



Effectiveness of the SAVI Learning Model Based on Flipped Learning for Enhancing Creative Thinking Skills in Early Childhood Education in Indonesia

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Abstract

This study aims to determine the effectiveness of the SAVI learning model based on flipped learning in improving creative thinking skills in children. This study is a quantitative research with a meta-analysis approach. Data for this study were obtained from 23 studies that met the inclusion criteria. The process of searching for data through Google Scholar, Mendeley, ERIC, ScienceDirect and Wiley databases must be indexed by Sinta or Scopus. Analyze the data with the help of Microsoft Excel and JASP. The analysis of 23 effect sizes concluded that the summary effect size value ($rRE = 0.931$; $z = 9.156$; $p < 0.001$). These findings show that applying the SAVI learning model based on flipped learning significantly influences creative thinking skills in children in the very high effect size category. This research provides information on the world of education in Indonesia and education in the future.

Keywords: *SAVI model; Flipped Learning; Creative Thinking; Meta-analysis*

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Introduction

In the era of the Industrial Revolution 5.0, creative thinking skills are one of the indispensable abilities to face global challenges. This ability allows children to generate new ideas, find innovative solutions, and face problems flexibly (Asnur et al., 2024); (Oktarina et al., 2021). In an increasingly dynamic world, creativity is not only important in the arts, but also in science, technology, and everyday life. According to Guilford (1967), creative thinking includes four main aspects, namely fluency, flexibility, originality, and elaboration. These aspects play an important role in helping children adapt to change, improve their problem-solving skills, and prepare them to become productive individuals in the future (Ramadhani et al., 2019).

However, various studies show that children's creative thinking skills are often not developed optimally in the traditional education system which tends to prioritize memorization and teacher-centered approaches (Komarudin et al., 2024; Hava, 2024). Conventional learning models often lack space for children to explore their ideas independently. This is a big challenge, especially because creative thinking skills can develop through learning that provides hands-on experience, involves various learning styles, and encourages students to actively think and collaborate (Oya et al., 2024; Nasir et al., 2024; Alan

& Yurt, 2024). The limitations of traditional learning are even more apparent when compared to more innovative learning approaches, such as flipped learning and experiential models. Research shows that teacher-centred learning tends to be homogeneous in the delivery of material, thus paying less attention to the individual learning needs of students who have different learning styles (Putri et al., 2024). This results in low engagement in the learning process, which indirectly affects the development of creative thinking skills. To overcome this, a student-centred learning model is needed, which provides opportunities for students to actively participate, explore their ideas, and develop creative solutions to complex problems (Tabieh & Hamzeh, 2022). The application of learning models such as SAVI (Somatic, Auditory, Visual, Intellectual) or flipped learning approach can be an alternative to train creative thinking skills that have been less accommodated by traditional learning (Rijal & Arifah, 2020; Nurtamam et al., 2023).

The SAVI (Somatic, Auditory, Visual, Intellectual) approach is a learning model designed to accommodate a variety of student learning styles. In this approach, learning does not only focus on one method of delivering material, but combines physical experience (somatic), auditory, visualization (visual), and intellectual activity in a balanced manner (Rijal & Arifah, 2020; Serevina et al., 2023). Through this combination, children can learn in a way that suits their individual learning preferences, thus maximizing their involvement in the learning process. For example, students with visual learning styles can better understand concepts through the medium of images or videos, while students with somatic learning styles prefer learning that involves physical activities such as experiments or educational games (Adawiyah et al., 2018). This approach creates a dynamic and inclusive learning environment, where each student feels engaged and motivated to participate (Yulianti, 2023; Bachtiar et al., 2023).

High learning involvement is one of the keys to success in the development of creative thinking skills in children. Through activities that involve the somatic aspect, students are invited to learn through hands-on experiences, such as manipulating objects or physically interacting with the environment (Adawiyah et al., 2018). On the auditory aspect, students are trained to listen actively, which strengthens their analytical abilities. Visualization helps students understand abstract concepts through the representation of images or diagrams, while intellectual activities challenge them to think critically and solve problems (Solehat et al., 2020). Research shows that the integration of different learning styles in the SAVI approach can improve students' comprehension, emotional engagement, and memory of the material studied. As such, this approach is not only effective for developing learning engagement, but also prepares students for the more complex educational challenges of the future.

