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A Systematic Literature Review Of *Flipped Classroom*: Is It Effective On Student Learning In Elementary School?

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Abstract

Flipped Classroom is a reverse classroom learning model that requires more active student participation. However, flipped classrooms are still rarely practiced at the elementary school level. Students must study learning material before discussing it in class. Writing this Systematic Literature Review aims to analyze and evaluate the effectiveness of the Flipped classroom on student learning in elementary schools. The method used is Systematic Literature Review by review Using 12 articles related to the effectiveness and implications of flipped classrooms for elementary students. These articles were obtained from the Google Scholar database for the 2016-2022 range. The results of the study show that learning using the Flipped Classroom is effectively implemented in elementary schools. Flipped classroom can develop students' active participation and independence. so that the teacher only acts as a facilitator. Flipped Classroom can foster a sense of responsibility, critical thinking skills, curiosity, honesty, creativity and motivate students to learn according to their own pace of learning. This study recommends that the implementation of the flipped classroom learning model should first be introduced to the learning culture. and s Several other components that must be mastered by teachers and students to avoid difficulties during flipped classroom learning. With these considerations, flipped classroom learning can run optimally.

Keywords: flipped classroom, effectiveness, elementary school.

Introduction

The era of the industrial revolution 4.0 created a transformation in the field of education. Educational transformation as part of technological progress. Technological advances provide new paradigms and changes in education and learning. Educational technology has become a trigger for the rapid increase in online-based learning and new pedagogical models in student achievement (Stöhr at al., 2020; Wei et al., 2020). The use of technological resources is efficient and sophisticated with a dynamic educational structure that is expected to increase student innovation and creativity (Choudhury & Pattnaik, 2020; Fidan et al., 2020). The current learning trend is to integrate technological sophistication. Digital transformation focuses on bringing competitive advantage, efficiency or productivity as a new paradigm that can be optimized in delivering learning content (Sousa, & Rocha, 2019; Fletcher & Griffiths, 2020; Jackson, 2019).

One of the efforts that elementary school teachers can make in innovating their learning in the industrial revolution 4.0 era is by using a flipped classroom. The reverse class introduces the principles of active, practical, and innovative learning concepts through technological advances that make it easier for students and teachers to carry out learning efficiently" (Bergmann & Sams, 2014; Abeysekera & Dawson, 2015; Academy of Active Learning Arts and Sciences, 2018; Strelan, Osborn, & Palmer, 2020). Flipped Classroom provides a new experience that takes into account the needs and speed of each student in learning (Cheng, Ritzhaupt, & Antonenko, 2019) and encouraging students to learn important learning materials both by reading and watching learning videos before class which supports interactive learning between students and teachers in class Mustofa, M. (2022). The main objective of this model is to create learning oriented toward understanding and high-level skills of Bloom's taxonomy (i.e., creating, analyzing, and evaluating) by making students take on a much more active, effective, and efficient role. Ruiz-Jimenez, et al., 2022).

Students come to class prepared and the teacher's belief in technology integration has become an important factor, so that students are more active and understand concepts well (Bequette, 2018; Chou et al., 2020). Flipped classroom offers a different concept from traditional learning, where learning is carried out through "pre-class learning and in-class learning", which begins with a transitional stage before class methods are carried out through videos and online discussions, while in-class activities focus on higher cognition. and evaluation of students' abilities (Anderson, 2001; Nja et al., 2022).

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In addition, the classroom is turned upside down to help the development of students in preparing for their learning and become more interactive before entering the learning class. This pedagogical approach is advantageous for a number of reasons namely; refers to flexible and extensive learning to the development of students to learn at their own pace, developmental approaches, student intellectuals, and can cope with students who process ideas slowly and students who think faster (O'Flaherty, & Phillips, 2015; Munir et al. , 2018). Flipped classrooms can provide opportunities to adapt the learning process to the diversity of skills and learning styles of students for those who have special educational needs or require more time and explanation to understand and internalize learning material (Goedhart et al., 2019; Martínez-Jiménez & Ruiz-Jiménez, 2020).

