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Revolutionizing Economics Learning in High School: Insights from the Flipped Classroom Approach

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Abstract

The study of Economics, particularly taxation, is often perceived as difficult because it requires an understanding of abstract concepts and technical calculation skills. Conventional teacher-centered instructional models tend to limit students' opportunities to build their own understanding actively. This study aims to examine the effectiveness of the flipped classroom (FC) model in improving student learning outcomes in Taxation. A quasi-experimental design with a non-equivalent control group pretest–posttest was used in this research. The sample consisted of 68 eleventh-grade students at XYZ Public High School in North Sulawesi, divided into an experimental group (FC) and a control group (traditional learning). Data were collected through pre-tests and post-tests and analyzed using ANCOVA, effect size, and N-Gain scores. The ANCOVA results, controlling for pretest scores, showed that the flipped classroom model led to better learning outcomes compared to traditional instruction. The FC model effectively strengthened students' cognitive abilities and practical skills through independent and collaborative learning activities. Practically, teachers need to prepare engaging digital content and contextual assignments so that the flipped classroom can serve as a relevant strategy to enhance the quality of Economics education at the senior high school level.

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INTRODUCTION

Education in Indonesia continues to face numerous challenges, particularly in improving the quality of teaching and student learning outcomes. Data from the Programme for International Student Assessment (PISA) 2022 show that Indonesia ranked 66th out of 81 countries, indicating that the national education system still requires substantial reforms to be globally competitive (OECD, 2022). Additionally, a survey conducted by the Political and Economic Risk Consultant (PERC) ranked Indonesia last among Asian countries in terms of educational quality, 12th out of 12 surveyed. (Pramana, 2021). These findings highlight the pressing need for comprehensive evaluations and fundamental reforms in educational policies and teaching methodologies at all levels.

The low quality of education in Indonesia can be attributed to various systemic issues, including the teaching of economics at the senior high school level. According to 2021 Sustainable Development Goals (SDGs) data, the elementary education completion rate stood at 97.37%, junior high school 88.88%, and senior high school only 65.94% (ISSED, 2025). Economics, a compulsory subject in senior high schools, faces significant challenges in enhancing students' understanding and engagement.

Economics learning at the senior high school level plays a strategic role, as it equips students with an understanding of basic economic concepts, decision-making skills, and financial literacy needed in everyday life. However, classroom practice shows that students' understanding of economics—reflected in their daily test results—remains relatively low. Based on data from a public senior high school in North Sulawesi during the 2023/2024 academic year, only 26.52% of 132 students achieved the Minimum Mastery Criteria in Economics, indicating a substantial gap in attaining optimal learning outcomes. Ganimian & Murnane (2016) argue that teaching quality in developing countries is often hampered by the continued use of conventional teaching methods, which fail to promote critical and analytical thinking. Therefore, more innovative, technology-integrated teaching approaches are needed to improve student learning outcomes in this subject.

Technological advancements have significantly impacted various fields, including education, by making information more accessible for self-directed learning. According to Purdue University (2024), technology has drastically expanded access to education, enabling learning from anywhere, at any time, via online platforms. However, the integration of technology into educational practices remains suboptimal. Many institutions have yet to fully integrate digital tools, limiting their potential to improve learning effectiveness. Bećirović & Dervić (2023) note that inadequate national and institutional policies often hinder the adoption of educational technology, thus reducing its effectiveness.

Interviews with teachers indicate that traditional methods, which primarily rely on PowerPoint presentations, are still prevalently used. These approaches position the teacher as the sole source of knowledge, with students as passive recipients, often leading to low engagement and motivation (Baig & Yadegaridehkordi, 2023; Naing et al., 2023). As an alternative, the flipped classroom model has been proposed to address these limitations. Several studies have confirmed its effectiveness. For instance, Ferriz-Valero et al. (2022) found that flipped learning enhances motivation, while Qi et al. (2024) emphasized its positive impact on learning styles and student engagement, particularly in language learning contexts. Similarly, Masruddin et al. (2024) reported that flipped learning facilitates student engagement through interactive synchronous and asynchronous activities. More recent experimental evidence also strengthens these findings. Eltahir & Alsalhi (2025) demonstrated that the flipped classroom significantly improves academic achievement, motivation, and engagement compared to traditional teaching. Likewise, Zhou & Zhang (2025) showed that integrating the ARCS Motivation Model into flipped classroom design further enhances student attention, relevance, confidence, and satisfaction. Collectively, these studies support the use of technology-integrated teaching strategies, such as the flipped classroom, to enhance educational quality and student participation (Masadeh, 2021).