High learning involvement is one of the keys to success in the development of creative thinking skills in children (Widyaningtyas et al., 2024). Through activities that involve the somatic aspect, children are invited to learn through direct experience, such as manipulating objects or interacting physically with the environment. On the auditory aspect, students are trained to listen actively, which strengthens their analytical abilities (Yustina et al., 2022). Visualization helps students understand abstract concepts through the representation of images or diagrams, while intellectual activities challenge them to think critically and solve problems (Fajri et al., 2023; Farooqi & Naeem, 2023). Combined with flipped learning, this method can provide more in-depth learning opportunities through practical experience. In flipped learning, children learn theories or basic materials independently outside the classroom, so that learning time in class can be focused on SAVI-based interactive activities that prioritize exploration, discussion, and application of concepts. The combination of these two approaches is able to create learning that is not only effective, but also meaningful for children (Liline et al., 2024; Luciana et al., 2024).

Research by Meier (2000) emphasizes that the integration of somatic, auditory, visual, and intellectual learning styles provides opportunities for students to be more involved in the learning process. This model is proven to increase motivation, engagement, and

understanding of concepts in depth because students can learn through hands-on experiences that suit their learning style. Another study by Susanti et al. (2022) found that the SAVI approach was effective in improving students' critical and creative thinking skills on science subjects, where practical activities and visualization of complex concepts played an important role in helping students understand the material. Research by Bergmann and Sams (2012), pioneers of flipped learning, shows that this method allows students to learn independently through videos or other learning materials before class sessions. Thus, class time can be focused on active activities such as discussions, problem-solving, and group work. A meta-analysis by O'Flaherty and Phillips (2015) also revealed that flipped learning has a positive impact on student engagement, material comprehension, and the development of higher-order thinking skills. This research shows that flipped learning gives students the freedom to learn at their own pace, while maximizing face-to-face time for more in-depth interactions (Romero & García et al., 2023).

Furthermore, by Rahmawati et al. (2021) found that the merger of these two approaches improves students' creative thinking skills in mathematics learning. In the study, students learn basic material independently through flipped learning, so that class time is used for SAVI-based activities such as physical experiments, group discussions, and collaborative problem-solving. This research shows that the combination of SAVI and flipped learning is not only effective for improving learning outcomes, but also building 21st century skills, such as creativity, collaboration, and communication. This makes this combination one of the relevant learning models to be applied in the modern education era.

Although the SAVI (Somatic, Auditory, Visual, Intellectual) learning model has been shown to be effective in improving children's learning outcomes and engagement in various contexts, research that explicitly integrates SAVI with flipped learning is still relatively limited, especially in the context of developing creative thinking skills in children. Most previous studies have focused more on using either of these methods separately. For example, research related to flipped learning often highlights its impact on critical thinking skills or conceptual understanding, while studies on SAVI are more focused on a multisensory approach to improving student learning motivation and engagement. However, the combination of these two approaches, which has the potential to strengthen learning outcomes through the integration of self-paced learning and multisensory experiences, has not been explored in depth.

In addition, most research on flipped learning and SAVI places more emphasis on academic outcomes in specific subjects such as science or mathematics, while creative thinking skills are often overlooked. In fact, creative thinking is a key 21st century skill that is urgently needed in facing global challenges. Meta-analysis research that specifically examines the effectiveness of the combination of flipped learning and SAVI on children's creative thinking skills is also very rare. Most previous meta-analyses only examined the effectiveness of one method without looking at the potential synergy between the two. Therefore, there is a gap in the literature that needs to be filled through research that systematically combines this approach. Based on this, this study aims to determine the effectiveness of the SAVI learning model based on flipped learning to improve creative thinking skills in children through meta-analysis.

