

A Systematic Literature Review on Flipped Classrooms in Elementary Schools for Advancing 21st-Century Learning

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Abstract: Implementing the flipped classroom in elementary schools has become a crucial learning alternative in responding to the demands of 21st-century learning, which prioritizes active student engagement and maximizing technological utilization. This research aims to conduct an in-depth analysis of existing empirical research regarding implementing the flipped classroom in elementary schools to obtain comprehensive information regarding developments, potential, and challenges in its implementation. The systematic literature review followed PRISMA 2020 guidelines and utilized data from Scopus and ERIC databases. Out of 133 articles, 29 met inclusion criteria and were analyzed using the meta-synthetic approach. The findings revealed limited progression of flipped classroom implementation in Indonesian elementary schools, with global development fluctuations. Implementation advantages included increased student engagement, comprehension, and motivation, aligning with 21st-century learning needs. Technology, particularly instructional videos, played a pivotal role, while challenges included material readiness, technology access, and parental support. These findings offer an overview of the current circumstances surrounding the implementation of flipped classrooms and highlight the potential and obstacles that need to be considered to increase their effectiveness at the elementary school level. In conclusion, integrating flipped classrooms emerges as a pertinent alternative to address the demands of 21st-century learning. Nevertheless, it is imperative to recognize that the identified challenges, coupled with the restricted implementation in Indonesia, warrant further research.

Keywords: flipped classroom, 21st-century learning, elementary school

Abstrak: Penerapan flipped classroom di sekolah dasar menjadi alternatif pembelajaran yang penting dalam menjawab tuntutan pembelajaran abad ke-21, yang mengutamakan keterlibatan aktif siswa dan memaksimalkan pemanfaatan teknologi. Penelitian ini bertujuan untuk melakukan analisis mendalam terhadap penelitian empiris yang ada mengenai penerapan flipped class di sekolah dasar untuk memperoleh informasi yang komprehensif mengenai perkembangan, potensi, dan tantangan dalam penerapannya. Tinjauan literatur sistematis mengikuti pedoman PRISMA 2020 dan memanfaatkan data dari database Scopus dan ERIC. Dari 133 artikel, 29 artikel memenuhi kriteria inklusi dan dianalisis menggunakan pendekatan meta-sintetik. Temuan ini menunjukkan terbatasnya kemajuan penerapan kelas terbalik di sekolah dasar di Indonesia, seiring dengan fluktuasi perkembangan global. Keuntungan penerapannya mencakup peningkatan keterlibatan, pemahaman, dan motivasi siswa, yang selaras dengan kebutuhan pembelajaran abad ke-21. Teknologi, khususnya video pembelajaran, memainkan peran penting, sementara tantangannya mencakup kesiapan materi, akses teknologi, dan dukungan orang tua. Temuan-temuan ini memberikan gambaran mengenai keadaan terkini seputar penerapan kelas terbalik dan menyoroti potensi dan hambatan yang perlu dipertimbangkan untuk meningkatkan efektivitas penerapan kelas terbalik di tingkat sekolah dasar. Kesimpulannya, mengintegrasikan ruang kelas terbalik muncul sebagai alternatif yang relevan untuk memenuhi tuntutan pembelajaran abad ke-21. Namun demikian, penting untuk menyadari bahwa tantangan yang teridentifikasi, ditambah dengan terbatasnya implementasi di Indonesia, memerlukan penelitian lebih lanjut.

