Improving Academic Learning Outcomes through the Team-based Project Learning Model in the Audio and Video Processing Engineering Course

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ABSTRACT

The purpose of this research is to find out whether the team-based project model increases learning outcomes and is efficiently applied to the Audio and Video Processing Engineering Subject for Class XII Students of SMKN 1 Baureno Bojonegoro. This research is based on changes in the pattern of learning activities with online learning methods. During online learning students are required to study more independently because they study online, so the teacher does not fully supervise students while learning. During the learning process students complained about several problems such as the difficulty of the signal in their homes, their lack of understanding of the material being distributed and the lack of interest of students in doing the assignments given. This problem occurs in the Audio and Video Processing Engineering (TPAV) subject, students often do not do the assignments given because the time given is quite short. While students do not understand the material provided and tend to only take attendance instead of studying. This causes motivation and learning outcomes are not optimal. This research is a Quasi Experimental Design study, with a Pretest-Posttest Control Group Design. The data to be tested are learning motivation instruments and learning outcomes. The learning outcomes that will be studied are cognitive domain data (knowledge). For motivational data will be known through the distribution of questionnaires and learning outcomes using tests. Before entering implementation, validity and reliability tests will be carried out, followed by a prerequisite test and then a t test to answer the research objectives. The results of this study are the learning outcomes of the experimental class have increased by 29.63 point and the application of the team-based project model is more efficiently applied than the discovery learning model.

Keywords: Team-based Project, Learning Outcomes, Learning Effectiveness, Audio and Video Processing Course.

1. INTRODUCTION

The pattern of learning in Indonesia is experiencing change. Change the caused by the ongoing covid-19 pandemic continues until moment this. For prevent spread of covid in the environment schools, Minister of Education and Culture issue a Circular Letter Number 4 of 2020 concerning Implementation of Education in the Emergency Period of Coronavirus Disease (Covid-19). Learning process done from their respective homes (study from home). Where is learning distance remote (online) is selected for help in Educational [1]. System This is learning possible alternative help the learning process during the covid-19 pandemic. Online learning is learning based capable technology done in distance Far through online media such as internet network. So that participant educates get lesson wherever and whenever [2].

During online learning implementation process tend only gift assignment through online media. Student required For Study more independent Because Study online, so teachers don't in a manner full supervise student in learning. Besides making student become more independent, online learning has obstacles experienced during the learning process [2], [3].

Constraints experienced like limited media availability, lack instruction from government area, appropriate curriculum, ability operation or limited internet network in several regions [4], [5]. For overcome problem the government make several policies that can help relieve problem during online learning. Ministry of Education and Culture help relieve cost affected parents with give scholarships and or help infrastructure form internet or pulses [6].

Ministry of Education and Culture disclose decline results Study student appear during online learning [7]. Efforts that can used by the teacher i.e., with increase creativity in manage material learning and accompanying with choosing the most appropriate strategy [8] [9]. Apart from two things the teacher should increase ability in the use of online media as a learning medium [10]. Study results is objective education in the form of statement for describe several category activities. For now level achievements student after follow activity Study is objective main know result.

SMKN 1 Baureno is one school affected vocations the covid-19 pandemic. During pandemic This activity Study apply online learning assisted by school E-learning media. During the participant online process educate complained a number of problems like not enough he understood to materials shared and lack interest participant educate in do tasks during the learning process. From the learning process that has been going on for two semesters using the E-learning, participants educate the say that during teacher learning is rare explain shared material so that participant educate not enough understand will the material being taught. So that during this online learning participant educate can said be lazy inside read shared material.

Solution for problem on that is apply some more learning strategies interactive. Possible example done during Online learning is Project Based Learning. Learning models This apply processing involving projects student for finish A problem (Student Center Learning). Students get learning meaning so that acquired knowledge and knowledge beneficial for stock they as a problem solver [11].

Another alternative learning strategy is Team Based Learning. this model own Student Center Learning concept. Benefit from draft This student can deepen ability discuss in group. With stage discussion group student given chance for apply understanding in friend tutoring activities peers (Altintas in [12]). Besides that, learning with a group model can used For each other complement and motivate perceived other students not enough capable in understand draft material or matter others [13].

Based on description problem and description background back above become base formulation destination to be from research to be done namely (1)

Knowing enhancement results Study after application of the Team Based Project model to the subject technique audio and video processing of students class XII SMKN 1 Baureno, Bojonegoro ; and (2) Knowing effectiveness application of the Team Based Project model to the subject technique audio and video processing of students class XII SMKN 1 Baureno , Bojonegoro.