Methodology

This study uses a meta-analysis approach to determine the effectiveness of the SAVI learning model based on flipped learning in improving creative thinking skills in children. Meta-analysis is a research approach that evaluates previous research statistically to reach a conclusion (Tamur et al., 2020; Badawi et al., 2023; Nurtamam et al., 2023; Zulyusri et al., 2023). The meta-analysis research procedure is 1) determining the research inclusion criteria, 2) collecting data and coding, and 3) analyzing the data statistically, as can be seen in Figure 1.



Figure 1. Prosedur Meta-analysis

Eligibility Criteria

In the process of searching for data through the Google Scholar, ScienceDirect, Wiley, ERIC, ProQuest, Fronteins and Web of Science databases, the research must meet several inclusion criteria, namely 1) the research was published in 2022-2024; 2) the research must be relevant; 3) research must be reputable indexed by SINTA or Scopus; 4) The research must report complete data. From the data search, 23 studies were obtained that met the inclusion criteria published in 2022-2024 which can be seen in Table 2.

Statistical Analysis

Data analysis in this study calculates the effect size value of each study analyzed. The effectiveness of the SAVI learning model based on flipped learning to improve creative thinking skills in children. According to (Borenstein et al., 2007) The stages of data analysis in the meta-analysis can be seen in (Figure 1.). Furthermore, the criteria for the effect size value in the study can be seen in Table 1.

Table 1. Category Effect Size Value

Effect Size	Category
$0.0 \leq ES \leq 0.2$	Low
$0.2 \leq ES \leq 0.8$	Medium
$ES \geq 0.8$	High

Source: (Borenstein et al., 2007; Bachtiar et al., 2023; Tamur et al., 2020; Zulkifli et al., 2022)

Publication Bias

In this study, publication bias testing used funnel plot analysis and the Rosenthal Fail Safe N test.

Result and Discussion

Based on the data search results through the database, 23 studies/articles met the inclusion criteria. The effect size and error standard can be seen in Table 2. Based on Table 2, the effect size value of the 23 studies ranged from 0.38 to 2.52. According to Borenstein et al., (2007) Of the 23 effect sizes, 7 studies had medium criteria effect sizes and 16 studies had high criteria effect size values. Furthermore, 23 studies were analyzed to determine an estimation model to calculate the mean effect size. The analysis of the fixed and random effect model estimation models can be seen in Table 3.

Based on Table 3, a Q value of 105.092 was obtained, higher than the value of 88.911 with a coefficient interval of 95% and a p-value of $0.001 <$. The findings show that the value of 23 effect sizes analyzed is heterogeneously distributed. Therefore, the model used to calculate the mean effect size is a random effect model. Furthermore, checking publication bias through funnel plot analysis and Rosenthal fail-safe N (FSN) test (Tamura et al., 2020; Badawi et al., 2022; Ichsan et al., 2023b; Borenstein et al., 2007). The results of checking publication bias with a funnel plot can be seen in Figure 2.

Based on Figure 2, the funnel plot analysis is not yet known whether it is symmetrical or asymmetrical, so it is necessary to conduct a Rosenthal Fail-Safe N (FSN) test. The results of the Rosenthal Fail-Safe N calculation can be seen in Table 4.

Table 2. Effect Size and Standard Error Every Research

Code Journal	Years	Effect Size	Standard Error	Index
AL 1	2022	2.18	0.52	Sinta
AL 2	2023	0.59	0.19	Sinta
AL 3	2023	0.83	0.30	Scopus
AL 4	2023	0.51	0.23	Scopus
AL 5	2024	0.73	0.25	Scopus
AL 6	2024	1.25	0.40	Sinta
AL 7	2024	1.19	0.51	Scopus
AL 8	2024	0.97	0.38	Sinta
AL 9	2022	0.41	0.19	Sinta
AL 10	2024	1.30	0.53	Sinta
AL 11	2022	0.88	0.39	Sinta
AL 12	2022	0.72	0.21	Scopus
AL 13	2024	0.81	0.28	Sinta
AL 14	2024	0.99	0.35	Sinta
AL 15	2022	1.18	0.43	Scopus
AL 16	2023	1.72	0.54	Sinta
AL 17	2024	1.92	0.34	Scopus
AL 18	2023	2.52	0.58	Sinta
AL 19	2023	1.07	0.29	Scopus
AL 20	2024	0.67	0.19	Sinta
AL 21	2024	0.38	0.11	Sinta
AL 22	2022	0.71	0.30	Sinta
AL 23	2024	1.35	0.47	Sinta