Hung, H. T. (2017) explained that integrating clickers into face-to-face teaching in a reversed classroom can be a potential mechanism that creates an engaging and effective experience for students. Therefore, little is known about whether using clickers will add value to the teaching and learning process in reversed classrooms, where traditional learning structures and homework components are reversed to encourage more active learning (Bergmann & Sams, 2012; Hung, H. t). The flipped classroom learning model is a learning model that is still relatively new in the world of education. The flipped classroom learning model requires the more active participation of students because students must study the learning material before it is discussed in class. Thus, the "reverse" system in the flipped classroom learning model is expected to be an effective learning choice so that it provides a new and different color in learning in elementary schools.

Flipped classroom is a learning model that has recently been adopted by many educators. However, the implementation of Flipped Learning which is applied at a lower age such as for elementary school students has not been widely explored and researched, considering that the important factors of flipped learning are independence, commitment, and responsibility (Camiling, M. K, 2017; Ölmefors & Scheffel, 2021). There is still a lack of broad and in-depth knowledge about the impact of the flipped classroom at the elementary school level (Segolsson & Bäcklund, 2017). Research (Cheng et al., 2020) explains in more detail that the flipped classroom from the dimensions of the percentage of research participants that more than half of the research participants or who dominate this flipped classroom research are students with higher education (78%), followed by school students junior high school (8%), elementary school students (5%) and high school students (4%). This shows that a more in-depth study is needed regarding the effectiveness of the flipped classroom applied to elementary school students. The purpose of this paper is to identify and describe the effectiveness of the flipped classroom in elementary school students' learning.

Review of Literature

The Flipped Classroom learning model is new in the learning process. The Flipped Classroom model is a learning model where learning activities that are usually completed in class can now be completed at home by studying previous teaching materials, and learning activities that are usually done at home can now be completed in class, such as students being asked to report back on learning material or topics so that meaningful learning is created (Bergmann & Sams, 2012; Lundin et al., 2018; Joy et al., 2023).

A flipped classroom is a learning strategy and a type of blended learning that reverses learning patterns by delivering learning material that is usually online, outside the classroom, and making students' learning activities and homework is done as activities in the classroom Chaeruman (2016). Furthermore, the FC model is a learning reorganization that consists of learning outside and inside the classroom according to the needs of new learning formats, problem-based learning, and learning that is flexible in the implementation of the educational process (Ahmed & Indurkiya, 2020; Flores-Alarcia et al., 2022).

In the flipped classroom, students can read the material, watch learning videos before they come to class, and when in class they start discussing, exchanging knowledge, solving problems, with the help of other students or with educators. The flipped classroom trains students to develop procedural fluency, inspires, and assists students with challenging projects by providing greater learning control. Therefore, the flipped classroom is considered a good, effective, and efficient alternative to learning, and has been widely adopted by educators of all levels and in all disciplines (Steen-Utheim and Foldnes, 2018; Aloussef, 2022).

Bergmann & Sams (2015: 10) suggest that reversing teachers' thinking is the most important hurdle to overcome because many teachers have "schooled" the same way for years and it is difficult to change. Four aspects must be met by educators before implementing flipped learning in the classroom. The four aspects are described in the table 1.

Method

The research method chosen for the investigation of the research question was a systematic literature review. This research method is considered appropriate because it can contribute to the synthesis of existing academic literature reliably and accurately (Van Laar, Van Deursen, Van Dijk & Jos de Haan, 2017). In addition, it allows the application of elements of analytical criticism to the discussion of the synthesis (Hart, 1999).