Kata kunci: *flipped classroom*, pembelajaran abad 21, sekolah dasar

INTRODUCTION

The technological revolution, including advancements in artificial intelligence and the internet, has become a defining reality of the 21st century, fundamentally altering educational

methods. Concurrently, the rapid progression of society, encompassing shifts in social and economic values, adds complexity to the dynamics of education. These factors pressure the education system to adapt to the continuous and swift changes in today's global environment. To ensure students' adaptability within the context of 21st-century learning, emphasis must be placed on developing the 4C skills: creativity, critical thinking, collaboration, and communication (Sipayung et al., 2018). These skills are essential for students to integrate effectively into a dynamic and ever-changing learning era. As Yasar (2022) noted, learners' perceptions of 21st-century learning practices are crucial elements influencing their future learning patterns. This context necessitates a fundamental transformation in educational strategies to meet the increasingly complex needs of learners. The education system must proactively adapt to maintain the relevance and effectiveness of learning amid these developments, including implementing technology, curriculum enhancement, and teacher training.

One approach to meeting the demands of 21st-century learning is the flipped classroom (FC) model. The flipped classroom has gained popularity as an innovative learning method, attracting educators' attention in their efforts to create optimally student-oriented learning environments (Adams et al., 2016; Bergmann & Sams, 2012; Betihavas et al., 2016; Jensen et al., 2015; McEvoy et al., 2016; Zhang et al., 2016). In implementing the flipped classroom model, students have the opportunity to prepare independently by accessing learning materials before class sessions. Classroom time is then focused on discussion, collaboration, and deepening concept understanding, providing opportunities to practice skills such as problem-solving (Akçayır & Akçayır, 2018). Integrating technology with pedagogical principles is crucial, especially in the pre-class phase, where students are encouraged to access learning content via technology independently. In class, students are empowered to engage in interactive group learning activities (Bishop & Verleger, 2013b). The presence of digital technology is an unavoidable aspect of the flipped classroom, where technology use facilitates students' independent learning (Herreid & Schiller, 2013). In essence, the flipped classroom combines online and offline learning, emphasizing teachers' active role as information providers and students' responsibility for self-initiated learning.

Previous research indicates that the flipped classroom is relevant across all subjects and educational levels to maximize learning (Kostaris et al., 2017; Xiu & Thompson, 2020). However, in elementary education, concerns arise about implementing the flipped classroom model, particularly due to young students' self-regulation capabilities (Herreid & Schiller, 2013; Teo et al., 2014). Nonetheless, it is undeniable that previous research shows the flipped classroom can address 21st-century educational dynamics. Research by Nuryadin et al (2023) states that the flipped classroom model can enhance technological proficiency for both teachers and students, provide opportunities for independent learning, increase teacher-student interaction, and enable teachers to focus more on helping struggling students. Additionally, research by Wang et al. (2023) shows that implementing the flipped classroom in elementary schools significantly improves technology proficiency, student attitudes, and interest in learning. Furthermore, searches in the Scopus and ERIC databases indicate 134 articles related to the flipped classroom model and elementary education. This data suggests that this learning model has garnered considerable attention and intensive research among academics and researchers.

Despite the extensive research on implementing the flipped classroom model in elementary schools, no studies specifically focus on a comprehensive review of findings from previous research. Such a review is significant as it provides in-depth insights into existing findings, forming a comprehensive understanding of prior research exploring the benefits and barriers to adopting the flipped classroom model in elementary education. This understanding is crucial as a guide for academics and practitioners in developing new concepts and serving as a basis for further research and filling knowledge gaps from previous studies. Therefore, this study aims to address four primary research questions: (1) How has the flipped classroom model developed at the elementary level? (2) What are the benefits of implementing the flipped classroom model in elementary schools? (3) How does the flipped classroom model contribute to 21st-century

learning in elementary school settings? (4) What are the main challenges in implementing the flipped classroom in the context of 21st-century learning?

METHOD

The search and selection of articles in this review were conducted systematically by referring to the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) guidelines developed by Page et al. (2021). The primary focus of this research is to analyze various previous articles relevant to the implementation of the flipped classroom in elementary schools. The articles analyzed were collected on December 5, 2023, through the Scopus and ERIC databases. The search query used for the Scopus database was TITLE-ABS-KEY ("flipped classroom" AND "elementary school" OR "primary school"), while for the ERIC database, the query used was "flipped classroom" AND "primary school" OR "elementary school." A total of 133 articles were found, and a selection process was then carried out to eliminate articles that did not meet the research criteria. This step was implemented to ensure that the selected articles had optimal relevance to the research focus.

