by 3 students on these three aspects, it can be concluded that the RPS Learning Method of Team Based Learning on course. Practice with

the Product-Oriented Module was very suitable for small group trials according to the recommended revision. The overall average score of the three aspects is 96 which was qualitatively categorized as “very decent” (X 81%) (Ahmad, 2012). Based on the assessment table of the results of individual trials by 9 students in these three aspects, it can be concluded that the learning method was very feasible to use for small group trials in accordance with the recommended revision. The overall average score of the three aspects was 96% which was qualitatively categorized as “very decent” (X 81%). In the field test, the aspect of team involvement in Project Based Learning has a greater percentage than material and implementation. This means that in this aspect was very feasible with a percentage of 92%. The results of the t-test calculation, obtained data that  $t_{count} > t_{table}$  or  $5,868 > 2,0172$  or in other words  $H_0$  is rejected and  $H_1$  is accepted, it can be concluded that student learning outcomes using Team Based Learning Learning Methods on course. Practice with Product-Oriented Module is higher than students who are taught without using the Team Based Learning Learning Method on course. Practice with Product-Oriented Module with the effective use of Team Based Learning Learning Methods on course. Practice with Product-Oriented Module is 88,5667%.

Learning in the 21st century is changing very quickly and it is difficult to predict all the changes that occur in various fields of knowledge, economy, transportation, technology, communication, education and others (de Leon-Abao et al., 2015) (Erna et al., 2020). Learning involves adding new information to one's memory. Learning involves understanding the material presented by paying attention to relevant information, mentally rearranging it and connecting it with what is already known. The nature of learning and learning needs to be studied in depth to know the limitations of each of these terms. Learning is a conscious activity carried out by individuals through training and experience that results in behavioral changes that include cognitive, affective and psychomotor aspects (Faizah, 2017).

Learning is a complex process which contains several aspects, namely increasing the amount of knowledge, the ability to remember and reproduce, the application of knowledge, infer meaning, interpret and relate it to reality and change as a person (Reif, 2010). Project Based Learning (PjBL) as a teaching approach that is built on learning activities and real tasks that provide challenges for students related to everyday life to be solved in groups (Musa et al., 2011) (Mihardi et al., 2013) (Siradj et al., 2020). Project-based learning is a learner-centered learning model and provides a meaningful learning experience for students. Students' learning experiences and concepts are built based on the products produced in the project-based learning process.

## CONCLUSION

The practice with the Product-Oriented Module mentioned earlier can be concluded from the material expert, 4 aspects were assessed in the material expert test, namely the material aspect, quiz question aspect, linguistic aspect and implementation aspect. The material aspect has a higher percentage value than the other three aspects, namely 85.45%, then the questions and quiz aspects and the

implementation aspect have 80%, while the linguistic aspect has 60%. With this percentage value, the overall assessment of the material experts assesses that this learning media was considered "Eligible" to be developed. It concluded that the learning outcomes using Team Based Learning Learning Methods in the subject. Practice with the Product-Oriented Module was higher than students who were taught without using the Team Based Learning Learning Method in the course. Practice with Product-Oriented Modules with effective use of Team Based Learning Learning Methods in courses.

### **CONFLICT OF INTEREST**

Concerning the research, authorship, and publication of this paper, the author(s) reported no potential conflicts of interest.

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