Data source

This study searches the database from Google Scholar. According to previous research, by entering keywords such

Table 1: Flipped learning Instruction

Flexibility environment	Designing time and learning space according to the needs of students Observing and supervising students to make appropriate assessments Provide a variety of ways for students to learn and master content
Learning culture	Provide opportunities for students to carry out independent learning activities Breaking the content/material into several stages so that it is easily understood by all students in different ways
Intentional content	Prioritizing the concepts used in direct instruction so that students can understand them in their way Develop content that suits the needs of students Provide a variety of content to be easily accessible and relevant for all learners
Professional educator	Guiding all students both individually and in groups and providing feedback Conduct formative assessments during classroom learning, through observations to inform the next instruction Collaborate and reflect with other educators

Source: Adapted from: https://flippedlearning.org/wpcontent/uploads/2016/07/FLIP_handout_FNL_Web.pdf

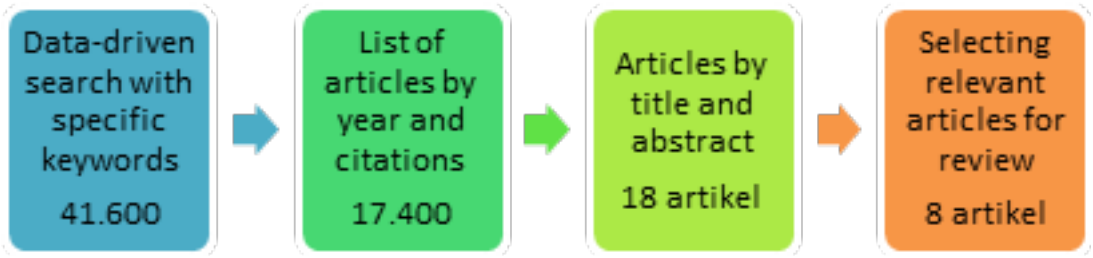

Fig. 1: Article Analysis Stage

as "flipped classroom," and "elementary school" into Google Scholar to search for relevant publications. The article sought is an article with a range of 2016-2021 with the topic of the effectiveness of the flipped classroom in elementary schools which is the result of research. All articles were independently selected by the authors. The number of related journal articles is eliminated and arranged according to the topic and frequency of citations.

Data analysis

Articles are screened in four stages before being selected for review. In the first stage, articles that do not meet the criteria based on the title of the article are eliminated. In the second stage, articles by the year and remaining citations will be re-screened, and articles that do not meet the selection criteria will be eliminated. In the third stage, the titles and abstracts of other articles are read and articles that do not meet the criteria are re-eliminated. The fourth stage, determining the articles carefully selected by the researchers to eliminate certain criteria that do not meet the selection criteria. The selected articles are the main references in this systematic literature review.

Findings

This study found a study on flipped classrooms in elementary schools from 2016-2022. Further details will be presented in table 2

Teacher and student involvement

Flipped classroom provides more portion to students than teachers in learning. The teacher's role in the flipped classroom is to facilitate students (Toh, T. S., Tengah, K. A., Shahril, M., Tan, A., & Leong, E, 2017). Flipped classroom makes students actively involved in discussing and participating during learning. This certainly gives an impression on teachers and students. Learning with knowledge graphs and concept maps through flipped classrooms can not only improve learning performance but can also foster active learning. (Jingjing Cui., & Shengquan Yu, 2019).

In addition, (Una, Z. & Unal, A, 2017) explains two perceptions during flipped classroom learning, namely the perceptions of teachers and students. Students' perceptions of the inverted classroom learning model found that students were generally satisfied with the use of the flipped classroom approach and provided detailed information regarding their perceptions of the experiment. Most students (94%) reported that the new learning format worked for them. Meanwhile, for Teachers' Perceptions of the Reversed Learning Model based on the Teacher Survey, the researchers also examined the data that was self-reported by teachers in the teacher survey. The online survey data collected at the end of the experiment showed that most of the teachers were satisfied with the use of the reverse classroom approach and provided detailed information regarding their perceptions of the experiment. Furthermore, this finding reports that all