2. RESEARCH METHODS

Research method This use approach quantitative design experiment. The experimental design used namely Quasi Experimental Design, with design Pretest-Posttest Control Group Design. In research this, second class will do pretest and posttest for now level understanding of each class. In research This class experiment will implementing a team-based project model while class control using the discovery learning model. From the treatment given (variable free) influential / focused in study This namely the learning model team based project(X). For affected variables variable free called with variable bound (Y), the variable that becomes variable free that is results learn.

Subject and object implementation study This that is student class XII multimedia SMKN 1 Baureno. Data retrieved in study This form of quantitative data obtained from test write and deploy questionnaire. Test instruments write used for pretest and posttest in form choice double. Before instrument test can used previously will done validity legibility by experts related instrument research. Readability test used for now level legibility or appropriateness instrument from facet language, construct, and content. Result validity legibility form statement can form valid, valid with revision, and invalid need revision. After done validity legibility validity test is carried out empirical and reliability with test subject instrument test that is besides subject implementation. Instruments that will test namely the test instrument write. validity empirical used for inspecting validity instrument test write that will used. For count validity empirical instrument used Press formula. (1). Validity tests have criteria ie H0 is accepted if r count > r table (tool valid measure) and H0 is rejected if r count $\leqslant$ r table (tool measuring invalid). How to set table R value ie R table = df (N-2), level significant asi two way test.

$$r_{xy} = \frac{N(\sum XY) - (\sum X)(\sum Y)}{\sqrt{\{N\sum X^2 - (\sum X)^2\}\{N\sum Y^2 - (\sum Y)^2\}}} \qquad (1)$$

Description:

r_{xy} : The correlation coefficient between the score of item X and the total score of Y
N   : Many respondents
$\sum XY$: The number of multiplications between X and Y
$\sum X2$: The sum of the squares of the items X
$\sum Y2$: The sum of the squares of the total score Y
$(\sum X)^2$: The number of questions X is then squared.
$(\sum Y)^2$: The sum of the Y scores is then squared.

After do validity empirical next with reliability test. Reliability relates to how much the instrument can be trusted in getting a fixed score even though it is tested in different situations. Cronbach's Alpha used for looking for reliability instrument that scores not 1 or 0. Coefficient reliability will compare to with alpha value, alpha reliability 0.75 or more Can own good reliability. _ Reliability test use formula as in the Press. (2).

$$R = \left(\frac{k}{k-1}\right)\left(1\frac{\sum \alpha b^2}{\alpha t^2}\right) \tag{2}$$

Description:
R   : Reliability value
k   : The number of questions
$\sum \sigma b^2$: Total variance of granules
σt^2 : Total variance

After validity and reliability instrument study stated feasible and valid, instrument can used for implementation in research. Obtained data during implementation normality test was carried out skewness and kurtosis as a prerequisite test. Uji this used to test whether the data is normally distributed or not use skewness and kurtosis test. The conditions for the skewness and kurtosis tests are said to be normal if the Z skewness and Z kurtosis ratio values are in the ratio – 2 and 2. The formula for calculating the Z skewness and Zkurtosis ratio values is as in Eq. (3).

$$Z_{skewness} = \frac{S - 0}{SE_{skewness}} \tag{3}$$

$$Z_{kurtosis} = \frac{K - 0}{SE_{kurtosis}} \tag{4}$$

Information:
Zskewness   : skewness rasio
Zkurtosis   : kurtosis rasio
S   : data skewness
K   : data kurtosis
SEskewness   : Standard Data Skewness Error
SEkurtosis   : Default Kurtosis data error

Prerequisite test will determine is data analysis can use a parametric test. If the pretest data is normal so will using the t test as a parametric test. t test will compare mark pretest and posttest of each class. The t test formula as in Eq. (4).

$$t = \frac{\overline{x_1} - \overline{x_2}}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2} - 2r\left(\frac{s_1}{\sqrt{n_1}}\right)\left(\frac{s_2}{\sqrt{n_2}}\right)}} \tag{5}$$

Information:
X_1 : sample mean 1
X_2 : sample mean 2
SD_1^2 : sample variance value 1
SD_2^2 : sample variance value 2
N_1 : number of samples 1
N_2 : number of samples

The pretest and posttest data in the study This will take mark motivation student as material supporters evaluation research. Motivational value student got with spread questionnaire motivation which has previously been tested for validity readability. The distributed questionnaire will use a Likert scale. The Likert scale used in filling out the instrument uses 4 (four) answer choices with details 4 for strongly agree, 3 for agree, 2 for No agree, and 1 for strongly disagree agree. Criteria assessment (percentage) motivation follow in Table 1. Quantitative data that has been obtained will done analysis description. these data will average described _ in detail and drawn conclusion. Formula For count motivation as in the Press. (5) following:

$$NP = \frac{R}{SM} \times 100\% \tag{6}$$

Description:

NP   : Motivational Value
R   : Gain Results
SM   : Maximum Value

Table 1. Criteria percentage questionnaire motivation.

