Systematic Literature Review: Learning Design Using the Flipped Classroom Model to Improve Learning Outcomes and Student Participation

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Abstract

With the help of anytime, anywhere access to online technologies, the flipped classroom learning approach focuses on students' needs to improve learning efficiency. One style of learning is called a "flipped classroom," which combines face-to-face synchronous interaction with online, individual learning. This study aims to analyze the use of the flipped classroom model to improve learning outcomes and student participation. The research method used is Systematic Literature Review (SLR) developed based on the PRISMA method. The search strategy is adapted to similar research and involves several variables, namely year of publication, journal index, research material methodology, and research results. Data collection is done by documenting all articles with similar research in reports. The articles that will be analyzed in this study are 25 journal articles obtained from the Scopus database using Harzing's Publish or Perish application over a period of 5 years, from 2018 to 2022. The data obtained is presented in a qualitative descriptive manner. The results of the study prove that the use of the flipped classroom model in online learning in various countries is useful for increasing student learning outcomes and participation.

Keywords: Flipped Classroom, Learning Outcomes, Student Participation

Introduction

The digital revolution is having an important impact on education. This influence is also causing changes in education, such as in terms of teaching and learning approaches. There are substantial effects of digitalization on education. Even with the most recent advancements in educational software and digital technologies, schools and teachers are still having trouble finding effective ways to incorporate technology into curricula and prepare students for the future. This idea of digital literacy aids academics, researchers, and education administrators in comprehending and addressing the needs of educational institutions and students in a digital society (Pangrazio et al., 2020).

The flipped classroom is a relatively new learning strategy. This learning strategy is growing with advances in technology, such as internet access and other supporting software. In traditional learning, educators deliver material, then to increase understanding of the material, students will do assignments at school and are given homework. In the flipped classroom, students participate in watching videos, and Powerpoint int and accessing learning resources provided by educator media such as e-learning. Flipped classroom pedagogics has become a widely used approach within blended learning (Ölmefors & Scheffel, 2021). Promoting active learning, which encourages students to actively engage with learning materials, participate in class, and collaborate with other students, is the most efficient way to increase teaching effectiveness (Tang et al., 2017). In its broadest sense, the flipped classroom is an instructional strategy where homework and instruction are switched, and where learning occurs outside of the traditional classroom setting (Turan & Akdag-Cimen, 2020).

To achieve all the goals of learning in schools, it is necessary to apply creative methods. The selection of learning models must be considered. One of them is the Flipped Classroom learning model, seen from the learning steps that can train students to be positive in utilizing technology, train students to discover lesson concepts independently, and, have the maximum time for learning. It is said to be able to maximize time because it utilizes activities at school and home. At home, students study material in the form of videos provided by the teacher. While at school students carry out group discussions to develop their potential. Positive use of technology is carried out when accessing learning videos, and videos to gain knowledge or material. So that the role of technology is very useful in the world of education and increases knowledge.

The high interest in Flipped Classroom is also due to Covid 19. The lockdown policy prohibits learning in schools by physical contact. Transferring online classes using the Flipped Classroom method as part of a mixed learning strategy is a good decision. Flipped Classroom deals with online learning materials, mixed learning preparations, class discussions, student-centered learning, active student participation, and influencing the improvement of student learning outcomes (Gerber & Eybers, 2021).

The author finds that there is a lack of clarity in the literature about Flipped Classroom and how effective it is developed. It was also found that there was a decrease in student achievement and participation in learning (Cevikbas & Kaiser, 2022a). Inequality and the digital divide are also in the limelight as adequate mobile data is required to participate in online classes. The motivation and background for this research is the need to understand exactly how Flipped Classroom can be used as a method to improve learning outcomes and student participation and how to design the next Flipped Classroom method approach.

Based on this, the authors try to answer three research questions as follows:

Research Question1 (RQ1): How is the overall research in Flipped Classroom in research methodology, country, and Scopus rank?

Research Question 2 (RQ2): What are the conclusions from the available literature?

Research Question 3 (RQ3): What are the research gaps in the existing literature?

Methodology

The author uses the Systematic Literature Review (SLR) research methodology with the PRISMA protocol (Moher et al., 2009) to summarize the findings of similar studies in the form of literature. From the PRISMA method, 30 articles were obtained which would be reviewed and analyzed.