The flipped classroom model is a pedagogical approach that reverses traditional learning structures by incorporating information technology (Birgili et al., 2021; Divjak et al., 2022). Students study material independently outside of class—often through instructional videos, while class time is used for interactive discussions and problem-solving activities. This method has been shown to improve student engagement, motivation, and academic performance across disciplines (Bosch-Farré et al., 2024). Hidalgo & Callo (2023) and Foster & Stagl, 2018) also emphasize that the flipped classroom enhances student satisfaction, collaboration, and learning environ-

ments. Bakar & Hashim (2022) further shows that it encourages active learning, strengthens critical thinking, and improves conceptual understanding. Moreover, it offers flexibility for students to learn at their own pace, fostering independent learning and greater responsibility (Rathner & Schier, 2020; Galindo-Domínguez & Bezanilla, 2025; Kılıç et al., 2025).

According to cognitive learning theory, students learn more effectively when they are actively involved in constructing knowledge through meaning-making processes. Furthermore, cognitive load theory emphasizes the importance of designing instruction that minimizes unnecessary cognitive load, allowing students' mental capacity to be fully utilized for processing essential information (Evan et al. 2024). Taxation material, which integrates both conceptual and procedural components, requires a learning approach that optimizes cognitive processing and provides structured guidance. The flipped classroom model aligns with these theories because it shifts the introduction of concepts to pre-class activities, enabling face-to-face time to focus on reinforcement, elaboration, and problem-solving.

This model has been successfully implemented across various disciplines—such as mathematics, English, chemistry, physics, medical education, and teacher education (Fitrah et al., 2025; Öztürk & Çakıroğlu, 2021; Purnomo et al., 2022; Spaic et al., 2025; Yu et al., 2023) Bansal, et al., 2020).Bosch-Farré et al., (2024) found that the flipped classroom improves learning outcomes and student engagement in higher education.Bintz et al., (2024) Similarly, reported enhanced conceptual understanding and critical thinking skills across disciplines.

Recent bibliometric analyses by Amalia et al. (2025) and Yulita (2024) revealed that from 2012 to 2024, flipped classroom research was most prevalent in disciplines such as social sciences, computer science, engineering, medicine, mathematics, arts and humanities, nursing, business, and chemistry. These findings indicate the adaptability of the flipped classroom model across various educational contexts, although most studies focus on higher education. More recent research by Baig & Yadegaridehkordi (2023) confirms its growing use in higher education for promoting personalized and interactive learning. A practical example is the Vienna University of Economics and Business, which implemented the flipped classroom model in its Master's program in Economics and Socio-Ecological Policy. Used to teach behavioral economics, this approach involved 49 graduate students and aimed to promote sustainability education. The results showed increased student engagement and satisfaction, as well as improved understanding of behavioral economics concepts (Foster & Stagl, 2018).

Several studies have applied the flipped classroom model in economics education, such as (Hidalgo & Callo, 2023) with Grade IX students in the Philippines; (Foster & Stagl, 2018) with graduate students in Germany; Campos, et al., (2016) with prospective teachers; and Yamarik (2019) in an International Economics course. These studies reveal that the flipped classroom is still relatively rare in economics education, especially at the senior high school level. While Foster & Stagl (2018) note its frequent use in higher education, Purba, Sangka, and Kristiani (Purba et al., 2021) conceptually support its potential in economics education. Despite its growing popularity globally, especially in higher education, the application of the flipped classroom model in Indonesian senior high school economics, particularly in taxation, remains limited. Therefore, a research gap exists, indicating the need for stronger empirical evidence regarding the effectiveness of the flipped classroom in the context of senior high school Economics learning.