The articles included as data for analysis had to meet specific criteria: (1) they must be journal articles, and (2) they must be written in English. Articles that did not meet these two criteria were eliminated during the selection process. As a result, 70 articles were deemed relevant, but only 48 articles were accessible for in-depth analysis of the full text. A thorough verification was then conducted on the obtained articles by analyzing their abstracts and full texts.

Articles were included in the analysis if they met the following criteria: (1) they were empirical research studies; (2) they involved elementary school students as participants; and (3) they focused on the implementation of the flipped classroom. Based on the selection results, 29 articles met the criteria. These articles were then analyzed using meta-synthetic analysis, which involved: (1) determining the focus; (2) finding relevant research; (3) selecting studies that met the criteria for review; (4) assessing the studies; (5) extracting data; and (6) synthesizing the data (Evans & Pearson, 2001). The complete selection process can be observed in Figure 1.

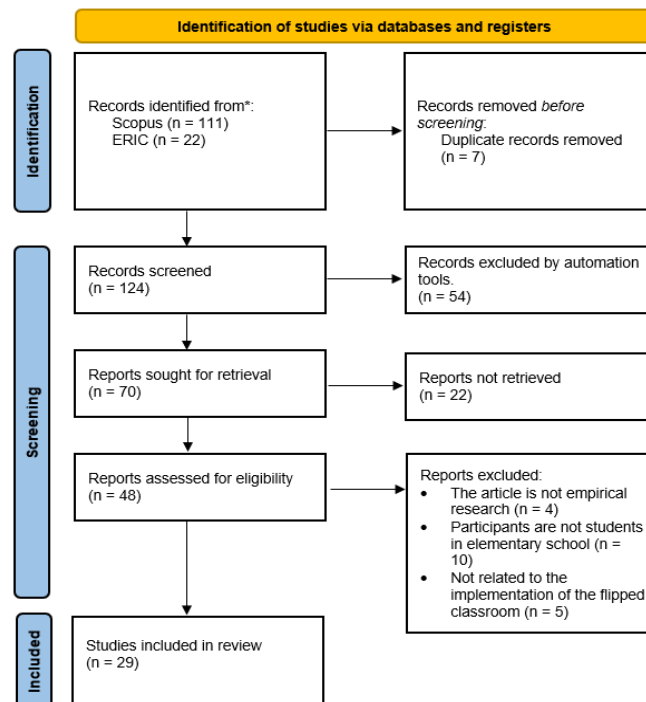


Figure. 1 Identification of Studies Via Database and Registers

RESULT AND DISCUSSION

Result

Through a structured selection process, 29 articles were found to meet the criteria, as recorded in Table 1. Detailed analysis and identification of these articles were conducted to produce a synthesis of information focused on the implementation of the flipped classroom concept in Indonesia, particularly in the context of elementary education.