Class Motivation Criteria	Information
$0\% \leq P \leq 20\%$	Not Motivated
$21\% \leq P \leq 40\%$	Less Motivated
$41\% \leq P \leq 60\%$	Simply Motivated
$61\% \leq P \leq 80\%$	Motivated
$81\% \leq P \leq 100\%$	Highly Motivated

3. RESULTS AND DISCUSSION

Obtained research data in the learning instrument test for validity legibility by experts concluded worthy, valid with revision. For validity test empirical data obtained from respondent (no sample research) i.e. high school students who have taken subject with specified theme. Amount validity test respondents namely 36 students class XI multimedia SMK. Product Moment validity was tested using SPSS. Terms in the validity test that is If mark $r_{hitung} > r_{tabel}$ so question said to be valid with level its significance is 5%. For validity test results instrument test can see in Table 2. From a total of 50 items question for test write, known amount valid statements as in table 5. R_{table} with level significance of 5% for 36 respondents as big that is 0.329. Provision considered valid, namely $0.329 < R_{count}$. From calculations the found amount valid statement that is 20 points, p This show that instrument test that can used as many as 20 statements.

Table 2. Validity result of instrument test.

Criteria	No. Question Items	Amount
Valid	5, 16,18, 19, 22, 23, 24, 25, 26, 28, 29, 32, 34, 37, 38, 39, 40, 41, 45, 46	20
Invalid	1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 20, 21, 27, 30, 31, 33, 35, 36, 42, 43, 44, 47, 48, 49, 50	30

Reliability test results for test instruments can see in Table 3. From the information in Table 3, value *cronbach's alpha* for instrument test that is 0.756. Based on criteria reliability mark *cronbach's alpha ≥ 0.75.* So that grain question test writes stated reliable Because more of 0.75.

Table 3. Percentage of.

Cronbach's Alpha	N of Items
,756	51

Learning process during do this research characteristic stare face. It based on SE Governor of East Java number 420/11350/101.1/2020. From mail the students who can enter in learning stare face per day ranging from 25-50% of students per class. SMKN 1 Baureno has apply learning stare advance with student present 100% with limitation time Study until at 12.00 WIB. During activity learning for each class good class experiment nor control own each obstacle. However, matter the can overcome with Enough ok. Research process done during three meetings although no by plan activity learn that has designed. At a meeting first of each class do question Pretest and questionnaire motivation. Experiment class is XII MM 1 meanwhile control class that is class XII MM 2. This based on results pretest and description from which student class XII MM 1 more not enough in notice material compared to class XII MM 2. Meeting third in each class, students requested for do post-test questions and questionnaires motivation. Value data pretest-posttest and motivation explained in Table 4.

Table 4. Validation results instrument write test.

Class	Pretest	Posttest	Motivation
Experiment	55,93	85.56	82.6
Control	56,61	79.11	76.3

Table 5. Reliability results instrument write test.

Descriptive Data	N	Skewness		Kurtosis	
	Statistics	Statistics	Std Error	Statistics	Std Error
Pretest of Experiment Class	27	-,362	,448	-1.171	,872
Pretest of Control Class	28	-,244	,441	,143	,858

Before the data is done t test, before will prerequisite test be using pretest data. From the data shown in Table 5 with mark $Z_{skewness}$ for pretest experiment ie -.362/.448 = -0.808 and value The $Z_{Kurtosis}$ is -1.171/.872 = -1.342 values $Z_{skewness}$ -0.808 and $Z_{Kurtosis}$ -1.342 are between -2 and 2, then stated mark pretest class experiment normally distributed. $Z_{skewness}$ value for pretest control ie-.244/.441 = -0.553 and value The $Z_{kurtosis}$ is .143/.858 = 0.166 values $Z_{skewness}$ -0.553 and $Z_{Kurtosis}$ 0.166 are between -2 and 2, then stated mark pretest class control normally distributed. After the data is declared normal, then the implementation data can evaluate using the t test. The results of the t test are explained in Table 6 and Table 7.

Table 6. Final student learning outcome data.

	N	std	t	Sig (2-tailed)	Information
Pair 1 *Pretest t – Posttest* Experiment Class	27	15,868	-9,703	.000	Increase
Pair 2 *Pretest t - Posttest* Control Class	28	11.507	-10,347	.000	Increase

Table 7. Pretest normality test results.

		t	*df*	*Sig. (2-tailed)*	*Information*
Learning outcomes	*Equal Variances assumed*	2,216	53	.031	Efficient

Based on t test results in Table 6. pair 1 produces mark tcount -9.703 with Sig value (2-tailed) 0.000. So, the result has possibility more big or smaller. If significance > 0.05 then H_0 is accepted and if significance <0.05 then H_0 is rejected. Sig(2-tailed) value 0.000 < 0.05 then H_0 is rejected. So that in conclusion that is There is enhancement in results study students in a class that uses the Team Based Project model on the eyes lesson technique audio and video processing class XII at SMKN 1 Baureno Bojonegoro.

