Applying of Flipped Classroom Model in Terms of Motivation Level on Learning Outcomes of Teacher Candidates

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Abstract. The role of prospective teachers in Indonesia determines to achieve quality education. This study looks at the relationship between motivation level and the flipped classroom paradigm. Quasi-experimental research designs are used in this kind of study. All STKIP PGRI Nganjuk students enrolled in statistics courses made up the research population. The sampling method is purposive sampling. The research sample is 40 students. Questionnaire and test data collection methods. Descriptive analysis, homogeneity testing, normalcy testing, and hypothesis testing are all included in data analysis. The study yielded the following findings: (1) students who are highly motivated in the flipped classroom model achieve academically differently from students who are lowly motivated; (2) students in the traditional model classroom differ in learning outcomes from highly motivated students in the flipped classroom model; (3) students who are highly motivated in the flipped classroom model and the regular classroom model differ in learning outcomes from students with low motivation in the flipped classroom model and the regular classroom model; (5) there is no correlation between the learning model and the level of motivation to the learning outcomes.

Keywords: Innovative Learning, Problem-Based Activities, Instructional Videos, Statistic Course

1   Introduction

Higher education is currently facing significant challenges in providing more effective, engaging, and responsive learning experiences that cater to the diverse needs of students and keep up with technological advancements. Regarding this, the Flipped Classroom model has come to light as a cutting-edge strategy that holds the potential to revolutionize the way that classroom instruction is conducted (Colomo-Magaña et al., 2020; Fadli et al., 2022; Fung et al., 2021; Goedhart et al., 2019; Julia et al., 2020; Kushairi & Ahmi, 2021; Nja et al., 2022; Rasheed et al., 2020). Using instructional technology, the Flipped Classroom concept reorganizes the traditional roles of in-class

and out-of-class activities. This innovative approach to teaching and learning is more dynamic and interactive.

Before class, students are provided instructional videos or reading materials as part of the Flipped Classroom paradigm. That allows them to participate in problem-based and interactive activities during class time, which helps them better understand statistical concepts with a more contextual and profound approach. (Deng, 2019; Saira et al., 2021; Yeh, 2022; Zainuddin & Halili, 2016). This learning model focuses on encouraging active student participation to motivate them to better understand statistics.

A contemporary teaching approach known as "flipped classroom," or "flipped learning," was first proposed in the early 2000s by two Colorado high school teachers, Jonathan Bergmann and Aaron Sams. In this approach, the conventional way of learning is reversed, and students are given digital resources like videos to study before attending their classes. According to recent studies (Ağırman & Ercoşkun, 2022; Deng, 2019; Nihan, 2020) traditional classroom lectures are replaced with interactive and collaborative activities like group discussions, projects, experiments, and practical exercises. With the use of technology, teachers can engage in online forums and provide digital resources that promote learning outside of the classroom.

The two main components of the flipped classroom concept are shifting learning resources outside of the classroom and promoting active student participation in the learning process (Agirrezabal, 2021; Kobayashi, 2017; Kushairi & Ahmi, 2021; Zainuddin et al., 2019). The teacher is a facilitator in the Flipped Classroom approach, helping students understand the material by asking questions and giving helpful feedback. This method encourages differentiated learning and lets students learn at their own speed. (Ariani et al., 2022; Chen, 2021; Fadli et al., 2022; Khofifah et al., 2021; Y. Putri et al., 2021; Wut et al., 2022). Students who learn quickly can proceed to the next topic, whereas those who require more time to comprehend can revisit the material.

One major benefit of the flipped classroom approach is that it increases students' engagement with the learning process (Chen, 2021; Wut et al., 2022). When students review the learning materials prior to class, they are better equipped and more motivated to actively participate in class discussions and project-based activities. This also improves collaboration and interaction among students, as they are able to share their knowledge and work together to overcome challenges. Additionally, students can learn excellent time management techniques and build self-directed learning abilities with the help of the Flipped Classroom approach (Anwar & Rohmawati, 2022; Murillo-Zamorano et al., 2019; Nugraheni et al., 2022; Rodríguez et al., 2019; Zhang et al., 2021). The usage of Flipped Classroom offers noteworthy points of interest for understudies within the setting of higher instruction. A few thinks about have uncovered that understudies who take an interest in Flipped Classrooms tend to have a more profound understanding of the learning fabric since they can prepare the data some time recently the in-class session (Jian, 2019; Manoharan & Birundha, 2019; Salas-Rueda, 2021). Enhances their engagement in the Classroom, leading to active participation in discussions, collaborations, and debates (Al-Shabibi & Al-Ayasra, 2019; Aldossari & Alhamam, 2021; Jdaitawi, 2019).

