Analyzing the Impact of Flipped Learning and Learning Motivation on Academic Achievement Through Learning Independence in Modern Education

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Abstract. This research aims to analyze the impact of flipped learning and learning motivation on academic achievement with learning independence as a mediating variable among university students in the era of modern education. A quantitative approach with a survey method was used involving 100 active students at Universitas Negeri Jakarta selected by simple random sampling. Data were collected using a 5-point Likert scale questionnaire and analyzed using Smart PLS 4. Results show that flipped learning (p = 0.999) and motivation (p = 0.948) did not have direct effects on academic achievement. However, both significantly influenced learning independence (p = 0.033 for flipped learning, p = 0.000 for motivation). Learning independence had a strong impact on academic achievement (p = 0.000; path coefficient = 0.852), indicating a full mediation effect. The model's predictive capability was high, with an R-square of 73.2% for academic achievement. This research underscores the importance of cultivating self-regulated learning to enhance academic outcomes in modern education.
Keywords: Flipped Learning, Learning Motivation, Learning Independence, Academic Achievement, Modern Education

Introduction

The rapid advancement of information and communication technology has fundamentally transformed the landscape of education in the digital era. One prominent innovation gaining traction is flipped learning, an instructional model that reverses traditional teaching by shifting content delivery outside the classroom and utilizing classroom time for active, collaborative learning.(Bergmann & Sams, 2012).

In flipped learning, students engage with instructional materials—such as videos, readings, or interactive media—prior to class sessions. Classroom time is then allocated to discussion, problem-solving, and deeper exploration with the instructor's guidance. This model aligns with 21st-century education demands by promoting higher-order thinking, collaboration, and learner-centered instruction.

Flipped learning has demonstrated the potential to increase student engagement and conceptual understanding.(Abeysekera & Dawson, 2015; Lo & Hew, 2017) However, its success depends on critical factors, notably learning motivation and self-regulated learning. Motivation influences what and how students learn,(Pintrich, 2003; Ryan & Deci, 2000) especially in a setting that requires independent preparation. Students with high motivation are more likely to actively engage with pre-class materials and contribute during classroom activities.

Self-regulated learning is equally crucial,(Winne & Hadwin, 1998; Zimmerman, 1990) referring to students' ability to manage their own learning process cognitively, motivationally, and behaviorally. In flipped learning, students must allocate study time, monitor their comprehension, and identify topics for clarification in class. Therefore, self-regulated learning may act as a mediating variable linking flipped learning and learning motivation to academic achievement.

Although research on flipped learning is expanding, comprehensive studies integrating flipped learning, learning motivation, self-regulated learning, and learning outcomes within a single structural model remain limited. Most studies explore direct relationships without examining the mediating role of self-regulation. Understanding these dynamics is essential for optimizing the implementation of flipped learning.

In the Indonesian context, flipped learning is relatively new and underutilized across educational levels. Its implementation faces challenges such as digital infrastructure readiness, educator and student digital competence, and learning culture. Consequently, a study that investigates the impact of flipped learning on learning outcomes through motivation and self-regulation is both timely and necessary.

This study aims to examine how flipped learning and learning motivation influence academic achievement, with self-regulated learning as a mediating factor. The findings are expected to contribute theoretically and practically to the development of effective instructional models in the digital age).

Literature Review

Flipped Learning (X1)

One of the rapidly growing learning approaches in today's digital era is Flipped Learning, which changes the role of the traditional classroom to be more interactive and learner-centered. This approach provides an alternative learning strategy that emphasizes the use of technology and changes the role of educators in the teaching and learning process. According to Flipped Learning Network (FLN), this approach is characterized by four main indicators that become the foundation of its implementation, namely Flexible Environment, Learning Culture, Intentional Content, and Professional Educator.

