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The Effectiveness of the Flipped Classroom Model on Students' Activeness and Learning Independence

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Abstract:
This research investigated the impact of the Flipped Classroom model on student activeness and learning independence in the Primary School Teacher Education (PGSD) Program at Universitas Muhammadiyah Buton. A quasi-experimental method with a nonequivalent control group design was employed. The sample included 30 students in the experimental group who received instruction via the Flipped Classroom model and 29 students in the control group who were taught using the expository method. The research instrument was a questionnaire measuring student activeness and independence, consisting of 18 valid items ($r = 0.552–0.957$; Sig. < 0.05) and demonstrating high reliability (Cronbach's Alpha = 0.993). The results showed that both experimental and control groups experienced significant improvements in activeness and independence following the intervention, as evidenced by the Paired Samples T-Test (Sig. = 0.000 < 0.05). However, when comparing the two groups using the Independent Samples T-Test, a significant difference was found in learning independence (Sig. = 0.047 < 0.05), whereas the difference in activeness was not statistically significant (Sig. = 0.574 > 0.05). This suggests that the Flipped Classroom model is more effective in enhancing student independence compared to the expository model, although its effect on activeness did not differ significantly. Consequently, the Flipped Classroom can be regarded as a viable alternative teaching strategy in higher education, particularly for PGSD students, as it promotes greater learning independence while supporting active participation in the learning process.

Keywords: Flipped Classroom, activeness, learning independence, PGSD students.

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INTRODUCTION

Education is a fundamental factor in shaping high-quality and competitive human resources. Higher education institutions, as key pillars of educational development, hold a significant responsibility to equip students with critical thinking skills, learning autonomy, and active participation in the learning process (Trisniawati et al., 2023). In line with global educational standards, the quality of human resources directly affects societal development and national competitiveness (OECD, 2019).

However, in practice, many students remain passive, overly reliant on lecturers' explanations, and show limited engagement in classroom discussions (Trisniawati et al., 2023). Low engagement is often exacerbated by traditional teaching methods that emphasize rote memorization over conceptual understanding (Freeman et al., 2014). Consequently, students' higher-order thinking skills, such as analysis, evaluation, and creation, are rarely fully developed (Akyol & Garrison, 2011).

Observations in the Primary School Teacher Education (PGSD) program at Universitas Muhammadiyah Buton indicate that the expository teaching model is most commonly used, with lecturers serving as the main source of information. Students often act as passive listeners, with limited opportunities to ask questions, share opinions, or relate theoretical knowledge to practical experiences (Bergmann & Sams, 2012).

Although the expository model effectively delivers structured factual knowledge, it positions students—especially future educators—as passive recipients. According to the revised Bloom's Taxonomy, students in higher education are expected to achieve higher-order thinking competencies, including analysis, evaluation, and creation (Wilson, 2016). This underscores the need for more interactive and student-centered learning approaches.

A contributing factor to low engagement is limited learning autonomy (Hwang & Lai, 2017). Interviews with PGSD students indicated that many only prepare materials shortly before examinations and rely on memorization rather than conceptual understanding (Putri et al., 2024). This learning habit reduces their ability to solve real-world problems, highlighting the importance of fostering independent learning.

Constructivist theory frames learning as an active process in which students construct knowledge through experience, reflection, and social interaction (Jensen et al., 2015). From this perspective, students are not passive recipients but active agents in meaning-making. Learning models that allow exploration, discussion, and self-directed discovery are thus aligned with constructivist principles (Fosnot, 2013).

Cognitive theory complements this view by explaining that learning involves processing information in memory, including receiving, storing, and integrating new knowledge with pre-existing cognitive structures (Lo & Hew, 2017). Active participation facilitates comprehension and retention, while passive learning limits knowledge transfer (Sweller et al., 2011). The Flipped Classroom aligns with cognitive theory by having students acquire foundational knowledge independently before engaging in interactive, collaborative class activities.