Table 3. Fixed and Random Effect

	Q	df	p
Omnibus test of Coefficients Model	88.911	1	< 0.001
Test of Residual Heterogeneity	105.092	22	< 0.001

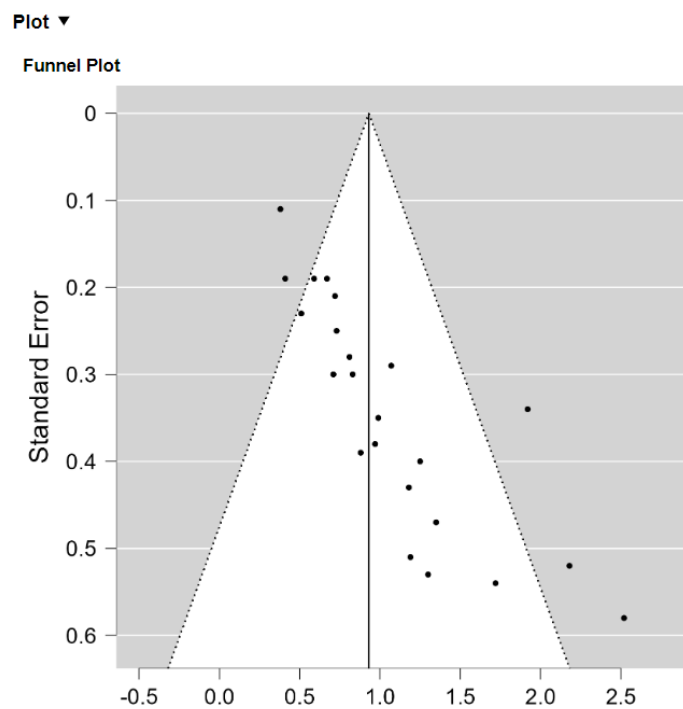


Figure 2. Funnel Plot

Table 4. Fail-Safe N

File Drawer Analysis			
	Fail-Safe N	Target Significance	Observed Significance
Rosenthal	1844	0.050	< 0.001

Based on Table 4, the Fail-Safe N value of 1844 is greater than the value of $5k + 10 = 5(23) + 10 = 125$, so it can be concluded that the analysis of 23 effect sizes in this data is not biased by publication and can be scientifically accounted for. Next, calculate the p-value to test the hypothesis through the random effect model. The results of the summary effect model analysis with the random effect model can be seen in Table 5.

Table 5. Summary effect Size

Coefficient						
	Estimates	Standard Error	z	p	95 % Coefficient Interval	
					Lower	Upper
Intercept	0.931	0.129	9.156	< 0.01	0.623	1.192

Table 5 explains the *summary effect size* value of 0.931 with a standard error of 0.129 and 95% confidence level of lower 0.623 and upper 1.192. These findings explain that the effectiveness of the SAVI learning model based on flipped learning has a positive effect on creative thinking skills in children with a value ($z = 9,156$; $p < 0.001$). So, the application of the SAVI learning model based on flipped learning is effective in encouraging creative thinking skills in children compared to conventional learning. The integration of flipped learning with SAVI leverages modern technology and diverse sensory approaches to create a learning environment that is engaging, participatory, and conducive to critical and creative thought processes (Ahmad & Mohamed, 2021). By moving instructional content delivery outside of the classroom through digital platforms and focusing on active, hands-on activities during classroom sessions, this model addresses various learning styles and promotes deeper cognitive engagement (Victorina & Sumarmin, 2020).

