



The Impact of Flipped Classroom Model on Student's Learning : Study Meta-analysis

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Abstrak

Model flipped classroom telah menjadi model pembelajaran yang populer dalam beberapa tahun terakhir. Model ini membalikkan konsep pembelajaran tradisional dengan memindahkan aktivitas belajar utama ke luar kelas, memungkinkan siswa untuk belajar secara mandiri melalui video, modul, atau sumber belajar lainnya. Penelitian ini bertujuan untuk menganalisis dampak model flipped classroom terhadap pembelajaran siswa melalui meta-analisis. Meta-analisis dilakukan dengan mengumpulkan dan menganalisis hasil dari 14 studi primer yang meneliti efektivitas model flipped classroom dibandingkan dengan metode pembelajaran tradisional. Analisis data adalah analisis kuantitatif dengan aplikasi JSAP. Hasil penelitian ini menyimpulkan bahwa Hasil meta-analisis menunjukkan bahwa model flipped classroom memiliki dampak positif yang signifikan terhadap pembelajaran siswa dengan nilai overall effect size sebesar 0.826; $p < 0.001$ termasuk dalam kategori effect size tinggi. Temuan menunjukkan bahwa siswa yang mengikuti pembelajaran dengan model flipped classroom memiliki hasil belajar yang lebih baik dibandingkan dengan siswa yang mengikuti pembelajaran tradisional.

Kata Kunci: Flipped Classroom; Effect Size; Pembelajaran Siswa ; Meta-analisis

Abstract

The flipped classroom model has become a popular learning model in recent years. This model reverses the traditional concept of learning by moving key learning activities outside the classroom, allowing students to learn independently through videos, modules, or other learning resources. This study aims to analyze the impact of the flipped classroom model on student learning through meta-analysis. The meta-analysis was conducted by collecting and analyzing the results of 14 primary studies examining the effectiveness of the flipped classroom model compared to traditional learning methods. Data analysis is a quantitative analysis with a JSAP application. The results of this study concluded that the meta-analysis results showed that the flipped classroom model had a significant positive impact on student learning with an overall effect size of 0.826; $P < 0.001$ is included in the high effect size category. The findings show that students who participate in learning with the flipped classroom model have better learning outcomes compared to students who follow traditional learning.

Keywords: Flipped Classroom; Effect Size; Student Learning; Meta-analysis

Introduction

The flipped classroom model has evolved as a relatively new learning strategy and continues to evolve along with technological advancements (Aslan, 2022);(Kaya, 2022). In this model, teachers provide preliminary material through videos, podcasts, or online materials before class meetings, so students can learn the material at home and conduct discussions, exercises, or projects in class with teacher guidance (Diningrat et al., 2023). Thus, students can understand the material more deeply and more effectively, and have more time to discuss and practice in class. The development of the flipped classroom model also shows that this model can be implemented in several stages of activities(Sengul & Bensen Bostanci, 2021). In the research conducted, the flipped classroom model can be implemented in six stages of activities, two stages before class (low-level thinking skills) and four stages in the classroom (high-level thinking skills). The results of this study show that the innovative learning model of the flipped classroom has the potential to be applied in the teaching and learning process in higher education, with the aim of building a culture of independent learning and students' critical thinking skills (Diningrat et al., 2023)

In the digital era, the flipped classroom model is an attractive alternative for teachers and students(Ivan et al., 2023);Nayci, 2021). By using technology, this model can improve teacher-student interaction, improve student learning independence, and improve students' higher-level thinking skills. In addition, the flipped classroom model can also help teachers to focus more on student guidance and evaluation, as well as increase student participation in the learning process. Therefore, the flipped classroom model can be an effective strategy in improving learning outcomes and improving the quality of education (Hamidah & Kusuma, 2021)