Moreover, students can address difficulties directly with the instructor and interact with their peers in a student-centered learning environment (Kobayashi, 2017; Saira et

al., 2021). In addition to these benefits, the Flipped Classroom approach can reduce anxiety and stress among students because they can prepare in advance and feel more confident in facing the learning material during the class (Jian, 2019; Salas-Rueda, 2021). Consequently, the use of Flipped Classroom creates new avenues for improving the standard of instruction and giving students in higher education institutions a more engaging and productive learning environment.

Previous research on Flipped Classrooms in higher education has yielded various interesting and valuable findings. According to some research, flipped classrooms improve students' comprehension of the course topics and increase their participation in class (Ariani et al., 2022; Shafique & Irwin-Robinson, 2015; Strelan et al., 2020; Sun & Xie, 2020). As a result, these earlier studies offer insightful information that helps teachers and higher education institutions create and execute successful Flipped Classroom initiatives.

The "flipped classroom" approach is a way of teaching in which students watch films or read books before being taught how to study the content at home while participating in interactive activities and having class discussions. Flipped classrooms and student motivation are closely related because when students have control over their own learning motivation, students are more likely to want to learn information. The level of student motivation can also increase when they have direct contact with lecturers and classmates because they feel more involved and motivated to be active in learning. In a flipped classroom, students may study at their own speed, which increases their sense of ownership over their education.

Motivation determines students' learning outcomes (Rehman et al., 2020; Saptono et al., 2020; Sari et al., 2021; Tu & Chu, 2020). High-motivation students demonstrate better learning performance because they have an intrinsic drive to achieve academic goals. Strong motivation can influence several aspects contributing to learning outcomes, such as the level of engagement in learning, perseverance in overcoming challenges, and willingness to seek further knowledge. In contrast, a lack of motivation can have a detrimental influence on learning outcomes. Highly motivated students also have a tendency to employ more effective and efficient learning procedures in order to obtain a deeper comprehension of the learning content. (Attika Robbi et al., 2020; Moh Ghoizi Eriyanto et al., 2021; Rafiola et al., 2020). More motivated students may need help to focus and pay attention in class, leading to higher academic achievements. In order to build a learning environment that best supports and encourages students' motivation, educators must recognize the significance of motivation in students' learning outcomes. Factors influencing students' learning motivation are highly complex and vary from individual to individual (Hanesty et al., 2021; Nguyen & Tran, 2021). Some significant factors influencing students' learning motivation include (1) Parental roles, (2) Teacher creativity; and (3) Learning interest (Lukita & Sudibjo, 2021; Rizqi et al., 2018).

The connection between Flipped Classrooms and learning motivation is highly relevant in education. In Flipped Classroom, it can influence a focus on student-centered learning and allow them to access materials before the class. By giving opportunity and independence to memorize at their claim pace and fashion, understudies can feel more engaged and excited within the learning prepare, as they can seek after their interface and feel fulfilled with their advance. On the other hand, Flipped Classroom can also

leverage motivation by providing positive reinforcement, such as rewards, praise, or recognition for students' participation and achievements in-class activities. These outward fortifications can incentivize understudies to take part in learning and endeavor to attain scholarly objectives. Hence, Flipped Classroom can shrewdly integrate both sorts of inspiration to form an effective learning environment and upgrade students' inspiration and engagement within the learning handle.

Past investigate on the relationship between Flipped Classrooms and students' learning inspiration has created curiously discoveries that reflect the positive affect of actualizing this guidelines approach. A few considers demonstrate that understudies who take part within the Flipped Classroom demonstrate tend to appear higher learning inspiration since they feel more locked in and have control over the learning handle (Gómez-Carrasco et al., 2019; R. R. Putri et al., 2022; Yilmaz, 2017; Zheng et al., 2020). The difference between this study and previous research lies in the research topic and the field of statistics, a demanding course.