Learning Motivation (X2)

In addition to the learning approach, internal factors such as learning motivation also play an important role in the success of the education process. Learning motivation directs individuals to actively engage in learning activities to achieve certain goals. According to Sardiman (2007), motivation is the power that underlies an action in order to achieve learning goals. The indicators of learning motivation as expressed by Makmun (2003) and Wigfield and Guthrie (2013) include duration and frequency of learning, perseverance in facing difficulties, aspirations and learning goals, participation and focus in learning activities, and direction of attitude towards learning.

Learning Independence (Z)

In addition to motivation, learning success is also influenced by the level of learning independence that students have. Learning independence reflects the ability of individuals to organize and manage their learning process actively and responsibly without dependence on other parties. Johnson (2009) explains that independent learning gives students the freedom to organize, adjust actions, and make decisions in order to achieve learning goals. The indicators of learning independence include the ability to plan, responsibility for the learning process, self-management, and initiative in finding information or learning solutions.

Learning Outcomes (Y)

As the main indicator of success in the educational process, learning outcomes reflect the achievements of students after participating in a series of learning activities, both in aspects of knowledge, skills, and attitudes. Bloom in Azwar (2006) classifies learning outcomes into three main domains, namely cognitive (ability to think, understand, and solve problems), affective (attitudes, feelings, values, and motivation), and psychomotor (physical or motor skills in completing tasks). To measure learning outcomes, some commonly used indicators include academic grades or test results, improved thinking skills, and changes in attitude and behavior in the learning process.

Research Framework and Hypothesis

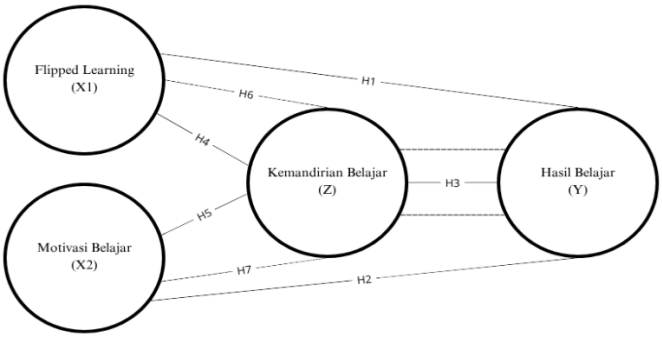

Figure 1. Framework Hypothesis

This research is entitled “Analysis of the Effect of Flipped Learning (X1) and Learning Motivation (X2) on Learning Outcomes (Y) through Learning Independence (Z) in the Modern Learning Period”. This research is motivated by the importance of understanding effective learning strategies and internal factors of students in improving learning outcomes in the modern education era. Learning independence is seen as an intermediary variable that can strengthen the relationship between learning approaches and the results achieved. Based on the theoretical foundation and previous studies, this research formulates seven main hypotheses.

First, it is assumed that Flipped Learning (X1) has a positive effect on Learning Outcomes (Y). Second, Learning Motivation (X2) is also expected to have a positive influence on Learning Outcomes (Y). Third, Learning Independence (Z) is assumed to have a positive influence on Learning Outcomes (Y). Furthermore, the fourth hypothesis states that Flipped Learning (X1) has a positive effect on Learning Independence (Z). The fifth hypothesis shows that Learning Motivation (X2) also has a positive effect on Learning Independence (Z).

The last two hypotheses test the indirect effect, namely that Flipped Learning (X1) and Learning Motivation (X2) each have a positive effect on Learning Outcomes (Y) through Learning Independence (Z) as an intervening variable.

Methods

This study employed a quantitative explanatory approach using a survey method to examine the causal relationships among variables. The research aimed to analyze the effect of flipped learning (X1) and learning motivation (X2) on learning outcomes (Y), mediated by self-regulated learning (Z). A cross-sectional design was applied, collecting data at a single point in time. The population consisted of active undergraduate students at Universitas Negeri Jakarta (UNJ) during the even semester of the 2024/2025 academic year. A total of 100 students were selected using simple random sampling, based on Slovin’s formula (Slovin, 1960) with a 95% confidence level and 10% margin of error. Criteria included students who had completed at least two semesters and had experienced flipped learning. Data were collected through an online questionnaire via Google Form. The instrument used a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), designed to measure perceptions of flipped learning, motivation, self-regulation, and learning outcomes.

