



The Influence of the Flipped Learning Model on Creative Thinking Ability in the Revolution 4.0 era

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Abstrak

Abstrak Banyak penerapan flipped learning memberikan dampak yang begitu besar terhadap kemampuan berpikir kreatif siswa dalam belajar. Akan tetapi, belum ditemukan kesimpulan yang mendalam dan masih bersifat subjektif. Penelitian ini bertujuan untuk mengetahui pengaruh flipped learning untuk meningkatkan kemampuan berpikir kreatif siswa era revolusi industri 4.0. Jenis penelitian ini adalah meta-analisis. Data penelitian berasal google scholar, Researchgate, ScienceDirect dan ERIC. Kriteria inklusi dalam penelitian ini adalah penelitian berasal dari jurnal terindeks SINTA dan Scopus; Penelitian harus eksperimen atau quasi eksperimen; Penelitian terkait model flipped learning terhadap kemampuan berpikir kreatif siswa; Penelitian terbitan tahun 2020-2024; penelitian harus mempunyai data yang lengkap untuk menghitung nilai effect size; ukuran sampel (N) > 25 siswa. Hasil analisis 15 jurnal menyimpulkan terdapat pengaruh yang signifikan terhadap kemampuan berpikir kreatif siswa dengan nilai mean effect size (ES = 1.12) kriteria tinggi. Temuan ini menjelaskan penerapan flipped learning efektif membantu guru dan siswa dalam meningkatkan kemampuan berpikir kreatif dalam proses pembelajaran.

Kata Kunci: *Flipped Learning; Effect Size; Berpikri Kreatif; Meta-analisis*

Abstract

Many applications of flipped learning have had a huge impact on students' creative thinking abilities in learning. However, no in-depth conclusions have been found and it is still subjective. This research aims to determine the effect of flipped learning to improve students' creative thinking abilities in the era of the industrial revolution 4.0. This type of research is meta-analysis. Research data comes from Google Scholar, Researchgate, ScienceDirect, and ERIC. The inclusion criteria in this research are research originating from journals indexed by SINTA and Scopus; Research must be experimental or quasi-experimental; Research related to the flipped learning model on students' creative thinking abilities; Research published in 2020-2024; research must have complete data to calculate the effect size value; sample size (N) > 25 students. The results of the analysis of 15 journals concluded that there was a significant influence on students' creative thinking abilities with a high mean effect size (ES = 1.12) criterion. These findings explain that the application of flipped learning is effective in helping teachers and students improve creative thinking skills in the learning process.

Keywords: *Flipped Learning; Effect Size; Creative Thinking; Meta-analysis*

Introduction

Creative thinking is an ability that students must have in facing the industrial revolution 4.0 (Piaw, 2014; Nurtamam et al., 2023). Creative thinking skills help students to develop new ideas and innovative problem solving (Rahman et al., 2023). In addition, the ability to think creatively trains students to find better and efficient solutions (Zhuang et al., 2021). Teachers play an important role in training students' creative thinking skills. One way is to give assignments that challenge students to think from different points of view (MoU, 2024). Next, teachers can ask open-ended questions that have many possible correct answers or have students design their own projects based on their interests. Teachers also need to encourage students to develop their ideas without fear of being wrong (Marcos et al., 2023).

But in fact, the creative thinking ability of students at school is still relatively low (Kardoyo et al., 2019; Suharyat et al., 2023; Hidayat et al., 2022). According to the results of the Program for International Student Assessment (PISA) study in 2018, the average score of Indonesian students' creative thinking ability only reached 396 (Supriyadi et al., 2022; Suryono et al., 2023; Ichsan et al., 2022; Utomo et al., 2023), well below the OECD average of 500. This low ability to think creatively is caused by several factors. First, the curriculum and teaching methods in schools are still teacher-centered and do not encourage students to hone higher-order thinking skills (Ningsih et al., 2020; Rahman et al., 2023). Second, a learning culture that still emphasizes memorization rather than critical thinking and finding creative solutions (Zulyusri et al., 2023; Fadhil et al., 2021). Third, the lack of opportunities for students to express creativity through other non-academic activities (Supratman et al., 2021; Khairunnisa et al., 2022). Therefore, increasing creativity needs to be a priority in education reform in Indonesia.

Flipped learning is a learning approach in which learning materials are given to students to learn independently outside the classroom, usually through learning videos (Zainuddin &

Halili, 2024; Jim et al., 2023). Activities in the classroom are more focused on discussions, practice questions, projects, and other activities that encourage a deeper understanding of students' concepts (Cubelo, 2023; Staddon, 2022). According to Basal (2015), flipped learning helps students to learn at their own pace and maximize class time for interaction with teachers and other students. Some of the benefits of flipped learning include making students more responsible for independent learning, providing more personalized feedback and assistance to students in need, and encouraging parental involvement in student learning.

Research by Alqahtani et al., (2022) Flipped learning effectively improves students' academic achievement because they can learn anytime and anywhere according to their individual conditions. Previous research on flipped learning has a significant influence on students' creative thinking ability (Lestari et al., 2020; Tabieh & Hamzeh, 2022; Susanti et al., 2020). However, many studies on flipped learning have not found a meta-analysis of the effect of flipped learning on students' creative thinking skills. Meta-analysis is a research method that systematically collects, reviews, and integrates findings from several previous independent studies to answer the same research question (Razak et al., 2021; Chamdani et al., 2022; Tamur et al., 2020). Therefore, this study aims to determine the effect of flipped learning to improve students' creative thinking skills in the era of the industrial revolution 4.0.