Statistics is often considered one of the difficult subjects for some students.

However, traditional methods of teaching statistics, including in-class lectures and structured exercises outside of class, can sometimes reduce student interest and motivation (Casinillo, 2022; Hadi et al., 2020; McGrath, 2014; Rumahlewang et al., 2022). Therefore, many educators are turning to alternative teaching models to provide students with more engaging and effective learning experiences. STKIP PGRI Nganjuk is a Higher Education Institution with one graduate competency as "mastery of educational research methodology and basic research methods along with basic statistical techniques" (Nganjuk, 2021). However, based on the data evaluation of the statistics course at STKIP PGRI Nganjuk, 30% of students still need to receive grades below the average. Given this, there is a significant need for effective teaching methods to improve student's learning outcomes.

Further research is needed to determine the impact of the flipped classroom on student motivation in a statistics course, although it has the potential for improvement. This study aimed to investigate the impact of a flipped classroom teaching model on student motivation to meet the challenges of a statistics course. By understanding its effects, this research is expected to make valuable contributions to the development of more effective and appropriate teaching strategies to meet the learning needs of students in this modern era.

2   Method

The appropriate research is quasi-experimental. This quasi-experimental inquire about includes two groups: the test gathers accepting treatment (Flipped Classroom) and the control bunch getting a diverse treatment (routine educating). The inquire about sort utilized is test with a "treatment by level" plan with two categories 2x2. The plan utilized in this think about falls beneath quasi-experimental investigate. The information collection procedures utilized in this inquire about incorporate perception, documentation, and testing. The sought-after information in this investigate are students' learning

moti-vation and students' insights learning results. Underneath is the factorial investi-gate de-sign with a 2x2 proportion.
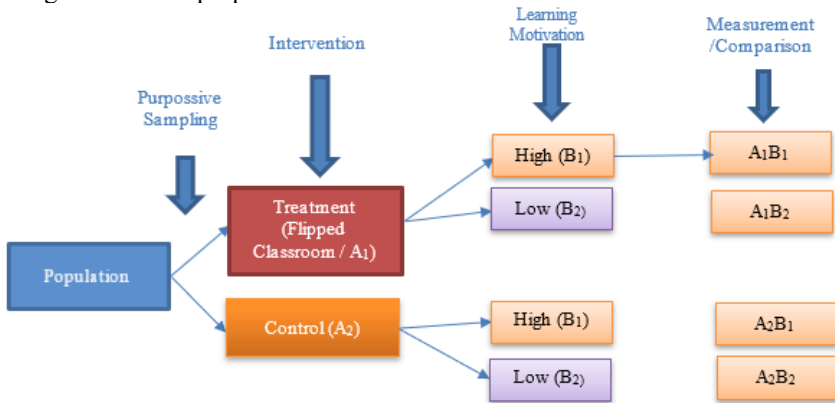

Fig. 1.   Quasi-experimental Design

The research instruments utilized in this consider are understudy learning inspiration question-naires and a test of understudy learning results in insights. Information on understudy learning inspiration will be collected using a survey around natural and outward motivation. Data will be collected before and after the treatment over several class meetings to observe changes in learning motivation over time. This questionnaire instrument measures student learning motivation influenced by implementing the Flipped Classroom approach in the Statistics course.

Table 1. Learning Motivation Questionnaire Indicators

Aspects of Learning Motivation	Counts of Item	Numbers of Item
Willingness to succeed	6	1,2,3,8,9,12
Motivation and needs in learning	7	4,5,10,11,14,15,18
Diligent in facing tasks	5	6,13,16,19,20
Persistent in dealing with challenges	3	17,21,28
Presence of engaging activities in learning	4	7,22,23,24
Enjoy finding and solving problems	5	25,26,27,29,30

Source (Nasrah, 2020)

At that point, the understudy survey information was analyzed by calculating the rate of understudy inspiration. Adjusted from Fiza (Amelia et al., 2021), the adjusted categories of learning inspiration are as takes after :