The flipped classroom model is a learning model that changes the role of teachers and students in the learning process. In this model, teachers provide initial material through videos, podcasts, or online materials before class meetings. Students then study the material at home and conduct discussions, exercises, or projects in class with the guidance of the teacher(Vereş & Muntean, 2021). Thus, students can understand the material more deeply and more effectively, and have more time to discuss

and practice in class . The flipped classroom model also allows teachers to focus more on student guidance and evaluation, as well as increase student participation in the learning process. The flipped classroom model is very important in student learning because it can improve learning outcomes, increase student participation, and improve time efficiency (Erol & Celik, 2022). By studying the material at home, students can understand the material more deeply and more effectively, and have more time to discuss and practice in class. In addition, the flipped classroom model can also help teachers to focus more on student guidance and evaluation, as well as increase student participation in the learning process. Therefore, the flipped classroom model can be an effective strategy in improving learning outcomes and improving the quality of education (Ergene & Karaboğaz, 2024)

The application of the flipped classroom model in learning can cause several problems (Jarrah & Diab, 2019). One of the problems is how teachers can ensure that students have understood the material before the class meeting. In this model, teachers cannot directly monitor students while they are studying the material at home, so teachers must use other methods to monitor student progress(Erdogan & Akbaba, 2017). In addition, another problem is how teachers can ensure that students have the same access to the starting material, so that no student is left behind or does not have the ability to learn the material(İLiC, 2021). The application of the flipped classroom model is how teachers can overcome differences in students' abilities in learning the initial material. In this model, students with higher abilities may be able to learn the material faster and more effectively (Du, 2020); Aydın & Mutlu, 2023), while students with lower abilities may need more help. Therefore, teachers must have the right strategies in place to address students' differences in abilities and ensure that all students can understand the material effectively. In addition, another problem is how teachers can overcome the differences in technology used by students, so that no student is left behind because they do not have access to the necessary technology.

Previous research by (Bozdağ et al., 2021) the flipped classroom model has been found to have a positive effect on students' math skills, critical thinking skills, and academic achievement. Research by(Çevikbaş & Argün, 2017) shows that the flipped classroom model

has a significant effect on students' academic achievement. Research by (Bozdağ et al., 2021) stated that the flipped classroom model can be an effective strategy in improving student learning outcomes. Therefore, this study aims to conduct further meta-analysis to find out the impact of the flipped classroom model on student learning outcomes and identify the factors that affect its effect.

Method

This study is a quantitative research with a meta-analysis approach. Meta-analysis is a research approach that collects and analyzes previous research quantitatively (Ulum, 2022; (Hidayah et al., 2023); (Cooper et al., 2009). The data sources in this study come from 14 studies. Menurut (Bertsch et al., 2007; Oktarina et al., 2021) The meta-analysis research procedure consists of 1) determining the inclusion criteria of a research; 2) collecting and coding a study and 3) statistical analysis. The inclusion criteria are the research published in 2022-2024; data comes from SINTA and Scopus indexed journals; Research obtained from Mendeley; google Scholar and ERIC and Research Report complete data for effect size analysis. The data analysis in this study is a quantitative analysis by calculating the effect size value with the help of the JSAP 0.16.3 application. the criteria for the effect size value are $0.00 \leq ES \leq 0.20$ effect size low; $0.20 \leq ES \leq 0.80$ effect size medium and $ES \geq 0.80$ effect size High (Cooper et al., 2009).

Result and Discussion

From the results of the data search, 14 relevant studies were obtained. Furthermore, the study calculated the effect size and standard error values which can be seen in Table 1.