Data Sources and Search Strategy

The author collects data obtained from the Google Scholars and Scopus databases through the Harzing Publish or Perish (PoP) software (Harzing, 2014). For searches from the author's database using the keyword "Flipped Classroom" in the article's timeframe from 2018 to 2022 because it is vulnerable that year there is an outbreak of the Covid-19 Pandemic which encourages learning from home so that there is an increase in the use of online learning media. Most of the studies use English as the main language of instruction in their articles.

Selection Criteria

The author has selected articles for review based on selection and eligibility criteria according to the research focus. Only research articles with full text will be reviewed by the authors. In addition, the authors for selecting data are published in Scopus Q1-Q4.

Inclusion

All articles that are directly related and fit the criteria have been selected to find areas of focus.

Exclusion

Articles that are not directly or indirectly related to learning design using the Flipped Classroom model to improve learning outcomes and student participation in schools and those that are not related to the following themes are excluded from the analysis. In addition, articles that did not have full text were not published in Scopus Q1-Q4 and where research was not carried out in schools were also excluded.

Study Selection

A search on January 8, 2023, identified a total of 1844 articles from the Google Scholars and Scopus databases. Duplicate records (n = 298), Records marked as ineligible by automation tools (n = 686), and records removed for other reasons (n = 358), concluded that the total number of articles issued was 1342 articles, leaving 502 articles.

Screening

Screening is done first by reading the title and abstract, discussions that are inappropriate and not related to the theme are deleted. This screening resulted in the deletion of 419 articles and then the remaining 83 articles.

Eligibility

In the first literacy, it is mandatory to read full-text articles to eliminate unrelated articles, this resulted in the deletion of 38 articles and the remaining 45 articles.

In the second literacy, the author thoroughly searches for articles that describe theory, data, and keywords that contribute to this research. So that at this stage the resulting article and 30 articles remained for later to be reviewed in this study.

Figure. 1 shows the educator's article screening process, and the resulting articles reviewed.
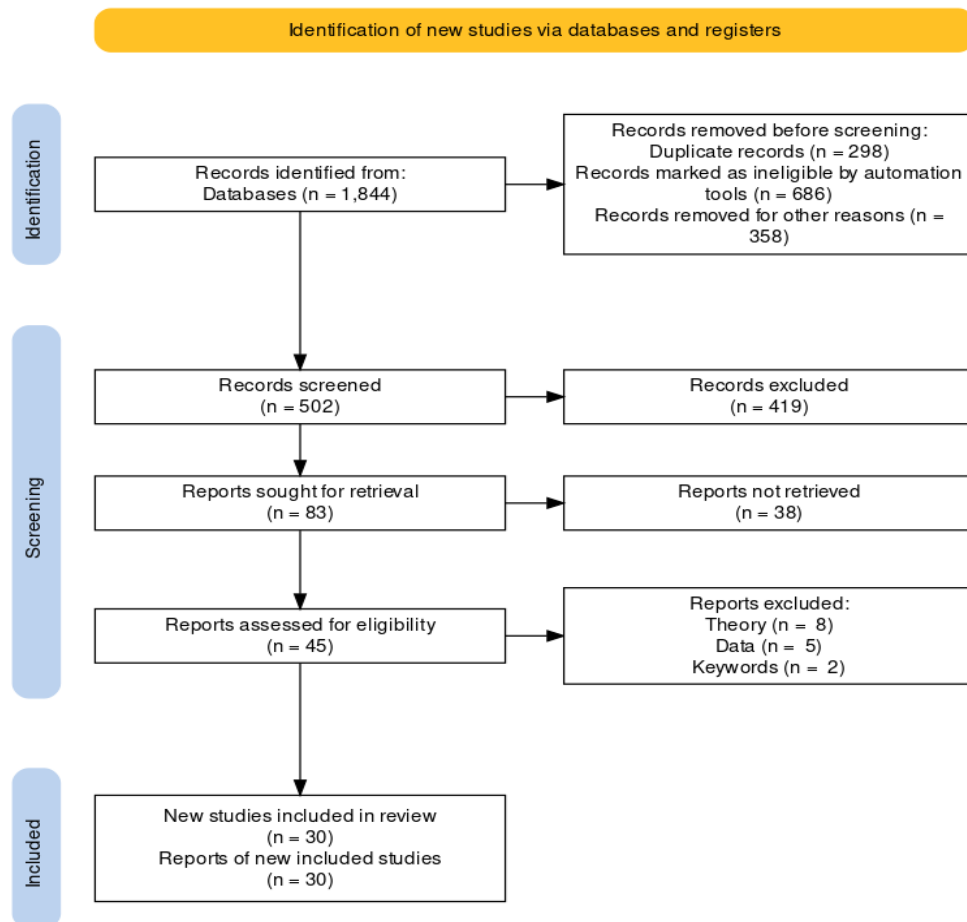

Fig 1. PRISMA

Result and Discussion

Before answering the selection research questions, the authors have collected 30 articles that will be discussed to find out the learning design using the flipped learning model to improve learning outcomes and student participation. We can see the available articles from 2021-2022.