Tabel. 2 Summary of literature review

Author	*Year*	*Research Method*	*Main Outcomes*	*Environment*
Lai & Hwang	2016	Experiment	Integrating self-regulated strategies into flipped learning can increase students' self-efficacy as well as their strategies for planning and using study time, thereby further improving student learning achievement.	Elementary school in Taiwan.
Tao et al.	2016	Experiment	The game-based flipped classroom can spark interest, and curiosity, promote achievement and encourage students to further learning	Elementary school in Taiwan.
Toh et al.	2017	Three-cycle action research	After flipping the class for three cycles, it is proven that the flipped classroom approach does have a positive impact on student performance.	Elementary school in Distrik Brunei-Muara.
Una & Unal	2017	Quasi- Experiment	The difference in learning outcomes was significant and most favored the reverse classroom as it promoted active learning, which required students to solve problems using what they learned before class.	Elementary school in USA.
Camiling	2017	Experiment	Contextual settings that emerge with the instructional approach are considered effective for teaching basic science process skills to students.	Elementary school in Filiphina.
Segolsson et al.	2017	Qualitative	The results showed that Flipped Classroom had a positive influence on most of the students because they developed a sense of suffrage in their learning which was indicated by them taking the initiative as students progressed with their learning.	Elementary school in Sweden.
Rombot et al.	2018 Experiment	The collaborative learning model of Flipped Classroom and Jigsaw can develop the character of students in elementary school education in Jakarta.	Elementary school in West Jakarta, Indonesia.	
Cui & Yu	2019 Experiment	Comparison between the learning effects of knowledge graphs and concept maps reveals that knowledge graphs have a greater positive impact on flip classrooms for effective, generative, and deeper learning.	Elementary school in Shenzhen, Cina.	
Ye et al.	2019 Experiment	Reverse learning with interactive problem-posing strategies is more effective in terms of learning achievement, self-efficacy, and in-depth approaches than conventional reverse learning methods.	Elementary school in Northern Taiwan.	
Kurnianto et al.	2020 Experiment	Flipped Classroom Model learning is effective in improving critical thinking skills, science learning outcomes, and student learning motivation, there is a positive influence between learning motivation and critical thinking skills on students' science learning outcomes.	Elementary school in Pati, Indonesia	
Murat & Cam	2021 Quasi-experiment	The flipped classroom model makes students more active in class and more likely to use collaboration and communication skills as 21st-century skills. Students are more responsible and aware of their own learning needs.	Elementary school in Turki	
Gao and Hew	2022 Quasi-experiment	The 5E-based reverse teaching model can improve students' understanding of CT concepts and computational problem-solving performance.	Elementary School in Hongkong	

teachers except one (94%, 15 teachers) reported that the new teaching format worked for them (Una, Z. & Unal, A, 2017). Findings of students' and teachers' perceptions of the reversed classroom approach were mostly positive. Both teachers and students believe that experimentation with flipped learning is successful, interesting, and motivating.

The Flipped Classroom model has a significant effect on students' learning motivation. This is in line with the findings of Kurnianto, B., Wiyanto., & Haryani, S. (2020) who found that the Flipped Classroom learning model provided a stimulus to students and caused varied reactions or responses as a driving force and positive attitude in the learning process. The application of the Flipped Classroom model provides stimulation in the form of illustrative and contextual science learning video content so that students' motivation will react positively and inspire students' enthusiasm in learning. Furthermore, the flipped classroom facilitates students to learn actively by thinking about a problem, struggling through problems, and exploring solutions where the teacher only provides technical assistance to students in learning (Gao & Hew, 2021). The motivation and needs of students in learning increased significantly, and students felt optimistic about their hopes and aspirations for a better future.

Utilization of learning resources

Flipped classrooms are accessed in a variety of ways by students. Based on research (Una, Z. & Unal, A, 2017) found the types of devices used by students for flipped learning, namely watching video lessons in reverse class. This finding reports that 44% of students watch videos using a desktop computer, 29% use a laptop computer, 24% use a tablet, 2% use an iPod, and 1% use a smartphone. In addition, students are given assigned reading materials in the form of textbooks and videos as homework so that they can watch videos at home or do their reading outside of class at their own pace (Toh, TS, Tengah, KA, Shahril, M., Tan, A., & Leong, E, 2017; Camiling, MK, 2017).