Table 1. Effect Size dan Standar Error

Study Code	Year	Effect Size	Standar Error
Y1	2023	1.20	0.27
Y2	2023	0.41	0.13
Y3	2023	0.65	0.23
Y4	2024	1.19	0.42
Y5	2023	2.03	0.44
Y6	2022	0.98	0.33
Y7	2022	0.55	0.31

Y8	2024	0.72	0.26
Y9	2024	1.16	0.48
Y10	2024	0.80	0.32
Y11	2023	1.05	0.35
Y12	2022	0.38	0.11
Y13	2022	0.89	0.34
Y14	2024	1.05	0.31

Table 1. The results of the effect size analysis ranged from 0.38 to 2.03 and the standard error ranged from 0.11 to 0.48. According to Cohen's criteria in (Cooper et al., 2009) Of the 14 effect sizes analyzed in three studies (n= 3), they had low effect size values; Three studies (n=3) had a medium effect size value and eight studies (n=8) had a high effect size value. Selanjutnya, menganalisis nilai overall effect size melalui model fixed dan random effect model yang dapat dilihat pada Tabel 2.

Table 2. Fixed dan Random Effect Model

	Q	df	p
Omnibus test of Coefficients Model	57.162	1	< 0.001
Test of Residual Heterogeneity	122.521	13	< 0.001

Table 2. The Q value analysis obtained was 122,521 compared to 57,162 with a confidence level of 95% and a $p < 0.001$. These findings conclude that the effect size data is heterogeneously distributed. Therefore, the model used to analyze the 14 studies was a random effect model. Selanjutnya, menghitung nilai summary effect size/ mean effect size dengan model random yang dapat dilihat pada Tabel 3.

Table 3. Summary Effect Size

Coefficient	Effect Size	SE	Z	P
Intercept	0.826	0.109	7.593	< 0.001

Based on Table 3. The value of 95 % Confidence interval lower is 0.612 and upper 0.945. Furthermore, the value of summary effect size sebesar 0.826 dan standar error sebesar 0.109. These results conclude that the flipped classroom model has a significant influence compared to the conventional learning model with indigo $z = 9.593$; $p < 0.001$ with a high

influence category, This finding is in line with (Chen et al., 2018) The flipped classroom model is effective in improving student learning outcomes in the learning process. These findings are supported by research (Sarigöz, 2020) stated that the application of the Flipped Classroom model has a positive influence on students' thinking skills and learning achievement.

The flipped classroom model has been gaining popularity in recent years due to its potential to enhance student learning outcomes (Erol & Celik, 2022). This instructional strategy involves reversing the traditional classroom approach, where students are given instructional materials to complete at home and engage in active learning activities in class (Hava & Gelibolu, 2018). A study conducted by Khe and Chung found that the flipped classroom approach significantly improved student learning performance and attitude compared to traditional teaching methods. The study suggested that the flipped classroom method allowed students to learn at their own pace, interact more with their peers and teachers, and develop a more dynamic and flexible learning environment (Anjomshoaa et al., 2022)

One of the key benefits of the flipped classroom model is its ability to increase student engagement and motivation. By giving students more control over their learning, the flipped classroom approach can foster a sense of autonomy and self-efficacy, leading to improved academic performance and attitudes towards learning (Çevikbaş & Argün, 2017). Additionally, the flipped classroom model can help to reduce student anxiety and increase their confidence in learning, particularly in subjects like English as a Foreign Language (EFL) where students may feel more comfortable practicing speaking and listening skills in a more interactive setting. The flipped classroom model also offers teachers

more opportunities to support students as they apply concepts and develop their critical thinking skills (Bozdağ et al., 2021). By providing students with pre-class materials and activities, teachers can focus on facilitating discussions, guiding group work, and providing feedback in class, allowing them to be more effective and productive.

Furthermore, the flipped classroom approach can help teachers to identify and address individual learning needs more effectively, as students are given more opportunities to work on tasks and activities that cater to their strengths and weaknesses (Diningrat et al., 2020). However, the flipped classroom model is not without its challenges. Students who were taught in flipped classrooms had better levels of idiomatic knowledge, engagement, and motivation, but the study also noted that the flipped classroom approach can be resource-intensive and require significant changes to teaching practices (Ivan et al., 2023).

