

# Student Engagement, Motivation, and Active Learning in K–12 Flipped Classrooms: A Systematic Literature Review of Benefits and Strategies

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**Abstract** – Flipped instruction has received attention in K–12 education for the potential to increase student engagement, motivation, and active learning by combining technology and redesign of the teaching and learning process. The purpose of this study is to determine the recent trends and the main findings of literature studies related to flipped classrooms in K-12 education in order to find the most common investigated themes of the studies, the research methods used, and to look at the benefits of flipped classrooms in those. The review was conducted based on the PRISMA 2020 framework to maintain rigor and transparency. The electronic databases including Science Direct, ProQuest and Scopus were reviewed from January 2020 to December 2024 for peer-reviewed articles. Twenty-nine articles were chosen as relevant by content analysis. The results showed that research on the flipped classroom model in K–12 education was a new area of research, with a notable increase in the number of publications in the last five years. The most commonly employed designs were mixed-methods and quantitative. The prevalent topics were student engagement, motivation, and active learning.

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The results of the studies found that the flipped classroom approach is significantly increasing the learning process in terms of interaction, independent work, and active participation in the class. Nevertheless, a lack of studies in the higher secondary school and on several stakeholders (e.g., the parents and school leaders) was underlined. The flipped classroom model presents notable benefits for K–12 education, but further research is needed to explore its challenges, particularly in underrepresented contexts. Practical recommendations for educators to help increase implementation and for further research into the benefits and limitations of this strategy are included.

**Keywords** – Flipped classroom, K-12 education, student engagement, student motivation, active learning.

## 1. Introduction

The flipped classroom concept has gained popularity as a pedagogy in numerous educational institutions worldwide. The fundamental idea behind the flipped classroom approach is to use internet videos or documents to predispose students to the teacher's lectures, freeing up in-class time for problem-solving and active learning. Flipped classroom as described an instructional environment that enables teachers to reach each learner in each class each day to enhance differentiated instruction [1]. It is a comparatively new approach to learning where the materials are pre read prior to the class and can be actually used in class by both the teacher and the student [2]. Moreover, flipped classroom approach is a teaching strategy that reverses a course or subject discipline's traditional lecture and assignment parts [3].

The learning environment in the actual class is to be active, collaborative, and interactive [4]. In the flipped class, direct instruction is moved out of the classroom, often in the form of asynchronous online teaching documents or videos, and the classroom time is made available for active learning activities.

These actions stimulate teacher-student interaction, which is essential for student engagement and motivation in flipped classrooms and, in practice, absolutely inspire student-centered learning [5]. Given the flexibility and the availability of broadband access, digital resources and access to technology, the flipped classroom has garnered much attention and admiration in recent times [6], [7]. Therefore, flipped classroom model offers great flexibility [8] where students can be more active and collaborative in their learning. It is referred to as active learning because it provides students with materials to engage with outside of class [2], [9]. Although the flipped classroom model was first introduced in 2007 [1], it has gained significant traction and widespread adoption in recent years, particularly with the advancement of digital technologies. While it is not entirely “new” in terms of its inception, its implementation continues to evolve, making it a relatively modern and increasingly popular instructional model. This approach enables flexible teaching and learning by incorporating technology to “flip” traditional classroom structures [10]. As a result, it is now being more prominently applied across all levels of education, especially in K–12 settings.

Flipping the classroom involves engaging in application and evaluation tasks throughout the class time, which fosters active learning and creativity [11], [12]. Previous research has shown that flipped teaching improves student learning in a variety of ways [13] increased learner autonomy [14], and improved achievement [15]. Given the benefits, there has been an ongoing scholarly call in recent years for teachers in various fields to use flipped classroom [16], [17]. However, flipped classroom practices play a crucial role in designing and implementing K–12 classrooms by enhancing students’ motivation and engagement [18], [19]. They also have a positive impact on various aspects of students’ active learning, such as improving teacher–student interaction [20], [21]. As a result, this instructional strategy contributes to improved student learning outcomes.