To address this gap, the present study employs a quasi-experimental design to examine the effectiveness of the flipped classroom model on students' learning outcomes in Economics, particularly in taxation material. The findings of this study are expected to provide relevant empirical evidence for teachers and schools in developing more effective technology-based instructional models. Hypothesis: Students taught using the flipped classroom model will demonstrate significantly better learning outcomes in economics compared to those taught using traditional methods.

METHODS

This study utilized a quasi-experimental design with a pretest-posttest non-equivalent control group. This design was chosen for its suitability in evaluating intervention effectiveness in real-world conditions where random assignment is not feasible. It is commonly applied in educational research to assess changes in learning outcomes by comparing pretest and posttest results between treatment and control groups (Creswell, 2014). The study was conducted in XYZ public senior high schools in North Sulawesi, purposively selected based on the availability of digital infrastructure and the criterion that students were

enrolled in the Economics subject to support the flipped classroom implementation.

The sample consisted of 68 eleventh-grade students, divided into two groups: an experimental group using the flipped classroom model and a control group using traditional instruction. To ensure the equivalence of students' initial abilities, pretest scores were compared, and teacher similarity was verified prior to the treatment. This step was taken to confirm that both classes had comparable baseline abilities before the intervention.

The experimental group received instruction through the flipped classroom model, following the framework by Bergmann and Sams (Bergmann & Sams, 2012), consisting of: preclass: students accessed instructional videos, duration 5-7 minutes, distributed via WhatsApp, and were required to take notes as well as respond to the questions embedded in the videos independently at home. Assigning tasks that required students to take notes and answer questions in the video was done to ensure that they watched the provided video. In-class stage: the learning process focused on reflection and clarification discussions to deepen conceptual understanding. Group work stage: students engaged in collaborative activities within small groups to solve problems or analyze case studies, followed by presentations of their findings to the class. Reflection and evaluation stage: the teacher reinforced key concepts, administered quizzes, and reviewed student responses to ensure that the intended learning objectives were achieved.

The control group received traditional instruction involving direct teaching, practice problems, and summative evaluation without prior individual preparation, consistent with the expository learning model. The treatment was delivered over four sessions (90 minutes each) within 4 weeks, focusing on taxation. Importantly, the same teacher delivered instruction in both classes to ensure consistency.

This research instrument was developed to measure students' economics learning outcomes in taxation material. The development process involved several stages, including identifying competencies, constructing the test blueprint, writing the test items, and conducting a review by three validators. Content validation was carried out using the Content Validity Index (CVI). The results of the content validity analysis indicate that most items received an I-CVI value of 1.00, suggesting that the validators agreed the items were relevant and could be accepted without revision (items 1–20, 22–25, and 27).

However, two items received lower I-CVI values, namely items 21 and 26, with a score of 0.67, thus requiring revision. Overall, the S-CVI value obtained from the average of all items was 0.93. This result demonstrates that the instrument generally possesses excellent content validity. Furthermore, empirical validity was tested using the Pearson Product-Moment correlation, in which items with an r-value greater than the r-table at $\alpha = 0.05$ were considered valid (Arikunto, 2016). Reliability was assessed using the Kuder-Richardson Formula 20 (KR-20), yielding a coefficient of 0.851 after removing two invalid items, indicating high reliability.

Table 1. Research Instrument Test

Category	Item	Validity	Reliability
Feasible	1, 3-7, 8–27	Valid	Reliabel
Not Feasible	2, 7	Not Valid	Reliabel

Source: Processed data (2025)

The instrument used to measure students' economics learning outcomes on taxation material covers the aspects of understanding, applying, analyzing, and evaluating (C2-C5). The distribution of competency achievement indicators is presented in Table 2.