Conclusion

From the results of this study, it can be concluded that the flipped classroom model has a significant positive impact on student learning with an overall effect size of 0.826; $P < 0.001$ is included in the high effect size category. The findings show that students who participate in learning with the flipped classroom model have better learning outcomes compared to students who follow traditional learning. The study suggests that the flipped classroom approach can be an effective instructional strategy for enhancing student learning, as it provides students with more control over their learning and allows teachers to focus on facilitating active learning activities.

References

- Anjomshoaa, H., Hashemi, A. H. G., Alsadaji, A. J., Jasim, Z., & Masoudi, S. (2022). *The Effect of Flipped Classroom on Student Learning Outcomes; An Overview*.
- Aslan, S. (2022). Teacher Candidates' Experiences with the Flipped Classroom Model: A Phenomenological Approach. *International Journal of Contemporary Educational Research*, 7(2), 202–211. <https://doi.org/10.33200/ijcer.718461>
- Aydın, G., & Mutlu, O. (2023). Project-Based Learning and Flipped Classroom Model Supported Project-Based Learning's Impact on Academic Success, Retention, and Individual Innovation Competence. *International Journal of Contemporary Educational Research*, 10(4(Online First)), 823–833.

- <https://doi.org/10.52380/ijcer.2023.10.4.532>
- Bertsch, S., Pesta, B. J., Wiscott, R., & McDaniel, M. A. (2007). The generation effect: A meta-analytic review. *Memory & Cognition*, 35(2), 201–210. <https://doi.org/10.3758/BF03193441>
- Bozdağ, H. C., Türkoğuz, S., & Gökler, İ. (2021). Bibliometric analysis of studies on the Flipped Classroom Model in biology teaching. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, 7(3), 275–287. <https://doi.org/10.22219/jpbi.v7i3.16540>
- Çevikbaş, M., & Argün, Z. (2017). An Innovative Learning Model in Digital Age: Flipped Classroom. *Journal of Education and Training Studies*, 5(11), 189. <https://doi.org/10.11114/jets.v5i11.2322>
- Chen, K.-S., Monrouxe, L., Lu, Y.-H., Jenq, C.-C., Chang, Y.-J., Chang, Y.-C., & Chai, P. Y.-C. (2018). Academic outcomes of flipped classroom learning: A meta-analysis. *Medical Education*, 52(9), 910–924. <https://doi.org/10.1111/medu.13616>
- Cooper, H. M., Hedges, L. V., & Valentine, J. C. (Eds.). (2009). *The handbook of research synthesis and meta-analysis* (2. ed). Russell Sage Foundation.
- Diningrat, S. W. M., Setyosari, P., Ulfa, S., & Widiati, U. (2020). Integrating PBI in the flipped classroom: A framework for effective instruction. *World Journal on Educational Technology: Current Issues*, 12(2), 117–127. <https://doi.org/10.18844/wjet.v12i2.4662>
- Diningrat, S. W. M., Setyosari, P., Ulfa, S., & Widiati, U. (2023). The Effect of an Extended Flipped Classroom Model for Fully Online Learning and its interaction with Working Memory Capacity on Students' Reading Comprehension. *Journal of New Approaches in Educational Research*, 12(1), 77. <https://doi.org/10.7821/naer.2023.1.1073>
- Du, Y. (2020). Study on Cultivating College Students' English Autonomous Learning Ability under the Flipped Classroom Model. *English Language Teaching*, 13(6), 13. <https://doi.org/10.5539/elt.v13n6p13>
- Erdogan, E., & Akbaba, B. (2017). Should We Flip the Social Studies Classrooms? The Opinions of Social Studies Teacher Candidates on Flipped Classroom. *Journal of Education and Learning*, 7(1), 116. <https://doi.org/10.5539/jel.v7n1p116>
- Ergene, Ö., & Karaboğaz, Y. (2024). The effect of the flipped classroom model on students proportional reasoning. *Journal of Pedagogical Research*, 1. <https://doi.org/10.33902/JPR.202425424>
- Erol, T., & Celik, S. (2022). Flipped classrooms: Designed and implemented with colleagues collaboration. *Journal of University Teaching and Learning Practice*, 19(3). <https://doi.org/10.53761/1.19.3.13>
- Hamidah, H., & Kusuma, J. W. (2021). The Improving Students' Mathematics Results and Interest Through Online-Based Flipped Classroom Models. *Malikussaleh Journal of Mathematics Learning (MJML)*, 4(1), 7. <https://doi.org/10.29103/mjml.v4i1.2919>
- Hava, K., & Gelibolu, M. F. (2018). The Impact of Digital Citizenship Instruction through Flipped Classroom Model on Various Variables. *Contemporary Educational Technology*, 9(4), 390–404. <https://doi.org/10.30935/cet.471013>
- Hidayah, R., Wangid, M. N., Wuryandani, W., & Salimi, M. (2023). The Influence of Teacher Efficacy on Education Quality: A Meta-Analysis. *International Journal of Educational Methodology*, 9(2), 435–450. <https://doi.org/10.12973/ijem.9.2.435>
- İLiC, U. (2021). Online course satisfaction in a holistic flipped classroom approach. *Journal of Educational Technology and Online Learning*, 4(3), 432–447. <https://doi.org/10.31681/jetol.935325>
- Ivan, M., Ulfah, M., Awalludin, A., Novarita, N., Nilawijaya, R., & Fitriyyah, D. (2023). An Exploration into the Impact of Flipped Classroom Model on Cadets' Problem-Solving Skills: A Mix Method Study. *International Journal of Educational Methodology*, 9(4), 745–759. <https://doi.org/10.12973/ijem.9.4.745>
- Jarrah, A. M., & Baki Mohammed Diab, K. M. A. (2019). The Effect of Flipped Classroom Model on Students' Achievement in the New 2016 Scholastic Assessment Test Mathematics Skills. *The Journal of Social Sciences Research*, 53,