Table 2. Categories of Learning Motivation

Range of motivation (%)	Categories
$80 \leq p \leq 100$	Excellent
$65 \leq p \leq 79{,}99$	Good
$55 \leq p \leq 64{,}99$	Sufficient
$40 \leq p \leq 54{,}99$	Lacking
$0 \leq p \leq 39{,}99$	Extremely lacking

Source (Amelia et al., 2021)

This instrument has been tested for its feasibility and validity by educational experts and has been piloted on several students not included in the research sample. In creating this instrument, each explanation can precisely delineate the specified as-pects of learning inspiration and is pertinent to the setting of the Flipped Classroom inquire about within the Measurements course. The comes about of this instrument will serve as a premise for measuring the impact of the Flipped Classroom approach on understudy learning mo-tivation within the Measurements course.

The population in this study is students of STKIP PGRI Nganjuk who are taking the Statistics course in the study programs of Civic Education, Mathematics Education, Economics Education, English Education, and Science Education. The total population consists of 162 students, with 20 students in Civic Education, 22 in Mathematics Education, 87 in Economics Education, 18 in English Education, and 15 in Science Education. The research sample will be taken from each study program using purposive sampling. This technique chooses the sample based on specific criteria relevant to the research objectives. The test estimate for each exploratory and control gather will be decided based on the factual control examination to guarantee a adequately huge test to identify noteworthy contrasts in understudy learning inspiration between the two bunches.

The equation utilized for the inquire about test calculation is to calculate the least test measure to test the contrast between two implies in two autonomous bunches since this ponder utilizes a quasi-experimental plan with a control bunch. To decide the least test measure, utilize the taking after equation:

$$n = \frac{N}{1+N(e)^2} \qquad (1)$$

(Slovin in Syatriani, 2020)

Using decimal numbers, the minimum sample size obtained is approximately 20.25. Therefore, for each group (experimental group and control group), at least around 20 students are required as samples. The total overall sample size for all groups is approximately 40 students.

Information investigation will utilize the two-way examination of change (ANOVA) method with the help of the SPSS 24.0 program for Windows. The theory is accept-ed when the result of the two-way ANOVA test incorporates a centrality esteem less than α (sig < 0> 0.05), the speculation is rejected. Before conducting the two-way ANOVA

analysis, assumption tests will be conducted. The assumption tests include the normality test of data distribution using the Komogrov-Smirnov Test and Shapiro-Wilk Test formulas, as well as the test of variance homogeneity between groups using Levene's Test. The SPSS 24.0 program for Windows will assist the normality and homogeneity testing in this research.

3   Result

This study involved 162 students from various study programs at STKIP PGRI Nganjuk. The researcher took a sample of 40 students from this population as research subjects. The test was separated into two groups: the control gathers with 20 understudies and the exploratory bunch with 20 understudies. The collected information comprises of pretest and post-test comes about of learning inspiration in both groups.

3.1   Descriptive Statistics

Table 3. Learning Motivation

No	Groups	Average of motivation	Categories	Numbers of Sample	
				High	**Low**
1	Experiment	69,04	Good	10	10
2	Control	68,04	Good	10	10

Based on Table 3, the learning motivation of the test group is categorized as great, and for the control group, it is additionally categorized as great.

Table 4. Descriptive Statistics of Learning Outcomes

Dependent Variable: Learning Outcome

Learning Motivation	Groups	Mean	Std. Deviation	N
High	Experiment	82.1000	13.11869	10
	Control	76.7000	1.88856	10
	Total	79.4000	9.53332	20
Low	Experiment	62.4000	4.52647	10
	Control	50.4000	5.14674	10
	Total	56.4000	7.75547	20
Total	Experiment	72.2500	13.90522	20
	Control	63.5500	14.00930	20
	Total	67.9000	14.46446	40

From Table 4, it can be watched that the normal learning results are based on learning motivation and gather. The normal learning result for the test gather with high motivation is 82.1, the normal learning result for the experimental gather with low motivation is 62.4, the normal learning result for the control gather with tall motivation is 76.7, and the normal learning result for the control groups with low motivation is 50.4.