Table 2. Distribution Competency Achievement Indicator

Competency Achievement Indicator	Cognitive Level
Explaining the definition of tax	1 (C2)
Explaining the functions, benefits, and tax rates	2-5 (C2, C3)
Understanding the differences between taxes and other official levies, as well as the principles of tax collection	6-9 (C2)
Analyzing the types of taxes	10, 11, 15 (C4)
Understanding the tax collection system in Indonesia	13, 14, 16 (C2, C4)
Understanding tax objects and tax assessment methods	17-20, 25 (C3)
Analyzing the functions and roles of taxes in economic development	12, 21- 24 (C4, C5)

Source: Processed data (2025)

Data were analyzed using ANCOVA to compare posttest critical thinking scores between

the experimental (Flipped Classroom) and control (traditional instruction) groups, controlling for pretest scores. ANCOVA was chosen because it allows the researcher to compare pretest–posttest scores while controlling for initial differences in pretest performance. Assumptions of linearity, homogeneity of variance, and homogeneity of regression slopes, outlier testing, and visual normality were tested before the analysis (Field, 2016). Effect size is reported by partial eta squared, while Hedges' g with 95% confidence intervals to provide accurate estimates (Aoki, 2020), and N-Gain analysis was conducted to evaluate improvement within each group, categorized as high (≥ 0.7), moderate (0.3–0.7), or low (< 0.3) (Hake, 1998).

RESULTS AND DISCUSSION

The data for this study were obtained from students' test scores collected through the administration of pre-tests and post-tests, which were randomly distributed to both the experimental and control groups. These results were analyzed to evaluate the effectiveness of the flipped classroom model in enhancing students' learning outcomes in economics. The experimental group obtained a mean score of 70.12 (SD = 9.91) with 34 students, while the control group had a lower mean score of 63.53 (SD = 10.78) with the same number of students. Overall, the total sample of 68 students achieved a mean score of 66.82 (SD = 10.80).

Table 3. Descriptive Statistics of the two groups

Group	Mean	SD	95% CI (Lower-Upper)	N
1.00	70.11	9.90	66.7 - 73.5	34
2.00	63.52	10.77	59.7 - 67.3	34

Note. Group 1 = Experimental (Flipped Classroom); Group 2 = Control (Traditional Instruction)
Source: Processed data (2025)

A pretest equivalency check showed no significant difference between the groups, as indicated by the UJI t-test (sig.). .584 (p-value > 5%), supporting the validity of the ANCOVA interpretation. Before conducting the ANCOVA, assumptions were tested. The Kolmogorov-Smirnov test of the residuals yielded a p-value of .200, which is greater than .05, indicating that the residuals were normally distributed. In addition to statistical tests, a visual inspection using a Q–Q plot was also conducted. The residual points appeared to lie on a diagonal line, indicating that the normality assumption was met. Levene's Test of Equality of Error Variances produced a significance value of .776 (> .05), confirming the homogeneity of variances between groups. The interaction between group and pretest was not significant, confirming that the assumption of homogeneity of regression slopes was met. These results show that the assumptions of normality and homogeneity were satisfied, allowing the ANCOVA to be conducted validly.

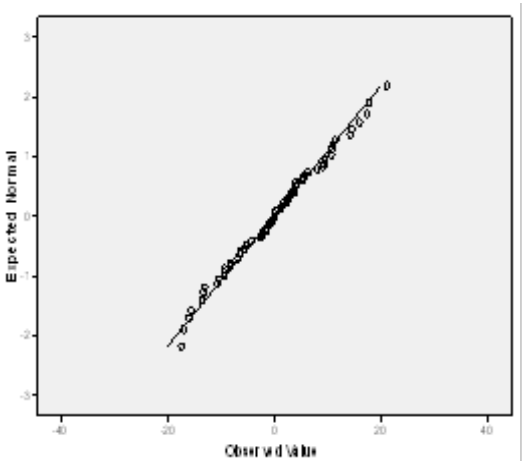

Figure 1. Normal Q-Q Plot of Residual
Source: Processed data (2025)

Table 4. Tests of Normality

	Kolmogorov-Smirnov(a)		
	Stat.	df	Sig.
Residual for Posttes	.071	68	.200(*)