Flipped teaching has recently gained popularity in K-12 grades education with its positive impact [22]. Studies even demonstrate positive outcomes of the flipped classroom model for secondary students [23], [24]. Furthermore, flipped classroom on K-12 education has positive outcomes in science, technology, engineering, and mathematics, as well as English language teaching that involves encouraging students to teach [25]. The flipped classroom model first introduced in 2007 and implemented in K-12 level education to facilitate instruction [1] to the students who were absent and missing essential content.

Colorado high school chemistry teachers Jonathan Bergmann and Aaron Sam were looking for ways to help their students, and thought how to use class time, giving rise to the concept of flipped classroom [26]. They thought that in prior to class, students must watch short instructional videos or read documents [27]. Furthermore, most previous review focuses solely on higher education settings and do not address much the flipped classroom on K-12 education. However, the purpose of this study is to hunt for research on K-12 education that has been undertaken worldwide.

### **1.1. Purpose of Review and Research Questions**

The flipped classroom has sparked scholarly interest, owing to its incorporation of enhanced technologies. As a result, interest in the flipped classroom has full-grown in recent years [28]. However, only a few studies have examined the literature on this emerging strategy to date. These review articles are typically characterized by limited coverage in terms of publication range, learner population, and academic context. Yet, as of 2012, flipped classroom has been considered as a formation for K–12 education. The focus of the present review was to understand how flipped learning activities are employed, how the flipped classroom approach influences the academic achievement of K–12 students, as well as K–12 students’ perception of this emerging pedagogical intervention. Given the voice of teachers and students, combined with what the literature has to say, a review of the broad-strokes goal of the current paper is to specify a flipped classroom model and some guidelines that arise from these possible benefits. With these objectives in mind, the present review is structured around the following questions:

1. *How can student engagement be fostered in a flipped classroom within K–12 education?*
2. *What is the influence of student motivation of flipped classrooms in K-12 education?*
3. *How do teachers ensure active learning in the flipped classroom in K-12 education?*

## **2. Method**

The present study employed a systematic review approach, which is the literature review with clearly stated question based on which are the studies that need to be considered of the existing literature that rationalize the systematic methods [29], [30]. If systematic reviews are performed, results of previous findings may be examined for overall consistency and whether or not they generalize to other areas or samples.

This study follows the PRISMA 2020 guideline that focuses on the means by which authors can assure the transparency and comprehensiveness of systematic reviews. While the text lacks a direct or comprehensive discussion of systematic review methodology, it does provide references to additional resources that may be of interest. In order to aid authors in the reporting of a diverse array of systematic reviews that evaluate the advantages and disadvantages of the PRISMA statement, and its elucidation paper were developed [31], [32].

### 2.1. Identification

A comprehensive search of the most popular and highly regarded electronic databases (Science Direct, ProQuest, and Scopus) for research publications is conducted in order to address this topic. These databases were chosen because it includes the greatest number of education-related studies. The search terms used in the present review were the frequent phases of expressing flipped classroom in K-12 education: (flip\* OR invert\*) AND (learn\* OR class\* OR instruction\*) AND (elementary\* OR secondary\* AND education\*) as well as flipped AND inverted AND learn AND class AND instruction AND elementary AND secondary AND education [2] could thus be included. The search was carried out utilizing several phrases with the Boolean operator “OR, AND”. While conducting the search, a time period was given (the search engine’s entire range is 2020-2024. As planned, high-quality publications were reviewed, with the document type restricted to research articles. The language chosen was 'English.' The last search was conducted on 31 December, 2024. The Table 1 below summarizes the inclusion and exclusion criteria applied in this systematic review.

Table 1. Inclusion and exclusion criteria of this study

| Criteria    | Inclusion                                | Exclusion                                         |
|-------------|------------------------------------------|---------------------------------------------------|
| Language    | English                                  | Studies published in languages other than English |
| Time frame  | January 2020-December 2024               | Document before 2020 and 2024                     |
| Sample      | Primary and secondary                    | Other than the sample                             |
| Publication | Peer-review documents (Research article) | Books, book chapters, editorial, and short papers |
| Database    | Science Direct, ProQuest, and Scopus     | Other databases                                   |
| Discipline  | Any field within K-12 education          | Studies other than K-12 education                 |

### 2.2. Data Collection

The articles were extensively filtered using the advanced search tools available in this database. Initially, in order to obtain pertinent and up-to-date information, articles were refined based on a recent publication date falling within the period of the past 5 years, specifically from 2020 to 2024. To thoroughly analyze each article, the “full text” filter was utilized. Subsequently, in order to guarantee the utmost excellence of the accessible study, publications were further filtered to exclusively encompass those that have undergone peer review. Finally, articles sourced from flipped classroom in K-12 education-specific publications were retained for a final evaluation to ensure their relevance to the topic. This exhaustive search method finally produced several papers for evaluation while simultaneously removing unreliable, irrelevant, or outdated literature.