Table. 1 List of Related Articles

Source	Country	Affected Learning Outcomes	Media or Tools		Challenges
			Pre-class	In-class	
(Tsai et al., 2015)	Taiwan	Learning achievement	Moodle and Video	Group discussion	Takes a lot of time
(McEvoy et al., 2016)	USA	Learning Achievement	Video	Teacher guidance	Not mentioned
(Lai & Hwang, 2016)	China	Learning achievement	Video and e-book	Group discussion	Video Creation
(Hultén & Larsson, 2018)	Sweden	Interaction	Video	Group discussion	Students are not used to it yet
(Županec et al., 2018)	Serbia	Engagement	Video	Group discussion	Not mentioned
(Hui et al., 2018)	China	Confidence and parental support	E-Schoolbag	Group discussion	Identify students who need help
(Girmen & Kaya, 2019)	Turkey	Knowledge, language, emotional and psychomotor skills	WhatsApp	Games	Not mentioned
(Ye et al., 2019)	China	Learning achievement and self-efficacy	Video	Group discussion	Not mentioned
(Sukasih, 2019)	Indonesia	Confidence, active, and Promoting 21st-century leaning	Video	Group discussion	Not mentioned
(Wasriep & Lajium, 2019)	Malaysia	Promoting 21st-century leaning	Video	Group discussion	Facilities, different abilities, and no interest in ICT
(C. C. R. Yang & Chen, 2020)	China	Independent, responsibility and knowledge	Video	Group discussion	Parental support and video creation
(Abdul Kader, 2020)	Singapore	Interaction	E-book	Group discussion	Not mentioned
(Zakaria & Md Yunus, 2020)	Malaysia	Learning achievement	Video, WhatsApp, and Kahoot	Group discussion	Internet connection and parental support
(Loizou & Lee, 2020)	Cyprus	Promoting 21st-century leaning	Video, Moodle, and Quizizz	Group discussion	Internet connection, parental support, technology capability, and disinterest

Source	Country	Affected Learning Outcomes	Media or Tools			Challenges
			Pre-class	In-class		
(Gómez-García et al., 2020)	Spain	Motivation	Video, puzzle, Moodle	Ed- and	Group discussion	Not mentioned
(Vicente et al., 2020)	Spain	Promoting 21st-century leaning, and motivation	Video		Teacher guidance	Not Mentioned
(Erbil & Kocabaş, 2020)	Turkey	Learning achievement	Video		Group discussion	Not mentioned
(Hwang et al., 2021)	Taiwan	Leaning achievement, and Promoting 21st-century leaning	Video		Not mentioned	Not mentioned
(Zou & Zhang, 2021)	Hongkong	Motivation, Confidence, and learning achievement	Video, puzzle, Kahoot	Ed- and	Games and group discussion	Not mentioned
(Botella et al., 2021)	Spain	Motivation	Video and Ed-puzzle		Practice	Not mentioned
(Khasawneh, 2022)	Yordania	Independence	Video		Group discussion	Video creation
(Gao & Hew, 2022)	Hongkong	Learning achievement, and problem solving	Video and Quizizz		Group Discussion	Need assistance
(AlManafi et al., 2023)	Libya	Promoting 21st-century leaning, problem solving, and motivation	Video		Group discussion	Facilities
(Yip & Cheng, 2023)	Hongkong	Motivation	Video		Group discussion	Not mentioned
(Nuryadin et al., 2023)	Indonesia	Interaction, parental support, and independence	Video		Not mentioned	Technology capability and takes a lot of time
(Parati et al., 2023)	Malaysia	Language skills	WhatsApp		Not mentioned	Technology capability
(Wang et al., 2023)	China	Interest	Video		Not mentioned	Not mentioned
(Chen et al., 2023)	China	Learning achievement and motivation	E-book		Group discussion	E-book creation
(Erkan & Duran, 2023)	Turkey	Promoting 21st-century leaning	Video		Group discussion	Not mentioned