- 769–777.
<https://doi.org/10.32861/jssr.53.769.777>
- Kaya, M. (2022). The Effect of the Flipped Classroom Model on Understanding and Access to the Nature of Science by Students. *The Turkish Online Journal of Educational Technology*, 21(1).
- Nayci, O. (2021). Content Analysis On The Graduate Theses Done About Flipped Classroom Model In Turkey. *Turkish Online Journal of Distance Education*, 206–222.
<https://doi.org/10.17718/tojde.906864>
- Oktarina, K., Suhaimi, S., Santosa, T. A., Razak, A., Irdawati, I., Ahda, Y., Lufri, L., & Putri, D. H. (2021). Meta-Analysis: The Effectiveness of Using Blended Learning on Multiple Intelligences and Student Character Education During the Covid-19 Period. *IJECA (International Journal of Education and Curriculum Application)*, 4(3), 184–192.
<https://doi.org/10.31764/ijeca.v4i3.5505>
- Sarigöz, O. (n.d.). *An Analytical Study Related Learning With Flipped Classroom Model*.
- Sengul, F., & Bensen Bostanci, H. (2021). In-Class versus Out-of-Class Flipped Classroom Models in English as a Foreign Language Writing. *Propósitos y Representaciones*, 9(SPE1).
<https://doi.org/10.20511/pyr2021.v9nSPE1.852>
- Ulum, H. (2022). A meta-analysis of the effects of different integrated STEM (science, technology, engineering, and mathematics) approaches on primary students' attitudes. *International Journal of Educational Research Review*, 7(4), 307–317.
<https://doi.org/10.24331/ijere.1166620>
- Vereş, S., & Muntean, A.-D. (2021). The Flipped Classroom As An Instructional Model. *Romanian Review of Geographical Education*, 10(1), 56–67.
<https://doi.org/10.23741/RRGE120214>