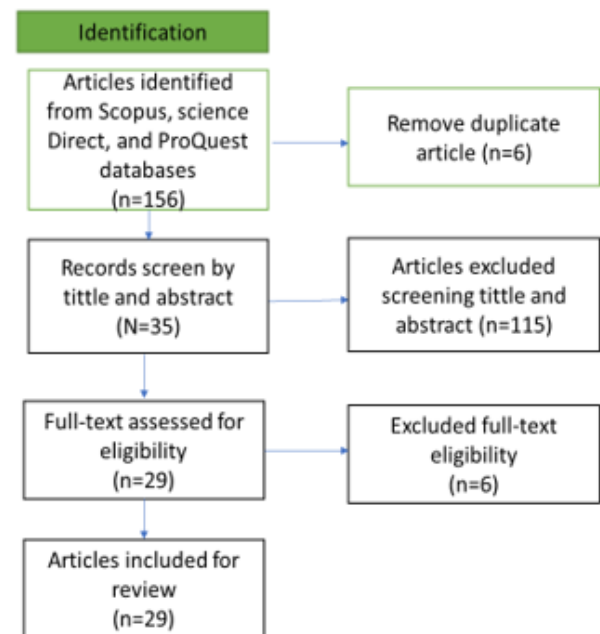


Figure 1. Flowchart of the screening and selection procedure [2], [32]

### 2.3. Data Analysis

All included studies were coded and analyzed as part of the review process for this review. For the analysis, the researchers made use of the content analysis method, usually applied for text analysis, to compare, contrast and categorize the data [8]. Specifically, a data extraction form was developed in Microsoft Word to capture items such as study title, publication year, country, sample size, level of education, research design/methods, and main findings pertaining to the flipped classroom in K-12 education. The form was completed in detail after reading each question carefully.

After filling out the form for each study, the codes and categories were organized for analysis in Microsoft Excel.

For the purpose of identifying the benefit, a reading of all the studies was carried and codes and categories were developed subsequently. A total of 156 articles were retrieved from three databases during the review search (Figure 1). After removing duplicates, 150 articles remained for review. The titles and abstracts of these articles were assessed, and 115 articles were excluded because they were not related to K-12 education or the flipped classroom.

The remaining 35 records were screened for eligibility, and 6 articles were excluded from the study because their full texts were unavailable.

After this process, a total of 29 studies remained for the final review.

### 3. Results

This section analyzed the selected publications to answer the research questions. The review identified recent studies on the flipped classroom and highlighted their practical benefits specifically student engagement, motivation, and active learning in K-12 education. Table 2 provides an overview of prior studies on Flipped Classroom Model (FMC) application, taking a comprehensive perspective.