Conceptual and Operational Definitions

- Flipped Learning (X1): A model that reverses traditional classroom instruction by delivering content outside class and using in-class time for active learning.
- Learning Motivation (X2): Internal and external drives that stimulate and direct learners’ academic behavior.
- Self-Regulated Learning (Z): Learners' ability to plan, monitor, and evaluate their own learning processes.
- Learning Outcomes (Y): Cognitive, affective, and psychomotor changes reflected in academic performance and participation.

Each variable was measured using specific dimensions and indicators. For example, flipped learning was assessed through pre-class preparation, in-class engagement, and use of digital technology. Motivation involved intrinsic and extrinsic drives, while self-regulation included initiative, discipline, and responsibility. Learning outcomes covered knowledge, attitudes, and skills. Data were analyzed using SmartPLS 4 to conduct Partial Least Squares Structural Equation Modeling (PLS-SEM) (Hair et al., 2019; Ringle et al., 2015) . This method was selected for its suitability in handling complex models with relatively small sample sizes and no strict assumption of normal data distribution.

Result and Discussion

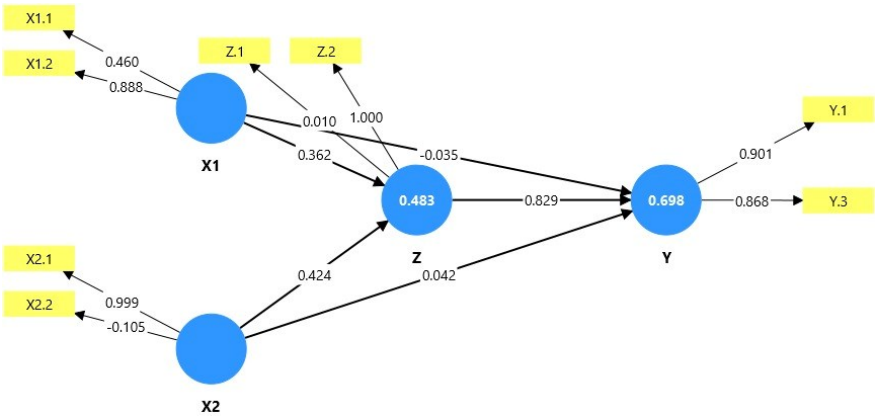

Figure 2. Research Model

The measurement model assessment was conducted to evaluate the reliability and validity of the constructs before examining the structural relationships. The outer loadings analysis revealed that all indicators demonstrated strong convergent validity, with loading values ranging from 0.854 to 0.948, all substantially exceeding the recommended threshold of 0.70 (Hair et al., 2017). Flipped Learning indicators showed loadings of 0.894 (X1.1) and 0.903 (X1.2), while Learning Motivation indicators achieved 0.914 (X2.1) and 0.854 (X2.2). Learning Outcomes indicators demonstrated strong loadings of 0.908 (Y.1) and 0.859 (Y.3), and Self-Regulated Learning exhibited the highest loadings with 0.948 (Z.1) and 0.939 (Z.2).

The reliability and validity assessment confirmed the robustness of all constructs. Cronbach's alpha values ranged from 0.724 to 0.877, with Self-Regulated Learning showing the highest internal consistency (0.877), followed by Flipped Learning (0.761), while Learning Motivation and Learning Outcomes both achieved 0.724. All values exceeded the minimum threshold of 0.70 (Nunnally & Bernstein, 1994). Composite reliability values further supported internal consistency, ranging from 0.877 to 0.942, with Self-Regulated Learning demonstrating the highest reliability (0.942). The Average Variance Extracted (AVE) values all surpassed the 0.50 threshold, with Flipped Learning achieving 0.807, Learning Motivation 0.782, Learning Outcomes 0.782, and Self-Regulated Learning showing the highest AVE of 0.890, confirming strong convergent validity across all constructs.