3.2   Normality Test

Table 5. Summary of Normality Test

No	Variable of research	Sig.	Description
1	Learning Motivation of the Experimental Group	0,010	Normal
2	Learning Motivation of the Control Group	0,010	Normal
3	Learning Outcomes of the Experimental Group	0,010	Normal
4	Learning Outcomes of the Control Group	0,020	Normal

Based on Table 5, it can be seen that each inquire about variable gotten a significance esteem over 0.05, meaning that all information factors are ordinarily conveyed.

3.3   Homogeneity Test

Table 6. Homogeneity Test

Levene's Test of Equality of Error Variances			
Dependent Variable: Learning Outcome			
F	df1	df2	Sig.
1.850	3	36	.156
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.			
a. Design: Intercept + Learning Motivation + Group + Learning Motivation Group.			

Table 6 shows the value (significance) Sig. 0.156 is > 0.05, indicating that the variance between groups is significantly different.

3.4   Hypothesis Test 1

Table 7. Hypothesis Test 1

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Learning Outcome	Equal variances assumed	1.202	.287	4.489	18	.000
	Equal variances are not assumed.			4.489	11.113	.001

Based on the data in Table 7, the Sig. value (2-tailed) is 0.000, indicating that it is less than the significance level of 0.05. Accordingly, Ho was rejected, implying that there is a significant difference between the learning outcomes of students with high learning motivation and students with low learning motivation when applying the flipped classroom learning method.

3.5   Hypothesis Test 2

Table 8. Hypothesis Test 2

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Learning Outcome	Equal variances assumed	13.669	.002	15.170	18	.000
	Equal variances are not assumed.			15.170	11.380	.000

According to Table 8, a significance value of 0.000 was found, which is lower than 0.05. This means that the null hypothesis (Ho) was rejected. In other words, the results show that there is a difference in the learning outcomes of students with high learning motivation compared to students with low learning motivation when using the conventional learning model.

3.6   Hypothesis Test 3

Table 9. Hypothesis Test 3

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Learning Outcome	Equal variances assumed	.095	.761	8.969	18	.000
	Equal variances are not assumed.			8.969	14.750	.000

According to the data in Table 9, the findings of hypothesis test 3 reveal a significance value of 0.000 which is less than 0.05. This indicates that the null hypothesis (Ho) is rejected. Therefore, it can be concluded that there is a difference in learning outcomes between students who have strong learning motivation and use the flipped classroom method and students who have strong learning motivation and use the flipped classroom method.

3.7   Hypothesis Test 4

Table 10. Hypothesis Test 4

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Learning Outcome	Equal variances assumed	.498	.490	5.536	18	.000
	Equal variances are not assumed.			5.536	17.711	.000

According to Table 11, the results of hypothesis test 4 indicate a significance value of 0.000 which is less than 0.05. This implies that the null hypothesis (Ho) is rejected. Therefore, it can be concluded that there is a notable disparity in learning outcomes between students with low learning motivation who use the flipped classroom model compared to those who use the conventional model.

3.8   Hypothesis Test 5

Table 11. Hypothesis Test 5

Tests of Between-Subjects Effects					
Dependent Variable: Learning Outcome					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6155.800a	3	2051.933	36.865	.000
Intercept	184416.400	1	184416.400	3313.200	.000
Learning Motivation	5290.000	1	5290.000	95.039	.000
Group	756.900	1	756.900	13.598	.001
Group Learning Motivation	108.900	1	108.900	1.956	.170
Error	2003.800	36	55.661		
Total	192576.000	40			
Corrected Total	8159.600	39			
a. R Squared = .754 (Adjusted R Squared = .734)					

According to the data in Table 12, the sixth row shows that hypothesis test 5 has a significance value of 0.170, which is greater than the threshold of 0.05. That indicates that the null hypothesis (Ho) is accepted. As a result, it can be concluded that there is no connection between the learning model and learning motivation with learning outcomes.

4   Discussion

4.1   There is a difference in the learning outcomes achieved between students with high learning motivation and students with low learning motivation in classrooms implementing the flipped classroom model.