Development of Flipped Classroom in Elementary Schools

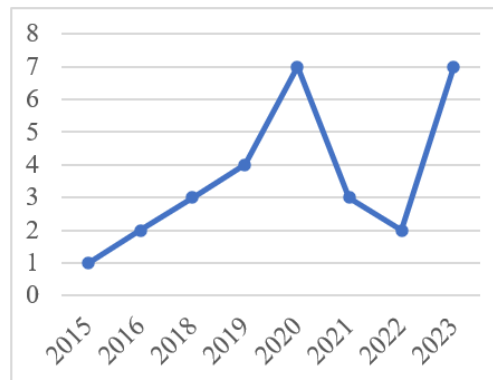


Figure. 2 Publication Trends

The term "Flipping the Classroom" was introduced by Baker (2000) in the late 1990s and quickly became a major focus in the education sector (Bernard, 2015; Bishop & Verleger, 2013c; Chua & Lateef, 2014; Giannakos et al., 2014; Zainuddin & Halili, 2016; Zuber, 2016). However, as shown in Figure 3, the flipped classroom model was first implemented at the elementary school level in 2015 in Taiwan, with a specific focus on integrating computational skills (Tsai et al., 2015). Up until 2023, the development of publications on the flipped classroom has shown a fluctuating pattern. There was a significant increase in the early period, followed by a decline in 2021 and 2022. It was not until 2023 that a recovery was observed with an increase in the number of publications. This trend indicates the potential for sustained and positive evolution of the flipped classroom approach.

From the analysis of Figure 3, it can be concluded that the application of the flipped classroom is more popular in Asia, with China being the most dominant country in terms of publications. This finding aligns with the research by Liang et al (2011), which indicates significant growth in China in the adoption of technology-based learning. Interestingly, technology is identified as a crucial element in the implementation of the flipped classroom Bishop & Verleger (2013). Therefore, this indicates that technological proficiency also influences the intensity of flipped classroom adoption in a country's education process. The significant dominance of China in flipped classroom publications can motivate other countries to enrich their contributions. This is because the relevance of the flipped classroom, which encompasses various subjects and educational levels, offers the potential to enhance the effectiveness of the learning process (Kostaris et al., 2017; Xiu & Thompson, 2020). Thus, these findings provide a strong foundation for developing more effective educational initiatives and strategies, ensuring that the flipped classroom can become an integral part of educational reform in various countries, including Indonesia.

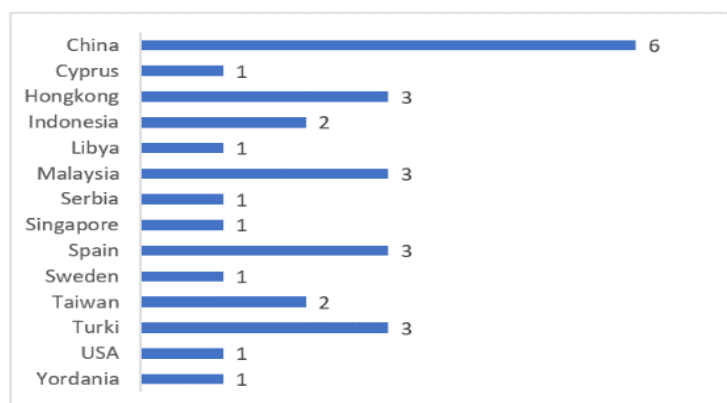


Figure. 3 Distribution of literature among countries

The Effect of Flipped Classroom on Learning Outcomes

This research found that the implementation of the flipped classroom at the elementary school level has a significant impact on the learning process. Several articles emphasize that the impact of the flipped classroom is more focused on learning outcomes, while other studies show effects involving various aspects directly. Figure 4 shows the frequency of learning outcomes positively influenced by the application of the flipped classroom. The three aspects most affected by the flipped classroom are academic achievement, motivation, and the promotion of 21st-century learning skills. These findings are consistent with previous studies showing that the flipped classroom can enhance academic achievement through active learning, provide motivation in learning, and promote 21st-century learning skills (Awidi & Paynter, 2019; McCallum et al., 2015; Sams & Bergmann, 2012; Sánchez Rodríguez et al., 2017; C. C. R. Yang, 2017; Yilmaz, 2017; Zainuddin & Halili, 2016). This explanation illustrates that the three aspects most positively impacted by the implementation of the flipped classroom at the elementary school level are interrelated.