Implementing the Flipped Classroom can overcome the limitations of expository teaching by shifting students from passive listeners to active learners (Bergmann & Sams, 2012). This model allows class time to focus on discussions, collaborative problem-solving, and application of knowledge (Tang et al., 2023; O'Flaherty & Phillips, 2015). As a result, students develop deeper understanding and higher engagement levels.

The Flipped Classroom approach enhances student engagement while promoting self-directed learning, enabling learners to regulate the pace, timing, and methods of their studies based on personal needs (Talbert, 2017). Studies indicate that self-directed learning strategies improve students' academic performance, motivation, and self-confidence (Zainuddin & Attaran, 2016).

However, challenges remain in implementing Flipped Classroom, such as students' intrinsic motivation, availability of high-quality learning materials, and technological infrastructure (Omarchevska et al., 2024). Without access to resources or sufficient motivation, the effectiveness of this approach may be compromised. Technology-supported learning environments must be accessible and reliable to optimize outcomes (Johnson et al., 2016).

Moreover, cultural and regional factors influence the success of active learning approaches. In regions like Eastern Indonesia, students may have less prior exposure to self-directed learning practices, requiring careful scaffolding and guidance (Li et al., 2019). Therefore, context-specific research is crucial to evaluate Flipped Classroom effectiveness in diverse educational settings.

Several studies highlight the benefits of Flipped Classroom in higher education, including increased student motivation, improved collaboration, and enhanced critical thinking (Roehl et al., 2013; Vitta, 2023). Additionally, empirical evidence suggests that Flipped Classroom can foster learning autonomy by encouraging planning, self-monitoring, and reflective practices (Chen et al., 2014).

Given the above, this study is both urgent and novel in examining the effects of Flipped Classroom on PGSD students at Universitas Muhammadiyah Buton. As future teachers, students require active and autonomous learning skills to meet 21st-century educational demands (Darling-Hammond et al., 2020).

In conclusion, while the expository model may increase student engagement to some extent, Flipped Classroom offers a more comprehensive approach to developing both engagement and autonomy. By equipping prospective teachers with these skills, higher education institutions can better prepare them to be professional, adaptive, and innovative educators.

Finally, this research contributes not only academically but also practically, offering strategies to implement active and independent learning in teacher education programs. The findings are expected to inform curriculum design, instructional strategies, and institutional policies for fostering higher-order skills in pre-service teachers (Means et al., 2013).

This research aims to analyze the effectiveness of the Flipped Classroom model in increasing the activeness and independence of learning students of the PGSD Study Program, Universitas Muhammadiyah Buton. Specifically, this study was designed to compare learning outcomes between the group using the Flipped Classroom model and the group using the expository model. The benefits of this study include: (1) providing empirical evidence on the impact of the Flipped Classroom model in the context of teacher education in Eastern Indonesia; (2) serving as a reference for educators in choosing a learning model that supports independent learning; and (3) providing practical recommendations for the development of 21st-century skills-oriented curriculum and learning strategies.

RESEARCH METHOD

This research employed a quasi-experimental method with a nonequivalent control group design, chosen because the researcher could not fully control external factors affecting the learning process but still allowed comparison between two groups under different conditions (Sugiyono, 2019). Both groups took a pretest before the intervention to assess their initial activeness and learning autonomy. The experimental group received instruction through the *Flipped Classroom* model over multiple sessions, while the control group continued with the expository learning method. After the treatment, a posttest was administered to both groups to evaluate changes resulting from the intervention (Sugiyono, 2019).

The population consisted of all students enrolled in the Primary School Teacher Education (PGSD) program at Universitas Muhammadiyah Buton during the even semester of the 2024/2025 academic year. The sample included two classes: the experimental class with 30 students who received instruction via the *Flipped Classroom* model, and the control class with 29 students taught using the expository learning model.