RQ1: How is the overall research in Flipped Classroom in terms of time, research methodology, country, and Scopus rank?

For the first research question, the author grouped the selected articles into several categories, namely based on year, research method, based on country, and Scopus rank in the selected articles.

Research grouping based on the year

The author makes 2 dimensions: impact on learning (referring to improving student learning outcomes and student participation in learning. In this research, the author found 30 articles relating to this matter.

Grouping research based on the selected year is only in 2021 and 2022 because this year the use of Flipped Classroom to support learning during the Covid-19 Pandemic has increased, Flipped Classroom has been proud as a learning model that utilizes web-based learning [8]. The number of articles selected in educators12 articles, 2022 there are 18 articles.

Year of Publication	Article
2021	12
2022	18

Table 1. Distribution of the published articles according to the publication year

Research grouping based on the country

According to the picture shown in Figure 2, it can be concluded that the authors who studied the Flipped Classroom model in schools from the top two countries are Turkey and Indonesia. This is due to the need in the world of education that it raises research related to this the Flipped Classroom model in learning in schools, each country has its own of developing it. Countries such as Australia, Saudi Arabia, China, Germany, India, Iran, Japan, Korea, Nigeria, Pakistan, Spain, Taiwan, and the United Arab Emirates also contributed articles related to the Flipped Classroom method for 2021 and 2022.
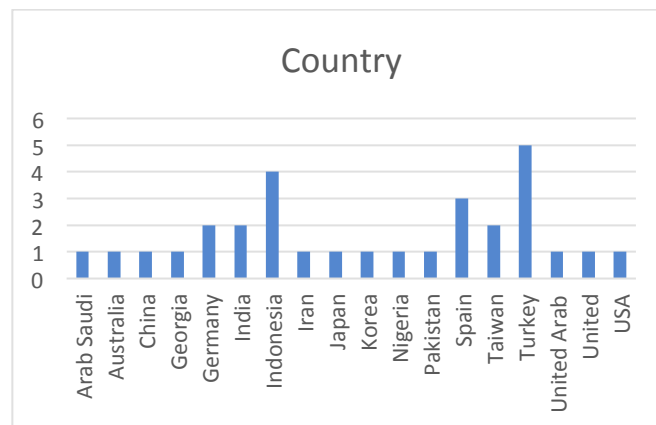

Fig 2. Studies by Country

Research grouping based on the research method

From Figure 3 it can perioded that there are 2 types of popular research methodologies used by researchers in Flipped Classroom research, namely quantitative descriptive methodology and qualitative descriptive methodology. Based on the select periods, research using quantitative descriptive methods was the most widely used method, namely 21 articles, while 9 other articles used qualitative descriptive methods. Quantitative methods include surveys and experiments, while conceptual papers include content analysis.
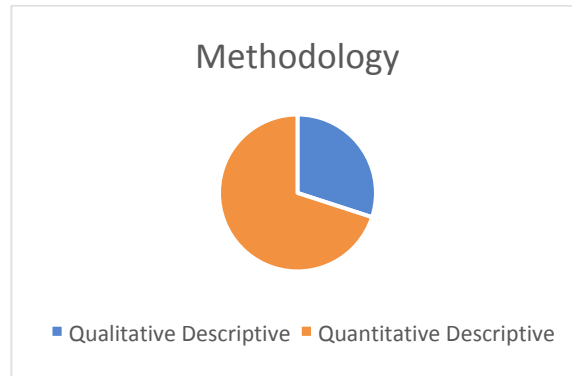
Fig 3. Studies by Research Method