Methods

This research is quantitative research with a meta-analysis approach. Meta-analysis is a type of research that collects and analyzes primary literature quantitatively (Rahman et al., 2023; Juandi et al., 2022; Santosa et al., 2021; Diah et al., 2022). This meta-analysis will use several stages of research methods. First, conduct a systematic literature search on international journal databases to identify relevant quantitative research.

The inclusion criteria are research from SINTA and Scopus indexed journals; Research

must be experimental or quasi-experimental; Research related to flipped learning models on students' creative thinking skills; Research published in 2020-2024; The study must have complete data to calculate the value of effect size; sample size (N) > 25 students Furthermore, statistical analysis was carried out by calculating the effect size with the JSAP application 0.8.5 from each study that showed the magnitude of the influence of flipped learning. The effect size criteria in this study are guided by the effect size criteria Cohen et al., (2007) can be seen in Table 1.

Table 1. Effect Size Value Criteria

| Effect Size | Criterion |
|--------------------------|-----------|
| $0.00 \leq ES \leq 0.20$ | Low |
| $0.00 \leq ES \leq 0.20$ | Medium |
| $ES \geq 0.80$ | High |

Result and Discussion

Based on the results of data search related to the effect of flipped learning on critical thinking skills, 15 articles were obtained that met the inclusion criteria. Data that have met the inclusion criteria are calculated effect size values which can be seen in Table 2.

Table 2. Effect Size Value

| Journal Code | Year | Sample Size | Effect Size | Criterion |
|--------------|------|-------------|-------------|-----------|
| A1 | 2020 | 40 | 0.92 | High |
| A2 | 2021 | 35 | 1.02 | High |
| A3 | 2021 | 60 | 0.78 | Medium |
| A4 | 2023 | 210 | 1.62 | High |
| A5 | 2022 | 80 | 0.48 | High |
| A6 | 2022 | 110 | 0.88 | High |
| A7 | 2023 | 96 | 1.28 | High |
| A8 | 2021 | 76 | 1.07 | High |
| A9 | 2020 | 60 | 1.16 | High |
| A10 | 2023 | 40 | 0.82 | High |
| A11 | 2023 | 30 | 0.78 | Medium |
| A12 | 2020 | 200 | 2.52 | High |
| A13 | 2023 | 46 | 0.42 | Medium |
| A14 | 2020 | 70 | 2.19 | High |
| A15 | 2023 | 84 | 1.41 | High |

Based on Table 2, the effect size analysis results of 15 articles ranged from 0.42 to 2.52.

According to the criteria Cohen et al., (2007) Three articles had a medium effect size value and twelve articles had a high effect size value. This finding can be concluded that the application of flipped learning has a positive influence on students' creative thinking abilities. The results of the study are in line with Agustini et al., (2022) The application of flipped learning has a significant effect on students' critical and creative thinking skills in learning. These results are also supported by research Suhartini & Marianti (2023) said the application of flipped learning can have a positive influence on students' creative thinking and problem solving skills.

Flipped learning is an innovative learning model that can improve students' creative thinking skills in the era of the industrial revolution 4.0. This is in line with the results of research from Basal (2015) which shows that the application of flipped classrooms has a significant effect on improving students' creative thinking skills. Through flipped learning, students can learn independently outside the classroom through learning videos. Later in the classroom, time is used for discussions, projects, and other collaborative activities that can enhance creativity (Tien et al., 2020). In line with that, another study by (Rahmatan et al., 2022) also indicates that flipped classrooms are effective for facilitating project-based learning which has an impact on improving students' creative thinking skills. Students become more creative in working on projects and solving problems in new ways. (Rahman et al., 2023; Hwang et al., 2019). Thus, it can be concluded that the application of the flipped learning model can have a positive effect on improving students' creative thinking skills (Lin, 2021).

Furthermore, analyzing the effect of flipped learning on students' creative thinking ability based on education level can be seen in Table 3.

Table 3. Effect Size Based on Education Level

| Education Level | Effect Size | Effect Size | Criterion |
|-------------------|-------------|-------------|-----------|
| Elementary School | 0.74 | 0.945 | High |

| | |
|---------------|------|
| Junior School | 0.89 |
| High School | 0.92 |
| College | 1.23 |

Table 3, the results of effect size analysis based on elementary school education level of 0.74, junior school 0.89, high school 0.92 and college of 1.23. Furthermore, the average value of effect size at the education level is 0.945 with the high category. These findings explain that flipped learning is effective for learning from elementary school to tertiary level.

Several studies show that the application of flipped learning has a positive effect on students' creative thinking skills both at the elementary to tertiary education levels. As the results of research from Roehl et al. (2013) who apply flipped classrooms to high school students, it was found that this model can improve students' creative thinking skills because of the opportunity to discuss and solve problems (Bhagat et al., 2016). At the basic education level, research conducted by Makruf et al., (2021)) also showed similar results that flipped learning effectively improved the creative thinking skills of elementary school students. This is because elementary students have more opportunities to engage in hands-on activities and discussions in the classroom that can practice their creative thinking skills (Ökmen & Kılıç, 2020; Mako et al., 2020). Thus, it can be concluded that flipped learning can have a positive influence on improving students' creative thinking skills at both primary and secondary education levels (Erkan & Duran, 2023).

Simpulan

Based on the results of a meta-analysis of several previous studies, it can be concluded that the application of flipped learning as a whole has proven effective in improving students' creative thinking skills. The positive effect of flipped learning on students' creative thinking ability was statistically significant with an average effect size of 0.945 high criteria. The effectiveness of flipped learning in improving students' creative thinking is

universal, independent of the measurement method. Thus, flipped learning is recommended to be applied to improve students' 21st century skills, especially creative thinking.

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