Research instruments included questionnaires, observations, and documentation. The questionnaire, using a Likert scale, comprised 18 items to assess students' activeness and 19 items to evaluate learning autonomy. Non-participant observations were conducted to examine

students' activeness and autonomy during the learning process and to evaluate the implementation of the *Flipped Classroom* model in the experimental class, complementing the quantitative data. Documentation, such as pretest and posttest scores, attendance sheets, and learning activity logs, was also used to support the validity of the findings. Integrating these instruments aimed to ensure thorough and accurate data collection.

The research procedure was carried out in three stages, namely:

a. Administering the pretest to both the control class and the experimental class.
b. Providing the treatment, in which the experimental class was taught using the Flipped Classroom model while the control class received instruction through the Expository model. The treatment was conducted over six sessions in accordance with the Semester Learning Plan (RPS).
c. Administering the posttest to both classes to determine the differences after the treatment.

Prior to hypothesis testing, prerequisite analyses were performed, including normality tests using either the Kolmogorov-Smirnov or Shapiro-Wilk test, and homogeneity tests via Levene's Test. Data were deemed normally distributed and homogeneous if the significance value exceeded 0.05 (Sugiyono, 2019). When these assumptions were not met, non-parametric methods were employed. Hypothesis testing then proceeded with a paired samples t-test to identify differences between pretest and posttest scores within each group, and an independent samples t-test to compare posttest results between the experimental and control classes. A difference was considered statistically significant if the significance value was below 0.05 (Creswell, 2018).

RESULTS AND DISCUSSION

Instrument Validity and Reliability Test

The research instrument, designed as a questionnaire to assess students' activeness and learning autonomy, included 18 items. The validity test, conducted using Pearson's Product Moment correlation, showed a significance value (Sig. 2-tailed) of 0.000 for all items (P1–P18). Because this value is below the 0.05 threshold, all items were deemed valid. The correlation coefficients ranged from 0.552 to 0.957, reflecting a strong positive relationship between each item and the overall score. Consequently, the instrument was considered suitable for use, with no items being removed. The Cronbach's Alpha reliability test resulted in a coefficient of $\alpha = 0.993$, placing it in the very high category (≥ 0.80). This suggests that the instrument possesses excellent internal consistency and can consistently generate reliable data when assessing students' activeness and learning autonomy.

Table 1. Instrument Reliability Test

Reliability Statistics

Cronbach's Alpha	N of Items
.993	18

Source: Data processed by the author, 2024

Based on the reliability test using Cronbach's Alpha, a coefficient value of $\alpha = 0.993$ was obtained for the 18 tested items. This value falls into the very high category (≥ 0.80), indicating that the instrument possesses an excellent level of internal consistency. In other words, the instrument is capable of producing stable and consistent results when used to measure the same variables across different subjects as well as at different times.

Observation Results

The classroom observation, conducted by Lisa Ariyani using a structured observation instrument, aimed to evaluate students' activeness and learning autonomy. Results showed that students in the experimental class, which used the Flipped Classroom model, exhibited higher learning autonomy than those in the control class following the Expository model. Specifically, experimental class students were more proactive in preparing materials before lectures, more confident in sharing their opinions, and better at managing their study time independently. Meanwhile, control class students relied heavily on lecturer explanations, were less inclined to ask questions, and demonstrated lower levels of independent preparation prior to lessons. Overall, the observations indicated that applying the Flipped Classroom model promoted greater student independence in managing their learning, especially regarding initiative, responsibility, and learning discipline.

Table 2. Observation of Students' Learning Autonomy

No	Aspect of Learning Autonomy	Control Class (Expository)	Experimental Class (Flipped Classroom)
1	Not dependent on others	3,2	4,5
2	Self-confidence	3,4	4,6
3	Discipline	3,1	4,4
4	Responsibility	3,3	4,7
5	Initiative	3	4,5
6	Self-control	3,2	4,6
	Average	**3,2**	**4,55**

Source: Results of classroom observations, 2024

Scale Description:
1 = Very Low, 2 = Low, 3 = Moderate, 4 = High, 5 = Very High

As shown in the table above, the experimental class had a higher average learning autonomy score (4.55) compared to the control class (3.2). This suggests that implementing the Flipped Classroom model positively impacts students' learning autonomy.