Research grouping based on the Scopus Rank

Details of the distribution of articles related to Flipped Classroom with qualitative and quantitative approaches are presented in Figure 4. From this figure, it can be seen that the results of studies related to Flipped Classroom were mostly published in Q1 with the number of articles selected, namely 19 articles, published in Q2 with 5 articles and published in Scopus Q3 with 6 articles. Meanwhile, there were no selected articles published in the Scopus Q4 journal.
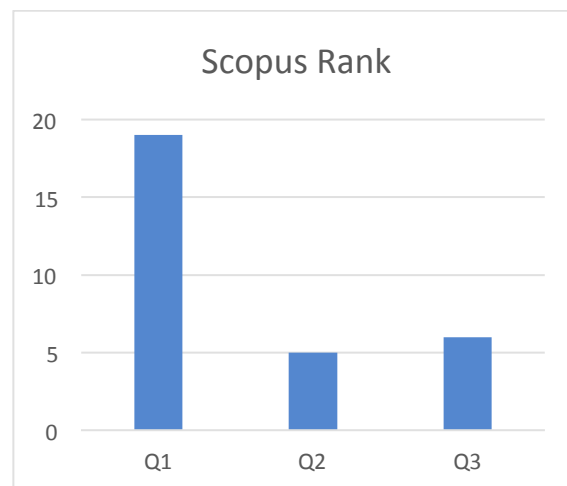

Fig 4. Studies by Scopus Rank

RQ 2: What are the conclusions from the available literature?

To answer RQ2, the researcher analyzed each article: the researcher divided the findings into 2:
1. The learning design uses the Flipped Classroom model to improve learning outcomes.
2. The learning design uses Flipped Classroom to increase student participation in learning.

Flipped Classroom to improve learning outcomes

From the selected articles reviewed, it was found that Flipped classrooms affected the improvement of student learning outcomes in online learning. Flipped classroom embodies student learning methods that can be understood, the model used has higher performance than traditional methods (Wang, 2021). This increases student learning outcomes as evidenced by

quizzes, midterm exams, and final exams. Flipped Classroom improves academic and learning memory. In this model, students use technology such as a laptop and p smartphone to do in-class activities such as listening to lectures, watching the teacher in action outside of the classroom, and watching and listening to pre-recorded video lessons on their own (Tutal & Yazar, 2021).

The results of other studies also prove that Flipped Classroom influences improving learning outcomes, students have a good view of the Flipped Classroom model in learning, it is and also said that there is a statistically significant achievement in post-test scores than those who do not use the Flipped Classroom model (Shooli et al., 2022). In secondary education the Flipped Classroom model also has positive benefits for improving learning outcomes, the findings also discuss implications for educational practice(Wagner et al., 2021). The benefits of active learning are participating in involving students in education for sustainable development (Howell, 2021). The right pedagogies are necessary for effective Education for Sustainable Development (ESD) students in transformative learning. These pedagogies incorporate experiential, group-based, learner-centered activities as well as reflective and active learning.

Research conducted by M.CarmenRuiz-Jiménez et. al (Ruiz-Jiménez et al., 2022) concluded that student attitudes can also be used as a key to understanding the increase in student academic results in a learning environment with the Flipped Classroom method. Both aspects (perception and attitude formative assessment) explain the perception of student learning outcomes. This leads us to conclude that student attitudes are a key element to encourage more and better learning which enhances their performance. In this way, it provides further evidence for the literature on the positive effects of Flipped Classrooms on the teaching-learning process.

Research conducted by Elif Polan et. all Results from structural equation modeling showed a positive correlation between engagement and FLR and student accomplishment in the online flipped classroom, but a negative correlation between social anxiety and achievement. The study also showed that in the online flipped classroom, engagement was the most important predictor of success (E. Polat, Hopcan, & Arslantaş, 2022). Similarly, the research conducted by Polat & Karabatak concluded that, When compared to other classroom models, the flipped classroom greatly improved students' academic achievement, academic happiness, and overall sense of belonging (H. Polat & Karabatak, 2022).

The newly emerging methodological shift in education is being aided by the internet. The flipped classroom is one of the methods that the Internet is used for. When contrasting this methodology with the conventional one, research has demonstrated that there are benefits. Significant variations in how academic performance has improved with the flipped classroom approach. The outcomes further demonstrate how the flipped teaching approach successfully fosters student engagement, autonomy in learning, and interpersonal and collaborative interactions (Torres-Martín et al., 2022). Utilizing the flipped classroom in addition to improving learning outcomes, also closing achievement gaps, and increasing student engagement and critical thinking, the application of the flipped classroom model in high school (SMA) writing courses influences the quality of writing, engagement, and student perceptions of and experience with flipped classrooms (Florence & Kolski, 2021).