Student learning outcomes

The flipped classroom influences the success of student achievement. Findings from (Lai, CL, & Hwang, GJ, 2016; Toh, TS, Tengah, KA, Shahril, M., Tan, A., & Leong, E, 2017) conclude that flipped classroom is beneficial for student learning achievement, efficacy self, and self-regulation; and there is a statistically significant increase after flipping classes for three cycles in Grade 7 Mathematics as evidence that the flipped classroom approach does have a positive impact on student performance. The results of this study are in line with the findings (Olifia Rombot., Ferry Doringin., & Freddy Widya Ariesta , 2018; Cui, J., & Yu, S, 2019) showed that the experimental results of class students who were treated using an inverted class, jigsaw model, and knowledge of graphs were higher than those of the untreated class or those who did not use the reverse class. (Mark Kenneth Camiling, 2017; Kurnianto, B., Wiyanto., & Haryani, S. (2020) shows that Flipped Learning provides significantly different learning outcomes and has an impact on student learning conditions. The learning outcomes obtained can promote deep thinking and internalization of knowledge, as well as supporting the deeper achievement of learning goals (Cui, J., & Yu, S, 2019). This provides effectiveness in terms of elementary school students' basic process skills applied in the school environment.

Student Character Value

Flipped classroom not only has an impact on student learning outcomes but also touches on the characters formed during flipped classroom learning. The results of the study (Lai & Hwang 2016; Tao et al., 2016) show that flipped classroom findings lead to self-learning strategies that are very beneficial for students who have higher self-regulation and spark interest, encouraging curiosity to continue learning. Furthermore, (Segolsson, M., Hirsh, ., & Bäcklund, J, 2017; Cui, J. and Yu, S. 2019) showed that the majority of students are responsible for their learning and can increase students' initiative in independent learning. , which includes: a) students find the learning material, b) students complete the learning elements, c) students plan their learning, and d) students seek help or solutions to a problem at hand. Students realize that responsibility is the most important thing for self-study and in acquiring knowledge outside the classroom and putting the knowledge learned in class into practice (Segolsson, M., Hirsh, ., & Bäcklund, J, 2017; Toh, TS, Tengah, K.A , Shahril, M., Tan, A., & Leong, E, 2017). This is done during teaching that takes place in the Flipped Classroom.

Similar findings related to character values formed during the flipped classroom learning process, namely (Rombot et al., 2018; Murat & Cam, 2021) explains that the use of flipped classes produces several characteristics such as honest, independent, creative, collaboration, communication, and responsible take responsibility for their learning and be aware of their learning needs. Similar findings related to character values formed during the flipped classroom learning process, namely (Olifia Rombot., Ferry Doringin., & Freddy Widya Ariesta, 2018) which explains that the use of flipped classroom produces several characters such as honest (82.2%), independence (84.4%), creative achievement (87.5%), responsibility (85.9%). Based on these data, the creative and responsible scores achieved the highest scores seen during the flipped classroom learning process. Research by (Cui, J., & Yu, S, 2019) explains that the flipped classroom results in well-prepared learning at home and adequate basic knowledge, where this basic

knowledge can develop students' higher-order thinking skills. This finding seems to be in line with the findings of Clark (2013) who reported that students need to build on their prior knowledge for further learning. (Kurnianto et al., 2020; Gao & Hew, 2021) shows that there is a significant effect that the Flipped Classroom Model can improve critical thinking skills and understanding of the concept of Computational thinking (CT) in students' computational problem-solving performance. In the reverse classroom, learning is scaffolding instruction, social interaction, and general perception activities. These activities can encourage and build students' basic skills in critical thinking. This is consistent with Vygotsky's theory in the context of the development of critical thinking and constructivism as educational philosophies that have a strong impact on modern teaching-learning processes (Erbil, 2020).