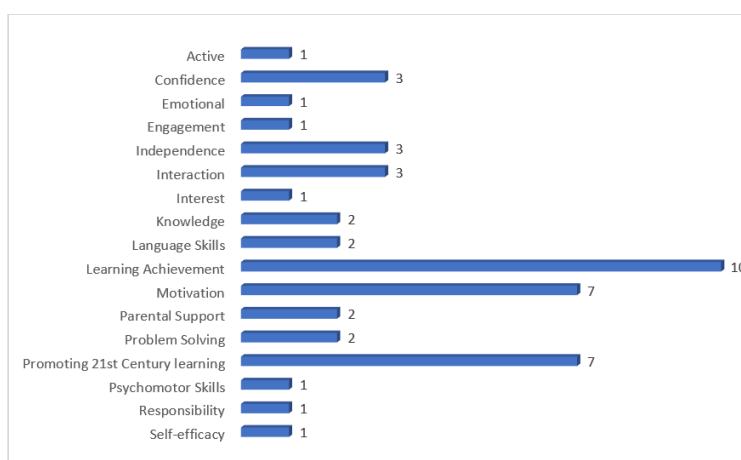


Figure. 4 Distribution of the effect of the flipped classroom

21st-century learning, encompassing aspects such as critical thinking, communication, collaboration, and creativity, has been the focus of research by several scholars (AlManafi et al., 2023; Hultén & Larsson, 2018; Hwang et al., 2021; Nuryadin et al., 2023; Sukasih, 2019; Vicente et al., 2020; Wasriep & Lajium, 2019). These findings are consistent with previous studies showing that the implementation of the flipped classroom model can enhance critical thinking skills through problem-solving, improve communication between students and teachers, encourage collaboration in the learning process, and stimulate student creativity (Huang & Hong, 2016; Kim et al., 2014). Furthermore, the flipped classroom implementation also positively contributes to self-skills, increased self-confidence, and enhanced higher-order cognitive abilities (J. Yang et al., 2018). These findings hold significant potential to become key elements in the advancement of future education, especially in addressing the challenges of elementary education in Indonesia to align with 21st-century demands. Nevertheless, further research on the application of the flipped classroom at the elementary school level, focusing on the development of 21st-century skills, remains a crucial aspect.

Technology involvement in 21st-century learning

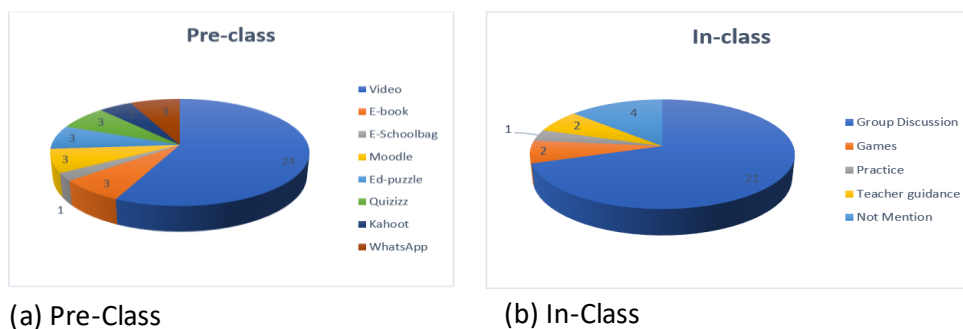


Figure 5: Pre-class and in-class process

The implementation of the flipped classroom model is based on utilizing technology with the advantage of accessibility to enhance the effectiveness of the learning process. The core concept of the flipped classroom deliver pre-class materials through video access or other media, while class time is utilized for problem-solving, summarizing concepts, and participating in collaborative learning. Figure 5 (a) demonstrates that before the start of the class session, the flipped classroom model generally utilizes videos (n=24). The benefit of using videos in the flipped classroom framework is to provide students with autonomy in the learning process (Yoon et al., 2020). This allows students to learn material outside of class at their own pace (Cui & Coleman, 2020; Divjak et al., 2022; Hutchings & Quinney, 2015). These findings indicate that students prefer learning through videos rather than reading text. Therefore, it is important for teachers to provide video materials so that students can work independently before the class session. It is recommended that the duration of videos be between 5 to 20 minutes to avoid overburdening students (Lo & Hew, 2017; Loizou & Lee, 2020). Although videos are dominant, several alternative media are also used to deliver learning resources in the pre-class phase.