To benefit from higher-order learning chances during collaborative in-class learning that builds on the newly learned knowledge, individual assumptions, and misconceptions,

students are typically encouraged to watch an educational video before an in-class session. With this constructivist-based instructional strategy, students apply the information and abilities they learned from the instructional video in practical activities and group discussions with their classmates(Förster et al., 2022). Behavioral engagement, cognitive engagement, learning achievement, and HOTS like problem-solving, critical thinking, and creativity all improved as a result of the use of the Flipped Classroom, according to the results of quantitative and qualitative evaluations (Huang et al., 2022).

Research conducted by Cecilia Obi Nja et. all The research utilizing a sample t-test revealed that when chemistry was taught using a flipped classroom, pupils had a positive attitude about the subject. The study also aimed to compare pupils who were taught using the flipped classroom technique to those who were not. The results of the academic accomplishment inquiry showed that pupils' academic performance was much higher than that of the traditional group (Nja et al., 2022). In line with the research conducted by Steven B. Rothman, A survey measures the student perceptions and reactions to the flipped class style compared to the traditional classroom, and a statistical analysis examines the effects of different teaching methods on student exam performance (Rothman, 2022). In addition, the use of Flipped Classroom can also be integrated with other media, as a whole, integrating PowerPoint is shown to help strengthen the learning process based on Flipped Learning to increase student understanding. (Ishartono, 2022), Further evidence that flipped instruction affected students' learning performance and perspectives came from comparing the mean scores of the groups receiving standard and flipped instruction (Shana & Alwaely, 2021).

Apart from using Powerpoint, students who get Flipped Classroom-Digital Game-Based Learning (FC-DGBL) have a better understanding of the concept of Genetics than students with traditional learning models. (Ristanto et al., 2022) effective in improving student learning behavior towards deep learning, self-efficacy, SDL, collaborative learning skills, and critically analyzing basic concepts using Flipped Classroom (Padugupati et al., 2021). Research conducted by Rapi et. al states. The findings show that students who learn with project assessments based on the flipped classroom approach and students who learned with conventional evaluations simultaneously and partially differ in their critical thinking abilities and learning outcomes (Rapi et al., 2022). The research conducted by Badriah Algarni concluded that there was no effect of using Flipped Classrooms in increasing student achievement (Algarni & Lortie-Forgues, 2022). Meanwhile, research conducted by Palazon e al (Palazón-Herrera & Soria-Vílchez, 2021) concluded that students who had studied under the flipped classroom model achieved higher academic achievement globally, expanded pedagogic learning innovations through Flipped Classrooms (Xiao & Adnan, 2022), and assisted independent learning.

Flipped Classroom to increase student participation in learning

Blended learning, which combines traditional classroom instruction with online learning resources, may be a viable strategy for encouraging a more active and regular learning process while accommodating students' flexible time and location.

The use of Flipped Classrooms in learning at school also plays a role in increasing student participation or active involvement of students in learning, as based on the results of research conducted by Polat et.al (E. Polat, Hopcan, Albayrak, et al., 2022) which concluded that there was an increase in students' active participation in learning. While there were gender-specific differences in online involvement, there were no differences in the forms of feedback.

However, it is crucial to have a well-developed interactive design and to promote social interaction in mathematics teaching and learning if you want to successfully flip learning. When students failed to do the pre-class assignments and had a poor opinion of flipped learning, engagement was found to be significantly impacted (Cevikbas & Kaiser, 2022b). Research conducted by Kusuma et. al The result showed a significant effect of e-portfolio in flipped classrooms on students' speaking performance. Furthermore, students showed active behavioral, cognitive, and affective engagement (Kusuma et al., 2021).

This research study highlighted a paradigm shift that is significantly altered by fusing technology and education. In the area of education, there has been significant progress toward changing how people learn. Teachers, students, and parents are now using technologically based methods at home and school as a result of the revolutionary improvement in the educational profession. Overall, it can be said that many students preferred the flipped classroom strategy to conventional education(Mujtaba Asad et al., 2022).