Creative thinking, a key component of 21st-century skills, requires students to generate novel ideas, approach problems from multiple perspectives, and devise innovative solutions. The SAVI model's emphasis on somatic (kinesthetic), auditory, visual, and intellectual engagement ensures that children interact with learning materials in ways that stimulate diverse neural pathways (Nurwidodo et al., 2023). Flipped learning complements this by providing opportunities for students to explore foundational content independently before applying their knowledge collaboratively in classroom activities. This approach fosters self-regulation, intrinsic motivation, and creativity by encouraging students to take ownership of their learning journey. Research indicates that combining flipped learning with SAVI has a profound impact on students' creative thinking abilities. The somatic aspect, which involves physical activities such as role-playing or hands-on experiments, helps students internalize concepts through active participation (Saregar et al., 2021). Meanwhile, auditory components like discussions or storytelling enhance their ability to articulate ideas and engage in meaningful dialogue. Visual elements, such as videos, diagrams, and graphic organizers, provide clarity and stimulate imaginative thought processes. The intellectual dimension encourages analytical thinking and problem-solving, which are critical for creativity (Yustina et al., 2022).

Moreover, flipped learning-based SAVI supports differentiated instruction, addressing the diverse needs of learners in a classroom. By allowing students to access pre-recorded lectures or materials at their own pace, flipped learning accommodates varying levels of readiness and learning speeds (Widyaningtyas et al., 2024). This enables teachers to dedicate

classroom time to facilitating collaborative and interactive SAVI-based activities that enhance peer-to-peer learning and creative problem-solving. The combination of pre-class preparation and in-class application creates a synergistic effect, deepening students' understanding and fostering an environment conducive to innovation (Wantu et al., 2024; Uluk et al., 2024; Alzoebi et al., 2023; Oya et al., 2024).

The effectiveness of this model also lies in its alignment with the principles of constructivist learning theory, which posits that learners construct knowledge through active engagement and reflection (Santhanasamy & Yunus, 2022). The SAVI model provides a multi-sensory platform for students to explore and experiment, while flipped learning ensures that they come prepared to engage deeply with the content. Together, these methods create a scaffolded learning experience where students can build on prior knowledge, collaborate with peers, and refine their creative abilities through iterative processes (Alpat & Görgülü, 2024). Flipped Learning-based SAVI model is a powerful pedagogical approach for enhancing creative thinking skills in children. By combining the strengths of flipped learning and SAVI, this model creates a dynamic and inclusive learning environment that caters to diverse learning styles and fosters critical, analytical, and imaginative thinking (Yawisah et al., 2019). Future research should focus on exploring the long-term impacts of this model on students' cognitive development and its applicability across various educational contexts to validate its efficacy and scalability further (Oya et al., 2024; Setemen et al., 2023).

Conclusion

From this meta-analysis research, it can be concluded that applying the SAVI learning model based on flipped learning significantly affects creative thinking skills in children with a very high effect size category. This research provides information on the world of education in Indonesia and education in the future. This has important implications for educators, curriculum developers, and policymakers. Educators can utilize this model to design engaging and effective learning experiences that foster creativity and critical thinking in students. Curriculum developers can incorporate elements of flipped learning and SAVI into their instructional materials to promote more creative and student-centred learning environments. Policymakers can consider supporting the implementation of such innovative teaching methods by providing teachers necessary resources and professional development opportunities.

The SAVI (Somatic, Auditory, Visual, Intellectual) approach based on flipped learning offers significant pedagogical innovations in improving creative thinking skills in early childhood education in Indonesia. This model integrates a holistic learning experience by providing opportunities for children to be actively involved through physical activities (somatic), auditory (auditory), seeing (visual), and critical thinking (intellectual). In flipped learning, children are introduced to learning materials before face-to-face sessions through interactive media so that class time can focus on discussion, exploration, and problem-solving. This approach optimises learning time and encourages children to be more independent, collaborative, and innovative in solving the challenges given. By adopting this method, teachers can create a learning environment that is inclusive, dynamic, and relevant to the needs of early childhood in the era of the Industrial Revolution 5.0.

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