Based on an independent samples t-test, where a t-test value at a significance level of 0.05 gives a significance value of 0.000 < 0.05 shows that implementing the flipped classroom model has an impact on students' learning outcomes and learning motivation. This finding is consistent with the study of Aşıksoy (2018), which showed that the experimental group had significantly higher motivation and learning outcomes than students in the control group. Additionally, according to Jdaitawi (2019), the flipped classroom strategy can also be used to promote self-regulated learning and enhance students' social connectedness. The Flipped Classroom learning model positively affects learning outcomes and student readiness (Jarrah & Diab, 2019).

4.2   There is a difference in learning outcomes between students with high learning motivation and students with low learning motivation in classrooms applying the traditional model.

Based on the Independent Sample t-test, where the t-test value at the significance level of 0.05 yielded a significance value of 0.000 < 0.05, it can be interpreted that the conventional model affects students' learning outcomes and motivation. This finding is consistent with Stevani (2016), which showed differences in learning outcomes between students with high and low motivation. Similarly, research conducted by Rusnawati (2020) found that implementing the flipped Classroom affects learning outcomes and motivation.

4.3   There is a difference in learning outcomes between students with high learning motivation in classes applying the flipped classroom model and students with high learning motivation in classes applying the traditional model.

Based on the research results using the Independent Sample t-test, the t-test obtained a significance value of 0.000, smaller than 0.05. The results indicate that the group of students with high learning motivation, who were taught using the Flipped Classroom model, achieved significantly higher average scores in statistical learning outcomes than the group with the Conventional learning model. That demonstrates that treating students with high motivation using the Flipped Classroom model is more effective than the Conventional model. These findings align with the research by Wright & Park (2022), which shows that the Flipped Classroom has an overall positive effect on science and mathematics learning.

4.4   There is a difference in learning outcomes between students with low learning motivation in classes that apply the flipped classroom model and students with low learning motivation in classes that apply the traditional model.

The research results obtained a significance value of 0.000, lower than 0.05. That means the learning outcomes of students with low learning motivation, who were taught using the Flipped Classroom model, showed significantly higher average scores in statistical learning outcomes compared to the group with the Conventional learning model. This finding is consistent with the research conducted by Saniah & Nindiasari (2023), which showed a significant difference in numeracy skills between direct learning and the Flipped Classroom model.

4.5   There is no interaction between the learning model and learning motivation on learning outcomes

Based on the research results, the t-test value shows a significance value of 0.170 < 0.05. Therefore, there is no interaction in this treatment, indicated by the absence of simultaneous improvement in student learning outcomes at different levels of learning motivation. According to Irianto (2010), if Ho is rejected, it means that the effect of factor A is not dependent on factor B, and the same applies in the reverse direction, where the learning model and learning motivation are not dependent on each other as variables. This finding is consistent with the research conducted by (Sahara & Sofya (2020), which showed that the applied models (flipped learning and conventional) did not interact with each other in influencing student motivation.

The flipped classroom learning method is a learning approach where students study learning material independently before learning in class, while the learning motivation variable is the level of encouragement for students to learn. This research found that there was no interaction between these two variables on learning outcomes. This means that when implementing the flipped classroom method, the level of students' learning motivation does not always affect their learning outcomes. Learning outcomes may be more influenced by other factors, such as students' cognitive abilities or the quality of the material presented.

5   Conclusion

After analyzing the research results and in-depth discussion, we can draw the following conclusions: (1) Students with strong learning motivation achieve better learning results in the flipped classroom compared to for students with low learning motivation; (2) In traditional model classrooms, learning outcomes are equivalent between highly motivated and low motivated students; (3) There is a difference in learning outcomes between highly motivated students in flipped classrooms and students in traditional classrooms; (4) Similarly, there is a difference in learning outcomes between students with low learning motivation in flipped classrooms and students in traditional classroom

models; (5) Finally, there is no interaction between learning model and learning motivation that affects learning outcomes. There are recommendations for educators and researchers to understand that although the flipped classroom can improve learning outcomes, there is not always a direct relationship between the method and learning motivation. Educators and researchers can further study other moderating factors that may influence the adoption of learning strategies on student performance.

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