Note. *This is a lower bound of the true significance.
Source: Processed data (2025)

Table 5. Levene's Test of Equality of Error Variances(a)

F	df1	df2	Sig.
.081	1	66	.776

Source: Processed data (2025)

The ANCOVA results showed that the corrected model was significant (F = 6.873, p < .005, Partial Eta Squared = .244), indicating that the predictors collectively explained a substantial proportion of the variance in posttest critical thinking scores. After controlling for pretest scores, the effect of group was significant (F = 4.486, p = .038, Partial Eta Squared = .066). This partial eta-squared value indicates that the effect of the Flipped Classroom treatment falls within the small-to-medium range, yet it still makes a meaningful contribution to improving stu-

dents' learning outcomes compared to traditional instruction. The pretest also showed a significant contribution (F=9.814, p=.003, Partial Eta Squared = .133), confirming that initial ability has a medium effect and role as a covariate in explaining posttest outcomes (Table 6).

Table 6. ANCOVA Test Result

Source	F	Sig.	Partial Eta Squared	Interpretation
Corrected Model	6.873	.000	.244	Significant
Intercept	286.074	.000	.817	Significant
Group * Pretest	1.156	.286	.018	Not Significant
Group	4.486	.038	.066	Significant
Pretest	9.814	.003	.133	Significant

Source: Processed data (2025)

The analysis using Hedges' g revealed that the flipped classroom model produced a moderate-to-large effect on students' learning outcomes (g = 0.64; 95% CI = 0.15–1.13). This value indicates that the difference in scores between the experimental and control groups was not only statistically significant but also practically meaningful. In other words, students who were taught through the flipped classroom approach achieved greater learning gains than those who received traditional instruction (Table 7).

Table 7. Hedges' g Result

Groups	Mean	Hedges' g	95% CI	Interpretation
1	70,24	0,64	0,15-1,13	Moderate–large effect, significant
2	63,53	—	—	

Note. Group 1 = Experimental (Flipped Classroom); Group 2 = Control (Traditional Instruction).
Source: Processed data (2025)

Furthermore, the N-Gain analysis corroborated these findings. The experimental group achieved an average N-Gain score of 0.64, which is moderate-to-high, while the control group achieved an average score of 0.55, which is moderate. These results suggest that although both groups improved, students engaged in flipped classroom learning demonstrated greater and more consistent progress. This finding highlights the effectiveness of the flipped classroom in fostering a deeper understanding of taxation concepts while simultaneously enhancing students' ability to apply knowledge through discussions, problem-solving tasks, and case analysis (Table 8).

Table 8. N-Gain Scores with 95% Confidence Interval

Group	Mean N-Gain	95% CI (Lower–Upper)	Category
1	.64	0.59 – 0.68	Moderate–High
2	.55	0.51 – 0.59	Moderate

Note. Group 1 = Experimental (Flipped Classroom); Group 2 = Control (Traditional Instruction).
Source: Processed data (2025)

The findings of this study indicate that the flipped classroom (FC) is effective in helping students understand Taxation material, as it provides wider opportunities for independent study of fundamental concepts outside the classroom. With prior knowledge as a foundation, face-to-face sessions can be devoted to case discussions, calculation exercises, and the solution of real-world tax-related problems. This aligns with the nature of Taxation, which requires analytical skills, rule interpretation, and practical application. In this context, the use of interactive media further enhances the effectiveness of FC.

Ohlenburg et al. (2024) demonstrated that interactive media improves performance and understanding in medical training, and a similar approach can be applied in economics education, particularly in online and hybrid learning environments (Celik et al., 2025). Moreover, FC's emphasis on collaboration enables students to construct understanding through group discussions, joint analysis, and practical problem-solving (Mostafa et al., 2025). Such collaborative approaches are critical in taxation, which demands calculation skills, rule interpretation, and assessment of policy implications.