Teachers and students have an important role in the successful implementation of Flipped Classroom in learning (Oh et al., 2022) so that it can implement the Flipped Classroom model is an active learning strategy to increase student participation and achievement(Navin Ganesh, 2021). Research conducted by Karaoğlan Yılmaz it was concluded that the mobile-based Flipped Classroom was recommended to be used to help increase student engagement and motivation (Karaoğlan Yılmaz, 2022). When comparing the FCM to the conventional face-to-face approach, students' composite levels of motivation showed a statistically significant difference, with the self-efficacy subscale showing the only statistically significant change (Dixon & Wendt, 2021). It has been claimed that to expand the number of science degrees conferred by higher education institutions, empirically supported teaching strategies that boost learner engagement are essential.

RQ 3: what are the research gaps in the existing literature?

The purpose of this Systematic Literature Review is to identify learning designs using the Flipped Classroom model to improve learning outcomes and student participation and identify existing gaps. In this part of the study, researchers compared various literature in various countries, methods, and years and analyzed aspects that had not been present in previous studies.

Based on the researcher's analysis, the number of articles that focus on the use of the Flipped Classroom method in schools is 1844 articles over 2 years, namely in 2021 and 2022. For research methods, most of the studies used quantitative research methods and conceptual documents. Quantitative methods consist of surveys and quasi-experiments. Meanwhile, qualitative research involves content analysis such as interviews. Based on the analysis of existing studies, there are findings from many authors who focus on primary and secondary education, whereas there are only a few studies that concentrate on universities, but the author only selects studies in schools to be studied. The reason for choosing primary or secondary school students, not higher education, is because Flipped Classroom is effectively used at the school level. This Systematic Literature Review shows that most of the articles are focused on the use of Flipped classrooms to improve student learning outcomes. Other research also concludes that the use of the Flipped Classroom model is to increase student participation during the learning process.

The Flipped Classroom learning model is intended to make learning in class more effective and efficient. The Flipped Classroom model provides what is generally done in class and what is generally done as homework then flipped or swapped. So students outside the classroom study the material before entering class, then when in class students do exercises or discuss or solve problems accompanied by the teacher. In addition, this learning model can make students more active in interacting with teachers. This is supported by the results of research conducted by Malek Jdaitawi (Jdaitawi, 2019) Conclude that Students in the flipped group consider by considered higher levels of self-regulation and social connectivity than those in the standard group, according to an ANOVA study. According to the results, kids who experienced flipped classrooms significantly outperformed their counterparts in the traditional group in terms of self-regulated learning and social connectivity. The outcomes show that the flipped classroom approach can be utilized to encourage independent learning and strengthen students' social connections. Other research also concludes that the Flipped Classroom model is a relatively new teaching strategy that tries to increase student engagement and performance by moving learning outside the classroom through technology (Clark, 2015).

In all areas, humans require technology. Education is one of them. It can be difficult to successfully incorporate technology into learning programs, and schools and instructors in particular must be careful whether so. The analysis that the purpose of the flipped classroom model is to continue to help improve learning outcomes and active participation of students at school even though the learning situation must be carried out outside the classroom. Several countries from the results of this literature research have proven this.

Conclusion

Technological developments in the era of globalization and the Covid 19 pandemic that attacked the world have a direct impact on the quality of education today so cannot be avoided in teaching and learning activities. One of the efforts that can be made to develop the potential of students is through the level of education that can be done in the teaching and learning process, by facilitating and encouraging their learning activities.

The use of Flipped Classroom can be used as a solution to maintain the quality of learning and still have an impact on increasing learning outcomes and active student participation. The author has found various benefits of using the Flipped Classroom method. Therefore, the author suggests future researchers consider other digital-based learning models to be developed. This subject is used to pique interest and inspire learning. Despite this, not all pupils have access to technology, and senior teachers continue to face technical difficulties. As a result, the school has essentially resolved how to solve this issue to help kids and staff. This is so because technology has become essential in this digital age.

The systematic literature review process was based on the quality criteria that have been described and took the PRISMA protocol criteria as a reference. The findings show that the flipped classroom method plays a fairly positive role in learning at school, especially during the Covid 19 pandemic.

Conclusively the success of the Flipped classroom model is influenced by teachers, learning innovations, and technological facilities such as the internet, cell phone etc. which can support learning using the Flipped Classroom model. Future researchers must adopt other models and approaches with various methods to way to increase learning outcomes and

active involvement of students in the learning process using technology so that they can predict active learning for student improvement and education improvement in the world. Recommendations are given based on the gaps that exist in previous studies. Future research should also add new variables such as technological constraints, parental support, or the use of Flipped classrooms to increase student creativity.

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