Assumption Tests for Data Analysis

Before conducting the hypothesis testing, the data were first tested for normality and homogeneity.

Normality Test

The results of the Shapiro-Wilk test showed that the data from the control class (29 students) and the experimental class (30 students) followed a normal distribution. Significance values for activeness ranged between 0.201 and 0.664, while those for learning autonomy ranged from 0.114 to 0.976. As all values exceeded 0.05, it can be concluded that the data were normally distributed.

Table 3. Normality Test of Activeness Data

Tests of Normality[a]

		Kolmogorov-Smirnov			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	df	Sig.
Activeness	Pretest Control	0.128	29	.200*	.952	29	0.201
	Posttest Control	0.106	29	.200*	.974	29	0.664

Pretest Experiment	0.138	30	.148	.964	30	0.394
Posttest Experiment	0.123	30	.200*	.973	30	0.618

*, This is a lowar bound of the true significance
a. Lilliefors Significance Correction

Source: Output of Shapiro-Wilk Test, SPSS, 2024

According to the Shapiro-Wilk test, the activeness data for students in the control class (N=29) and the experimental class (N=30) yielded significance values of 0.201, 0.664, 0.394, and 0.618. As all values exceed 0.05, it can be concluded that the activeness data are normally distributed.

Table 4. Normality Test of Student Independence

Tests of Normality[a]

		Kolmogorov-Smirnov			Shapiro-Wilk		
	Class	**Statistic**	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Independence	Pretest Control	0.114	29	0.200*	0.955	29	0.253
	Posttest Control	0.183	29	0.015	0.942	29	0.114
	Pretest Experiment	0.099	30	0.200*	0.988	30	0.974
	Posttest Experiment	0.100	30	0.200*	0.962	30	0.341

*, This is a lowar bound of the true significance
a. Lilliefors Significance Correction

Source: Output of Shapiro-Wilk Test, SPSS, 2024

Based on the figure, the significance values obtained are 0.253, 0.114, 0.976, and 0.309. As all of these values are equal to or exceed 0.05, it can be concluded that the normality assumption is satisfied, indicating that the data follow a normal distribution.

Homogeneity Test:

Levene's Test for homogeneity produced significance values of 0.231 for activeness and 0.244 for independence. Since both exceed the alpha level of 0.05, the data can be considered homogeneous.

Table 5. Homogeneity Test of Activeness Data

Test of Homogeneity of Variance

Variable	**Measurement Foundation**	**Levene Statistic**	**df1**	**df2**	**Sig.**
Independence	Based on Mean	1.452	3	114	0.231
	Based on Median	1.340	3	114	0.265
	Based on Median and with adjusted df	1.340	3	98.073	0.266
	Based on trimmed mean	1.374	3	114	0.254

Source: Output of Levene's Test, SPSS, 2024

As shown in the figure above, the significance value based on the mean is 0.231, which exceeds the 0.05 threshold (Sig. ≥ 0.05). This indicates that the activeness data are homogeneous.

Table 5. Homogeneity Test of Student Independence Data

Test of Homogeneity of Variance

Variable	**Measurement Foundation**	**Levene Statistic**	**df1**	**df2**	**Sig.**
Independence	Based on Mean	1.410	3	114	0.244
	Based on Median	1.394	3	114	0.248
	Based on Median and with adjusted df	1.394	3	100.722	0.249

Based on trimmed mean	1.388	3	114	0.250

eSource: Output of Levene's Test, SPSS, 2024

From the data, a significance value of 0.244 was obtained, indicating that the data are homogeneous because Sig. ≥ 0.05. Thus, the fundamental requirements for parametric tests were satisfied, permitting the use of both the Paired Samples t-test and the Independent Samples t-test for analysis.

Hypothesis Testing

Paired Samples T-Test

Student Activeness:

The test outcomes for both the control and experimental groups showed a significance value of 0.000 (< 0.05), indicating a meaningful difference between pretest and posttest scores for student activeness. This confirms that both the expository method and the Flipped Classroom model effectively enhanced student activeness.