Table 2. Overview of prior studies on Flipped Classroom Model (FMC) application

| No | Study | Topic                                                                       | Participants: sample size and level of participants                                                                              | Major findings                                                                                                                                                                                             | Study design                                                                                          |
|----|-------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| 1  | [24]  | Mathematics teachers' uses of Flipped pedagogical Model                     | Total number of 73 secondary school mathematics teachers from the Autonomous City of Melilla.                                    | The Flipped Learning paradigm, Project-Based Learning, and Gamification have shown significant beneficial influences on the tested items.                                                                  | Quantitative approach: Quasi-experimental method in questionnaire with 35 questions                   |
| 2  | [33]  | Flipped classroom in the elementary school after pandemic                   | Total 136 students and 3 teachers from elementary school. Students were included in survey and teachers were asked in interview. | Effectively unveiled the experiences and perspectives of educators with respect to flipped classroom.                                                                                                      | Case study accepting both qualitative and quantitative approaches expending with survey and interview |
| 3  | [34]  | Pedagogical integration of Flipped Learning                                 | 9 teachers from nine different schools and total number of 610 students from higher secondary-5 (Grade-11).                      | Students with high academic achievement demonstrated favorable outcomes from a flipped social enquiry learning experience.                                                                                 | Mixed method: quantitative with survey and qualitative with interview                                 |
| 4  | [35]  | Effectiveness of flipped learning with augmented reality                    | The sample consists of 116 secondary level Spanish students.                                                                     | Students valued both educational experiences and motivation. Increased peers' interactions.                                                                                                                | Quantitative quasi-experimental design with questionnaire.                                            |
| 5  | [36]  | Flipped classroom to teach mathematics in online education                  | 113 secondary school students were the sample of the study.                                                                      | Students were generally satisfied with the implementation of the Flipped Classroom methodology.                                                                                                            | A quasi-experimental design was used in this study with questionnaire.                                |
| 6  | [37]  | Gamified interactive e-books improve students' flipped learning performance | 130 students of third grade from primary school.                                                                                 | Students utilised the gamified interactive e-book-based flipped learning and demonstrated superior learning performance compared to the students who utilised the conventional flipped learning technique. | Quantitative: Quasi-experimental method with survey questionnaire                                     |
| 7  | [38]  | Flipped learning with e-learning tools                                      | 98 students from 5 and 6 grade (11-12-year-old). 52 from 6 grade and 46 from 5 grade.                                            | Harmony on the use of e-learning technologies for collaboration and the suitability of learning activities within the student's zone of proximal development.                                              | Case study approach in quantitative methodology with survey questionnaire.                            |
| 8  | [39]  | Flipped Classroom for Lower Secondary Physical Education                    | The sample consists of 284 secondary school students from Spanish PE students. 160 boys and 124 girls.                           | This study discovered that learning volleyball in PE and attending sessions where FC supervised the learning process that improved both students' learning and self-motivation.                            | Quantitative method with survey questionnaire                                                         |
| 9  | [40]  | Flipped Learning: Promoting Self-Regulation                                 | A total of 585 Spanish secondary school students took part.                                                                      | The study found that students who had flipped learning pedagogical experience performed better.                                                                                                            | A quantitative method with quasi experimental, pre-post type research design.                         |