Discussion

Flipped classrooms have been carried out at various levels of education. The results of the research by Isaiah and Paynter (2018) explain that the reversed classroom approach provides learning benefits for students. The flipped classroom is considered as one of the effective teaching and learning strategies to be applied in the classroom because the reverse classroom promotes student-centered learning (Toh, TS, Tengah, KA, Shahril, M., Tan, A., & Leong, E, 2017). Furthermore, student-centered learning certainly creates active learning. In a flipped classroom, students can experience active learning and receive personalized feedback based on their learning status, which increases student self-efficacy and learning achievement compared to conventional reverse learning methods (Bandura, 1997; Lai & Hwang, 2016; Ye et al., 2019).

This is following the constructivist approach by Piaget which explains that students actively construct or construct their knowledge and reality is determined by their own experiences. Cheng Li et al (2019; Cui, J. and Yu, S, 2019) suggest that the reverse classroom instructional strategy is considered a good way to help teachers and elementary school students organize learning experiences to improve student learning outcomes and develop understanding more about learning content.

Student-centered learning provides opportunities for students to further practice their independence. Mirlanda, Ela Priastuti et al (2019) stated the results of research that flipped classroom learning facilitates increasing students' independent learning abilities. The same thing is shown by Goedhart's research (2019) reporting that two indicators have a fairly large percentage of students' perceptions in the implementation of flipped classroom learning, namely (1) students feel it is important to complete their studies on time (95.3%) and (2) students indicated that they prefer independent learning in an online environment (95.5%).

21st-century skills are also needed by students these days. Toh, T. S., Tengah, K. A., Shahril, M., Tan, A., & Leong, E, (2017) explained that how students develop collaboration, communication, and numeracy skills through flipped classroom learning. First, collaboration in the form of cooperation and sharing in a group so that each student has a sense of belonging. Second, communication is identified with students who have self-confidence or courage in expressing opinions so that students can communicate with each other. Third, numeracy is related to students' skills in performing arithmetic operations without using an electronic calculator. In addition to collaboration, communication, and numeracy skills, there are also 4C skills, namely Collaborative, Communicative, Critical thinking, and Creative. The flipped classroom has a positive effect on understanding mathematical concepts, student learning outcomes, and students' creative thinking skills (Juniantari, et al, 2018; Misluhah, 2018 Khoirotunnisa, et al, 2020).

Based on the findings of some of these studies, it can be concluded that the flipped classroom has a positive effect on student learning at various school levels. The positive impacts obtained by elementary school students include learning experiences that are different from conventional learning, motivation, learning outcomes, and character development, creativity, and student independence in learning.

Conclusion and Suggestion

The inverted classroom approach has received a lot of attention in the world of education. The flipped classroom has an effective impact on student learning carried out in elementary schools by referring to the eight articles that were analyzed by the researchers. The indicators of the effectiveness of flipped classroom learning in elementary schools are based on the findings of the study. In general, research shows that the flipped classroom has a positive impact on various aspects of student learning, namely: a) teacher and student involvement; b) student learning outcomes; c) utilization of media and learning resources, and d) student character values. This finding is following the results of research related to the inverted learning model which is consistent with the findings of previous researchers (eg Morevec, Williams, et al 2010; Heybourne and Perett 2016; and Petersen 2015), so it can be concluded that finding positive signs that the reverse classroom approach can improve the student experience and learning outcomes. This needs to be studied more deeply and continuously to obtain more accurate research results to be used as a generalization in the current learning process, especially for students at the elementary school level. We need to continue to study how this teaching method contributes to the learning process of students at a younger age as well (Segolsson, M., Hirsh, ., & Bcklund, J. (2017).

As a recommendation from the implementation of the flipped classroom, it is necessary to consider feedback from students and teachers which highlighted the challenges faced with this new instructional approach. Una, Z. & Unal, A (2017) students reported the following: challenges of (1) unfamiliarity with the reverse class model, (2) watching long and boring video lectures, and (3) not having time to watch videos at home. Regarding teachers, the challenges are (1) time spent on preparation and (2) students do not watch videos. Therefore, the flipped classroom learning model needs to be prepared and studied carefully before carrying out learning.

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