Table 7. Results of the Paired Samples T-Test on Student Activeness

Paired Samples Test

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pretest_Control – Postest_Control	-28.276	6.117	1.136	-30.603	-25.949	-24.892	28	0.000
Pair 2	Pretest_Experiment – Postest_Experiment	-29.700	8.987	1.614	-34.244	-26.344	-18.101	29	0.000

Source: Output of Paired Samples T-Test, SPSS, 2024

The paired samples t-test produced a significance value of 0.000 (Sig. ≤ 0.05) in both the control and experimental groups, confirming that there was a significant difference between their pretest and posttest results.

Student Independence:

The control and experimental groups both recorded a Sig. value of 0.000 (< 0.05), demonstrating a significant difference between the pretest and posttest scores for student independence. This finding shows that each learning model contributed to improving students' independence in the learning process.

Table 8. Results of the Paired Samples T-Test for Student Independence

Paired Samples Test

					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Pretest_Control – Postest_Control	-24.414	14.204	2.638	-29.817	-19.011	-9.256	28	0.000
Pair 2	Pretest_Experiment – Postest_Experiment	-30.400	10.294	1.879	-34.244	-26.556	-16.175	29	0.000

Source: Output of Paired Samples T-Test, SPSS, 2024

The control and experimental groups both obtained a significance value of 0.000 (Sig. ≤ 0.05), which shows that there is a significant difference between their pretest and posttest scores.

Independent Samples T-Test

Student Activeness:

The analysis revealed a significance value of 0.574 (> 0.05), indicating that no meaningful difference was found in student activeness between the experimental group and the control group. This suggests that both the Flipped Classroom and the expository approach are equally capable of enhancing student activeness.

Table 9. Results of the Independent Samples Test for Student Activeness

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
						Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		F	Sig.	t	df				Lower	Upper
Activeness	Equal variances assumed	6.439	.014	-5.566	57	.574	-1.020	1.802	-4.629	2.590
	Equal variances not assumed			-5.572	42.741	.571	-1.020	1.784	-4.617	2.578

Source: Output of Independent Samples T-Test, SPSS, 2024

The analysis results show a significance value of 0.574 (Sig. > 0.05), indicating that there is no significant difference in student activeness between the two groups.

Student Independence:

The test results showed a significance value of 0.047 (< 0.05). This indicates a significant difference in student independence between the experimental and control classes. Students who participated in the Flipped Classroom model demonstrated a higher level of independence compared to those who learned using the expository model.

Table 10. Results of the Independent Samples Test for Student Independence

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
						Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		F	Sig.	t	df				Lower	Upper
Independence	Equal variances assumed	.792	.377	-2.029	57	.047	-3.849	1.897	-7.649	-.050
	Equal variances			-2.031	56.918	.047	-3.849	1.895	-7.644	-.054

	not assumed								

Source: Output of Independent Samples T-Test, SPSS, 2024

The significance value for student independence is 0.047 (Sig. ≤ 0.05), indicating a significant difference in the mean scores between the two groups.

Discussion

The results of this study indicate that the instruments used to measure student activeness and independence met the validity and reliability requirements. All items showed correlation coefficients ranging from strong to very strong, while the reliability obtained through Cronbach's Alpha ($\alpha = 0.993$) indicated a very high level of internal consistency. This aligns with Sugiyono (2017), who emphasized that valid and reliable research instruments are essential to ensure data accuracy and to measure research variables appropriately. These findings provide a solid foundation that the results of this study can be trusted and interpreted scientifically.

Furthermore, the results of the prerequisite tests showed that the research data met the assumptions of normality and homogeneity. Therefore, the use of parametric statistical tests was appropriate. This strengthens the validity of the analysis, as Creswell (2018) highlights that selecting an analysis technique consistent with data assumptions is crucial to avoid biased results and ensure high inferential validity.