|    |      |                                                                                |                                                                                                                                                             |                                                                                                                                                                                         |                                                                                                                                     |
|----|------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| 10 | [41] | Flipped Learning in boosting student motivation in Physical Education          | 100 students from the 6 <sup>th</sup> grade (11-12 years old) participated in this study, with 45 girls and 55 boys.                                        | There is a noticeable rise in identifiable motivation, introjected motivation, and intrinsic motivation.                                                                                | A mixed method: the qualitative component comes before the quantitative aspect.                                                     |
| 11 | [42] | High school students' perspectives on flipped classroom learning               | 8 students from upper secondary school in Swedish                                                                                                           | Students agreed that they would get used to the new way of working extra and saw educational benefits in watching videos before class.                                                  | Qualitative approach with focus group interview                                                                                     |
| 12 | [43] | Students' perceptions and experiences with the flipped classroom               | 26 students from middle school (8 grade) from Turkey                                                                                                        | Students engaged actively in the lessons, enhanced student-teacher and student-student interactions, and learnt more effectively when they had the support of their peers in the group. | Qualitative approach with focus group interviews, field notes, and semi-structured interviews.                                      |
| 13 | [23] | Students' perception of a math-flipped classroom based on their learning style | 37 secondary school students from Spain.                                                                                                                    | Students' view the Flipped Classroom applications more favourably and anticipate more engagement from their teachers and peers.                                                         | Quantitative approach with questionnaire                                                                                            |
| 14 | [44] | Student Engagement in a Flipped Secondary Mathematics Classroom                | 33 10 <sup>th</sup> grade students (17 female and 16 male) as well as their teachers.                                                                       | Flipped learning approach can benefit mathematics education by increasing students' engagement.                                                                                         | Qualitative approach with case study research design.                                                                               |
| 15 | [45] | Using a flipped classroom in optimizing other teaching methods                 | 77 students from two secondary schools in the city of Tangier, Morocco.                                                                                     | This confirms the positive impact of the flipped classroom on student learning.                                                                                                         | Quantitative approach with semi-experimental design.                                                                                |
| 16 | [46] | Motivating Primary School Students in flipped learning                         | Sample consist of 80 seventh grade female students that is divided into two groups.                                                                         | The students accepted flipped learning since they learnt with fresh tactics that increased their excitement and drive to study more, as well as the variety of activities.              | Quantitative approach                                                                                                               |
| 17 | [47] | Improving Self-Confidence in The Flipped Classroom                             | 410 students for quantitative approach as well as 16 students and 8 teachers for qualitative approach                                                       | Cycle 1 concluded that the flipped classroom approach was ineffectual. In Cycle 2, both teachers and students had much more positive things to say about the flipped classroom.         | Mixed Method: quantitative approaches with the instruments of questionnaire, and Qualitative approach with semi-structure interview |
| 18 | [48] | Teachers and students' readiness to flipped classrooms                         | 745 student participants: 383 from 5 <sup>th</sup> and 362 from 8 <sup>th</sup> grade as well as 233 teachers from 5 different secondary schools in Turkey. | Teachers and their students' technology self-efficacy are positively correlated. Students who have open-minded teachers, more favourable views of the flipped classroom.                | Quantitative approach with questionnaire                                                                                            |
| 19 | [49] | Online flipped classrooms for gifted students using the UTAUT model            | Sample consisted of 170 students from primary, middles and secondary school in from Makka school.                                                           | All of the research hypotheses were supported, and PE had a favourable effect on students' inclinations to utilise OFC.                                                                 | Quantitative approach with questionnaire.                                                                                           |
| 20 | [50] | Inquiry-based flipped classroom scenarios                                      | 18 lesson plans in the first cercle and 19 teachers in the second cercle.                                                                                   | The design heuristic assisted teachers in developing lesson plans for flipped classroom settings that were mainly consistent with the 5E paradigm.                                      | 5E inquiry model-based design heuristic.                                                                                            |
| 21 | [51] | Flipped Learning Methodology in the time of Academic Uncertainty               | Total number of 52 Spanish students from the fourth level of secondary education                                                                            | The results show higher levels of motivation in Twitch execution as compared to its materialisation without the use of this techno-pedagogical supplement.                              | Quantitative approach based on case study using quasi-experimental design                                                           |
| 22 | [52] | Flipped classroom on math performance                                          | The study involved 88 sixth-grade students from a secondary school in mainland China.                                                                       | The proposed flipped classroom approach dramatically enhances students' mathematical learning performance.                                                                              | Mixed method: qualitative thematic analysis and post-test with questionnaire                                                        |

|    |      |                                                             |                                                                                      |                                                                                                                                             |                                                                                                                |
|----|------|-------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| 23 | [53] | Flipped Learning in the Gamification                        | This study carried out with 60 secondary school students                             | Flipped learning improves procedures and results, leading to increased student engagement.                                                  | Quantitative methodology with experimental design                                                              |
| 24 | [54] | Flipped classroom model in science lessons                  | 22 were students chosen from junior high school.                                     | Students are motivated by their interest in the subject, and the school's purpose of socializing is being realized to a great extent.       | Quantitative methodology with statistical analysis                                                             |
| 25 | [55] | Flipped classroom in increasing autonomy and motivation     | Total number of 113 students from secondary education.                               | The study found that students prefer flipped classes and had favorable views towards autonomy, language skills, technology, and motivation. | Mixed method: Quantitative approach with questionnaire and qualitative approach with semi-structure interview. |
| 26 | [56] | Flipped Learning Classroom for Grammar Literacy Development | Total number of 120 male sixth-grade primary ELT students.                           | The findings highlight important pedagogical implications for learners, as well as teachers, curriculum developers, and administrators.     | Quantitative with pre-test and post-test.                                                                      |
| 27 | [57] | Flipped classroom model in high school mathematics classes. | Total number of 67 tenth grade mathematic students.                                  | The study found that both experimental and control groups improved their math achievement scores from pre-test to post-test.                | Quantitative methodology pre-test and post-test.                                                               |
| 28 | [58] | Flipped Classroom Model for Inquiry-Based Learning          | Total number of 5 teachers, 77 students, and 48 parents from primary school context. | The study indicated that teachers, students, and parents reported largely good experiences and perspectives.                                | Qualitative methodology: interview with teachers and FGD with students.                                        |
| 29 | [59] | Elementary teachers' perspective on flipped classrooms      | 153 primary school teachers.                                                         | Applying Nearpod application in flipped classrooms in primary schools that a produced positive result among students.                       | Quantitative methodology with questionnaire                                                                    |