As proposed by Sams & Bergmann (2012), the flipped classroom concept is not just about utilizing online tools but also emphasizes activities that occur during the learning process. The presentation in Figure 5 (b) shows that in the context of the flipped classroom, activities in the classroom are often conducted in the form of group discussions. Through active participation in group discussions, students can interact more dynamically with the teacher and classmates, applying the knowledge they have acquired in the pre-class stage. This is consistent with the research by Bishop & Verleger (2013), which states that the flipped classroom learning strategy consists of two phases: pre-class, where students can access learning content through technology, and in-class, where interactive group learning activities are conducted in the classroom. The perspective from Hung (2015) highlights that this approach provides greater opportunities for students to develop higher-order thinking skills, with direct support from the teacher and interaction with peers, in line with the learning needs in class after they have watched videos as prior preparation.

The combination of both is the foundation for the success of implementing the flipped classroom. This integration indicates that pre-class resources have the potential to be considered as teaching methods by students, not just material delivered by teachers in class. These findings align with previous research that asserts that the flipped classroom is identified as a learning environment capable of shifting the focus from teacher-centered to student-centered, as flipped classroom learning tasks involve preparation done by students outside of class time (Flumerfelt & Green, 2013). The indication of flipped classroom implementation shows the integration of online and offline learning, emphasizing the role of the teacher as an information provider while encouraging students to take the initiative for independent learning. However, there is still a dominance of certain methods or media used both in the pre-class and in-class stages. This condition indicates a delay in innovation, which, if not addressed promptly, can make the

implementation of the flipped classroom at the elementary school level monotonous and less engaging.

Challenges in the implementation of flipped classrooms in elementary schools

The implementation of the flipped classroom offers highly promising potential, but it cannot be denied that there are several challenges faced in its execution. As depicted in Table 1, the main challenges in implementing the flipped classroom are the lack of parental support in supervising and assisting students, as well as disparities in the technological capabilities of each student. These findings are consistent with the research conducted by Shamir-Inbal & Blau (2021), which states that students' difficulties in becoming independent learners are one of the main challenges in the implementation of the flipped classroom. Therefore, active support from teachers, parents, and peers is essential to help students overcome these barriers. The limitations of facilities possessed by students also affect the implementation of the flipped classroom model. Internet connectivity is a major obstacle for students in accessing video materials through learning platforms. Previous research indicates that the need for internet connectivity and required technology is considered as inhibiting factors (Gündüz & Akkoyunlu, 2019; Ramírez et al., 2014). Therefore, further research is needed to investigate the extent to which the potential benefits of the flipped classroom can be realized while addressing emerging challenges. This is crucial, especially when implementing the flipped classroom model at the elementary school level, to ensure that the desired learning objectives can be achieved.

CONCLUSION AND SUGGESTIONS

This study delved into the implementation of the flipped classroom in elementary schools, scrutinizing 29 articles that outline its impacts and challenges. The research divulges the initiation of flipped classroom adoption in 2015, notably with China leading in publications. This instructional model demonstrates positive effects on educational achievements, motivation, and the cultivation of 21st-century skills, with technology, especially video usage, emerging as a pivotal success factor. Challenges such as insufficient parental support and technological disparities exist, underscoring the importance of active support from educators, parents, and peers. Internet connectivity is critical for resource accessibility. This study serves as a foundational resource for a nuanced understanding of the flipped classroom model's deployment, tailoring insights to the specific context and challenges of the elementary school level in Indonesia. Moreover, it responds to the evolving dynamics of technological and educational advancements. Despite the observed benefits, further research is imperative, particularly for extensive implementation in Indonesia. Subsequent investigations should prioritize the development of 21st-century skills, diversification of methods and media in both pre-class and in-class settings, and the formulation of strategies to overcome challenges identified through this research.

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