Based on the Paired Samples t-test, both the control class using the expository model and the experimental class using the Flipped Classroom model showed significant improvements between the pretest and posttest scores for both student activeness and independence. This indicates that, in principle, both learning models are capable of improving students' learning quality. These findings are in line with Joyce, Weil, & Calhoun (2015), who argued that learning effectiveness is determined not only by the type of model used but also by the quality of planning, instructional strategies, and how instructors create a conducive classroom environment.

However, the Independent Samples t-test revealed more distinct differences. For the activeness variable, the significance value of 0.574 (Sig. > 0.05) indicated no significant difference between the control and experimental classes. In other words, both the expository and Flipped Classroom models were equally effective in enhancing student activeness. Student activeness is influenced not only by the learning model but also by intrinsic factors such as motivation and self-confidence, as well as extrinsic factors like instructor support and classroom climate. This result is consistent with Trisniawati et al. (2023), who found that increases in student activeness are more strongly influenced by instructor-student interaction and class activity design than by differences in learning models alone.

In contrast, for the independence variable, the Independent Samples t-test showed a significant difference between the two groups, with a significance value of 0.047 (Sig. < 0.05). Students in the experimental class using the Flipped Classroom model demonstrated higher independence compared to the control class. This can be explained by the nature of the Flipped Classroom, which requires students to study the material prior to face-to-face sessions, thereby training them to take responsibility for their learning process, manage their time, and develop

self-directed learning strategies. This is supported by Roehl, Reddy, & Shannon (2013), who stated that the Flipped Classroom provides greater opportunities for students to manage their learning independently. Similarly, Vitta (2023) emphasized that this approach enhances self-regulated learning, as students learn at their own pace and adjust strategies to suit their learning styles.

For PGSD students, improving independence is strategically important. As prospective educators, PGSD students are expected to cultivate self-directed learning habits to continuously adapt to curriculum changes, technological developments, and the evolving needs of future learners. Setiyawan et al. (2024) found that prospective teachers with high levels of learning independence are better prepared to face professional challenges and more flexible in developing instructional strategies. Therefore, this study confirms that the Flipped Classroom is more relevant for learning objectives that emphasize the development of student independence.

Nevertheless, the effectiveness of the Flipped Classroom is not without challenges. First, not all students are motivated to study independently before class. Some students remain passive, relying solely on instructor explanations during lectures, which limits their participation in discussions. Second, the success of the Flipped Classroom is heavily influenced by the quality of the teaching materials. Monotonous or hard-to-access materials can reduce students' interest in learning. Third, limitations in technological infrastructure also play a critical role. As noted by Omarchevska et al. (2024), successful implementation of the Flipped Classroom requires adequate access to digital devices and stable internet connectivity.

The role of the instructor in addressing these challenges is crucial. Instructors must act not only as information providers but also as facilitators who guide students in understanding, discussing, and applying the material in real-life contexts. Oktarianto et al. (2022) emphasized that the success of the Flipped Classroom also depends on the instructor's ability to design creative, interactive, and student-centered learning experiences.

Overall, the findings of this study reinforce that the Flipped Classroom is a relevant learning model for higher education in the digital era, particularly for fostering student independence. Meanwhile, for the activeness variable, both the expository and Flipped Classroom models were equally effective, so the choice of model can be adapted to the context, course objectives, and student characteristics. By cultivating independence while maintaining activeness, PGSD students will be better prepared to become professional, adaptive, and innovative educators in the future.

CONCLUSION

The study found that while both the *Flipped Classroom* and expository models significantly improved student activeness in the PGSD program, there was no significant difference between the two in this regard. However, the *Flipped Classroom* was more effective in enhancing student independence, with students demonstrating greater responsibility, time management, and self-directed learning skills. These results highlight the *Flipped Classroom* as a valuable and adaptable model for fostering learning independence, especially for future professional teachers, while both models can be strategically combined to promote activeness depending on the teaching context. Future research could explore how blending these models affects long-term learning outcomes and the development of 21st-century skills across diverse educational settings.

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