#### 4. Characteristics of Studies

The included studies varied in study design, sample size, period of use of the flipped classroom model, and outcome measures; nonetheless, the majority of them were undertaken at a single institution rather than many centers. As indicated in Table 2, the various FC model has been used in a variety of K-12 education programs. All the studies in this review involved K-12 grade students from different part of the world. However, most of the studies from Spain (n =9), secondly from Turkiye (n=4), and rest of the studies from other part of world like Indonesia, Morocco, Hong Kong, Thailand, Austria, Australia, Latvia, China, Sweden, Greece, Jordan, Cyprus, Ireland and Saudi Arabia.

Among the 29 studies, 18 studies were conducted with quantitative methodology, most of them use quasi-experimental design applying pre-test and post-test. Six (6) studies out of twenty-nine (29) were conducted with mixed method with survey and semi-structured interview and 4 studies were conducted with qualitative methodology. Only 1 study was conducted using 5E inquiry model-based design heuristic.

Total number of 4466 students from K-12 grade were sample of the studies. Most of them from different grades of secondary school and a good number from primary school as well as 430 teachers and 18 lesson plans. The participants also consist of 48 parents.

#### 5. Findings

The results of this integrative review of literature were presented according to the three main inquiry questions that guided the research on benefits and strategies for (1) Student engagement, (2) Student motivation, and (3) Active learning in K-12 flipped classrooms. For each of these thematic clusters, specific sub-themes were represented in the studies, including technology-enhanced collaboration, gamification, and teacher-led strategies for active learning, which included reoccurring characteristics within the studies identified for analysis. It can generally be concluded that both teachers and students, when guided by effective and thoughtful instruction, develop positive feelings toward the flipped classroom approach. Furthermore, engagement strategies and activities still heavily rely on technology, even in face-to-face classroom settings. Finally, the K-12 grade teachers used a variety of low-tech tactics and exercises to successfully engage and motivate students, and encourage successful completion of module, course, and program through effective and active learning. An overview of the examined articles and the results of each study is given in Table 2.

### **5.1. Student Engagement in Flipped Classroom (RQ 1)**

Flipped classroom has the facility to positively impact on student engagement because it gives learners with numerous options in K-12 education [34], [37], [58]. This allowed instructors to engage students in learning activities during in-class sessions. In flipped classroom system, instructors can use low-tech tactics to engage learners and produce favorable outcomes for modules, courses, and programs. It does not take much effort from teachers and can effectively enhance student engagement in completing the required pre-lesson assignments [34]. Even parents think that student engagement should be vigorously fostered [58]. Thus, educators and parents believe that engagement is required for higher performance.

New instructional technologies are constantly being developed, providing opportunities to enhance student engagement in the flipped classroom. Lower-tech strategies also increased student engagement. Student engagement is increased when students make collaboration with peers during the learning process. To understand students' engagement with e-learning tools, students to indicate their level of agreement with specific statements and to evaluate their own engagement when using these tools. Even in face-to-face session in the flipped classrooms, technology heavily influences engagement tactics and activities. Students' learning performance also could be significantly improved by the gamified flipped classroom approach in K-12 education since it increases their learning engagement and gives them more chances to socialize with their peers [37]. Even Near pod used as an effective tool for increasing student engagement, encouraging meaningful interactions, and delivering great educational results as education embraces technology.

The flipped classroom approach effectively increased students' cognitive, emotional, and behavioural engagement, hence improving their learning performance [34, 44]. However, it is significant issue that lack of proper engagement may threaten student achievement and performance in K-12 education [44]. Outcomes of the studies demonstrate that flipped classrooms have a significant impact on student engagement, as evidenced by their time-on-task behavior. It established the design reasoning for activating prior knowledge during the engagement's out-of-class phase, ensuring that the learner engages in scientifically connected inquiry both in and out of class [50], [56]. According to [56], pre-class engagement ensures that students arrive prepared to participate in class activities, hence increasing their efficacy. Furthermore, secondary school students held overwhelmingly positive sentiments of the flipped classroom approach, reporting higher engagement and overall satisfaction with the learning experience.