The results of this study are consistent with previous research, confirming the effectiveness of FC in improving student learning outcomes across disciplines (Birgili et al., 2021; Divjak et al., 2022; Ferriz-Valero et al., 2022; Naing et al., 2023; Purnomo et al., 2022). For instance. Zhang et al., (2025) and Khazaei et al., (2025) found that FC enhances reflection, learning efficiency, and teamwork, while in economics education, FC has been shown to foster learner autonomy and active discussions that deepen conceptual un-

derstanding (Katona & Gyonyoru, 2025; Rincón et al., 2025; Lau & Qian, 2025).

The integration of digital technologies, from mobile devices to interactive simulations, further enriches learning experiences and provides more personalized feedback (Dai & Kang, 2025). Cross-disciplinary evidence from Sun et al., (2025), Chust-Pérez et al., (2024), and Onódi et al., (2025) reinforces that FC can improve both theoretical achievements and practical skills. In the context of taxation material, this model provides students with the opportunity to independently explore fundamental concepts, allowing face-to-face sessions to focus on case discussions, tax calculations, and problem-solving activities that require deeper analysis.

Nevertheless, the implementation of FC at the secondary school level continues to face challenges. Student readiness often poses a barrier, as many remain accustomed to passive learning (Li & Li, 2022; Pilu et al., 2025). Teachers, in turn, are required to design engaging digital content while also facilitating in-class discussions (Lim, 2024). Thus, the successful application of FC must be supported by contextualized learning approaches, such as case studies or project-based learning, to ensure students acquire a more meaningful understanding of concepts (Fauzan, 2021).

Despite these obstacles, the advantages of FC in strengthening comprehension of complex topics such as Taxation far outweigh its limitations (Feledichuk, 2024). The effectiveness of the flipped classroom in the Taxation topic can be understood through four main mechanisms: (1) inquiry using trigger questions to explore tax regulations, (2) small-group collaboration to facilitate discussions on calculation strategies, (3) formative feedback from teachers to immediately correct misconceptions, and (4) case analysis presentations that increase student accountability.

However, several methodological limitations of this study should be taken into consideration. First, the non-equivalent control group quasi-experimental design is susceptible to selection bias because class assignment was not conducted randomly. Second, this study controlled only one covariate (pretest); other factors, such as learning motivation, technological readiness, and students' independent learning habits, were not fully controlled and may have influenced the results. Third, teacher–student interactions and classroom dynamics may have introduced variations in the treatment, even though the same teacher was involved.

For economics teachers, the practical implications include developing templates for trigger questions, designing rubrics for tax analysis assessment, and utilizing community data (e.g., regional tax surveys) to link theory with practice. Future research is recommended to adopt multi-site designs with randomized teacher assignments, integrate hybrid formats supported by interactive technologies, and measure implementation processes (such as quality of collaboration and depth of student engagement) in addition to final learning outcomes.

CONCLUSION

This study demonstrates that the flipped classroom is an effective pedagogical strategy for enhancing students' understanding of Taxation. By engaging with fundamental concepts independently before class, students are better prepared to use face-to-face sessions for meaningful activities such as discussions, exercises, and authentic problem-solving. This approach not only strengthens cognitive outcomes but also cultivates the analytical and applied skills necessary to interpret tax regulations and practices.

From a practical perspective, these findings highlight the need for economics teachers to prepare clear, engaging, and easily accessible digital materials accompanied by guiding questions that promote inquiry. In the classroom, the teacher's role shifts to that of a facilitator who guides discussions, provides formative feedback, and connects the content to real-world contexts through case studies or simple projects. Theoretically, this study strengthens the literature on the effectiveness of technology-based learning in economics education. It reaffirms the relevance of the Flipped Classroom as an approach that bridges the gap between theory and practice. Nevertheless, this study has limitations related to its quasi-experimental design, which does not allow complete randomization, and the use of a single school as a research site; therefore, caution is required when generalizing the findings. Future research is recommended to involve a larger sample, employ a more robust experimental design, and explore additional variables, such as learning motivation, student engagement, and digital competence, as potential factors contributing to the effectiveness of the Flipped Classroom.

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