Multicollinearity assessment through Variance Inflation Factor (VIF) analysis indicated no problematic correlations among indicators. All VIF values ranged from 1.474 to 2.561, remaining well below the critical threshold of 5.0 (Hair et al., 2017). Learning Outcomes and Learning Motivation indicators showed the lowest VIF values (1.474 and 1.476 respectively), followed by Flipped Learning indicators (1.607), while Self-Regulated Learning indicators had the highest but still acceptable VIF values (2.561).

The discriminant validity assessment using the Fornell-Larcker criterion generally supported the distinctiveness of the constructs, with inter-construct correlations of 0.916 between Flipped Learning and Learning Motivation, 0.654 between Flipped Learning and Learning Outcomes, and 0.759 between Learning Motivation and Learning Outcomes. However, an anomalous correlation value of 1.063 between Self-Regulated Learning and Learning Outcomes exceeded the theoretical maximum, likely indicating a data input error or model specification issue requiring attention.

The structural model assessment revealed important insights into the predictive power and effect relationships. The coefficient of determination (R^2) indicated strong explanatory power for Learning Outcomes (R^2 = 0.732, adjusted R^2 = 0.723), suggesting that 73.2% of variance in academic achievement is explained by the model predictors. Self-Regulated Learning showed moderate explanatory power (R^2 = 0.457, adjusted R^2 = 0.446), with 45.7% of its variance explained by Flipped Learning and Learning Motivation.

The effect size analysis through f-square values revealed the practical significance of the relationships. Both Flipped Learning and Learning Motivation demonstrated negligible direct effects on Learning Outcomes (f^2 = 0.000 for both), indicating that these variables do not directly influence academic outcomes. However, their effects on Self-Regulated Learning differed substantially, with Flipped Learning showing a small effect (f^2 = 0.058) and Learning Motivation demonstrating a moderate effect (f^2 = 0.232). Most significantly, Self-Regulated Learning exhibited a large effect on Learning Outcomes (f^2 = 1.470), confirming its central mediating role in the relationship between pedagogical approaches, motivation, and academic achievement. These findings suggest that the influence of flipped learning and learning motivation on academic outcomes operates primarily through the development of self-regulated learning

behaviors rather than through direct pathways.

Tabel 1: Path Coefficients

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
X1 -> Y	0.000	0.003	0.073	0.002	0.999
X1 -> Z	0.242	0.229	0.114	2.133	0.033
X2 -> Y	0.005	-0.002	0.071	0.065	0.948
X2 -> Z	0.487	0.486	0.124	3.918	0.000
Z -> Y	0.852	0.856	0.060	14.218	0.000

Direct path analysis showed that X1 and X2 did not significantly influence Y directly (p-values = 0.999 and 0.948). However, both X1 (β = 0.242, p = 0.033) and X2 (β = 0.487, p = 0.000) significantly affected Z. Z, in turn, had a strong effect on Y (β = 0.852, p = 0.000). These findings emphasize that the influence of flipped learning and motivation on achievement operates primarily through self-regulation.

Tabel 2: Indirect Effects

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
X1 -> Z -> Y	0.207	0.195	0.097	2.132	0.033
X2 -> Z -> Y	0.415	0.418	0.115	3.592	0.000

Specific indirect effect analysis confirmed that both X1 and X2 exerted significant indirect effects on Y via Z. The indirect path from X1 to Y through Z was β = 0.207 (p = 0.033), and from X2 to Y through Z was β = 0.415 (p = 0.000). These results establish self-regulated learning as a full mediator, indicating that the impact of flipped learning and motivation on academic success is fully channeled through students' capacity for independent learning.

Conclusion

The study confirms that flipped learning and motivation alone do not directly affect learning outcomes. Their influence becomes significant only through enhanced self-regulated learning. With self-regulated learning acting as a full mediator, strategies aimed at fostering learner autonomy should be prioritized in digital learning environments. The model demonstrated strong explanatory power (R^2 = 0.732 for Y), confirming its effectiveness in predicting academic performance.

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