Research results in this in line with study [14] and the application method discussion of research results is in line with the study Ammed in [15] via team-based method helps students in understand the material and focus on the core of the material learning. Interaction in groups capable of improving interpersonal and communication teams is seen in increased results post-test students [16]. Involve several tasks designed group, special in the team-based project strategy can push and improve the development group Study in an independent manner [17]. Exists discussion groups make students become active, which effect enhancement results in learning. With existing change strategy innovative learning like team-based learning, students can increase results Study in Work The same groups [18].

Research results This strengthened with study [19] via application learning based project can increase activity Because student demanded for active Work project for reach competence basic must _ achieved. [20] model with application solve problem life can increase

knowledge (cognitive) students. Inshasiska in [21] via learning-based project students are overly excited in do project and feel fun learning because they can explore more Lots Of knowledge. When working project in a manner group, students with ability tall will motivating less students active in settlement project. [22] via activity project student must Work The same for reach goals, students who are able taller will motivating less students For follow active in settlement project. Nindya in [23]

From exposure above, it is concluded that the team-based project model can increase results Study eye student lesson technique audio and video processing that can see from enhancement results learning (pretest - posttest) with a team-based project model. Engagement rate student in the learning process is especially important thing in the learning process. Another factor that causes student with a team-based project model more results tall that is First student given in a manner direct experience in process An object. Both models of team-based project are capable grow motivation and improve practice active students who can see from results questionnaire motivation student. Third learning emphasize student Study through real world experience so that learning become meaningful [24]. Fourth exists group learning that encourages and develops ability in application the material being taught. Fifth task designed group in a manner special capable boost and push development group Study in a manner independent [16]. Proven with it seems results increased learning and yield more value ok. So that student with given the treatment of the team-based project model has mark results learn higher.

Learning models Efficient project- based team applied Based on results of hypothesis testing in Table 7. results study, tcount 2.216 with df = 53 and Sig (2-tailed) value 0.031. t_{table} value df = 53 of 2.00575. If compared t_{count} 2.216 > t_{table} 2.00575 and Sig(2-tailed) value 0.031 <0.05 then H0 is rejected. So that in conclusion namely the efficient team-based project model applied to the subject class XII Audio and Video Processing Engineering lessons at SMKN 1 Baureno Bojonegoro.

Research results This in line with research by Samad in [18] method more team-based learning interesting interest student so that student will Study more effective and working the same in team with ok. [18] with learning active like this team based is method more learning effective for increase knowledge student. Danoebroto in [12] With draft team-based learning, students can deepen ability discuss in group, with so created interaction individual with environment social so that obtained Lots Of knowledge and experience.

Research results This strengthened with study Indriwati in [25] which describes learning strategies use highly effective project for increase quality results Study cognitive and skills live. [26] a project-based

learning model that emphasizes the learning process compared results product more effective for increase ability think student. Be [27] compilation design activity capable learning stimulate motivation and improve results Study make application of more project-based learning models effective.

From the explanation above, it is concluded implementation of an effective team-based project model applied to the eye audio and video processing techniques lessons can be seen from enhancement results learning and motivation student. Environment proper study become factor level success or failure in learn. With learning combination between the team and the project in condition stare face, student can each other interact with teachers and each other exchange information can grow Spirit in learning [28]. Learning Friend peer is one solution For each other share and empower fellow friends [29]. With exists task project can ensure student do research and work the same in objective for increase Skills solve problem, motivation, and creativity student [27]. Development of effective learning media during activity learning helped with innovative learning strategies capable increase results and motivation Study student (Leisey in [30]). Proven with it seems enhancement results study and grades motivation more ok.

4. CONCLUSIONS AND SUGGESTIONS

Based on findings study this, can concluded that 1) the application of the team-based project model can increase results eye study Class XII Audio and Video Processing Engineering lessons at SMKN 1 Baureno Bojonegoro, and 2) the application of the team-based project model is assessed efficient applied to the subject technique Class XII audio and video processing views from enhancement results more learning and motivation ok.

As utilization in learning can it is recommended 1) the team based project model can used as alternative method learning For increase motivation and results learning, 2) Other variations of learning models and or teaching materials can increase quality results Study student nor motivation learn which is factor from enhancement results Study That own , 3) Organizing learning models and procurement facility learning is very necessary and 4) Counseling related importance choosing the right learning model For maximizing knowledge, attitudes and skills SMK students.

AUTHORS' CONTRIBUTIONS

All of authors is a team who done this research and full of contributions.

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