It was expected that flipped classroom approach would boost students' learning performance in the pre-class stage, hence improving their learning engagement and outcomes in the classroom [37]. Though pre-class and in-class learning activities were implemented differently in these studies.

### **5.2. Student Motivation of Flipped Classrooms in K-12 Education (RQ-2)**

The use of the flipped classroom in learning environments enhanced students' motivation to the studies, and watching recorded videos at their own pace increased learners' motivation too [37], [48]. The flipped classroom appears to set the early stage for students to favorably build their autonomous motivation. The participant students prefer flipped classrooms and have generally positive opinions of them in terms of autonomy, technological attitudes, and motivation. Students who participated in flipped classroom method showed improved motivation and learning [39]. Furthermore, when flipped learning is used, there is a rise in motivation, which implies a significant increase in student motivation [53]. It is deemed adequate to encourage students from early ages, that is, from K-12 education [24]. Thus, motivation is critical to improving student performance.

In relation to extrinsic motivation, students in the flipped learning approach put more value on scoring well in the class, in addition to learning [35]. In the flipped classroom model, intrinsic motivation had a significant increase, implying that the flipped method boosts it [41]. Of particular interest is intrinsic motivation, as the gap between the two educational concepts is smaller in the area of extrinsic motivation. The findings [55] demonstrated that the flipped classroom environment enhanced peer interaction and autonomous learning skills while also enhancing students' intrinsic motivation.

The use of technology boosts motivation in the flipped classroom, which is linked to a greater readiness to learn and, overall, superior proficiency in K-12 education [36]. Even usages of mobile applications that improve students' performance and motivation [51]. According to [36], using ICT tools in a flipped secondary classroom setting improves academic achievement and motivation. A well-planned classroom enhances students' motivation; they study more independently by utilizing technology. Given that the flipped classroom is a technology-based paradigm, teachers play an important role in sustaining motivation, providing advice to students, and encouraging them to take responsibility for their own learning [48]. The study result confirms that gamification can increase students' learning motivation and make studying more appealing [37].

The study [55] indicates that technology-based content in the flipped classroom can lead to enhanced motivation and performance. Their motivation to participate in in-class activities rose when they learnt about the subject beforehand through video lectures.

### **5.3. Students' Active Learning in the Flipped Classroom in K-12 Education (RQ-3)**

Flipped classroom pedagogy allows students to do assignments at home, frees up class time for interactive exercises like group projects, problem-solving, and pair work, which ultimately saves time, and encourages active learning [45]. Flipped classrooms allow students to obtain hands-on learning experience while also building independence and self-motivation, which allows excellently promotes inclusive access to K-12 education [33]. The usefulness of flipped classroom and augmented reality in several aspects of the learning process [35]. To successfully contribute to these students' learning, teachers devote more time to responding to each student's educational requirements using an effective method of content transmission: Self-directed learning, followed by reinforcement and practice. This improves the effectiveness of the contact session by allowing for a more in-depth grasp of the subject covered during the teaching-learning process. The flipped classroom is a successful teaching and learning technique in grades K-12 [39], and studies reveal how flipped classrooms affect students' active learning and motivation, as well as foster cultures from a longitudinal perspective. Students create their own knowledge by participating in active learning activities such as question-and-answer sessions, problem solving, and solo and group studies [57]. Students can access it outside of the classroom to allow for diverse activities and active learning. It was also determined that active learning in the classroom is essential for a flipped classroom, and high-achieving students are always engaged in active learning.

In the flipped classroom, the use of technology brings with it augmented reality, which can contribute its amplitude and benefits to the diverse educational stages where it is used, being a useful and effective instrument in its different applications and formation for EC [51]. Positive-oriented coping strategy, involving problem-focused coping as an active learner-centered approach to flipped learning, is positively related to active coping methods, which are observed as good mental health and well-being comprises. One issue for the flipping learning is that students need to have a good level of self-regulation since their learning outcome on the final is in their hand [40].

The optimal use of learning time in the classroom according to procedure: Web-based active learning environment incorporating video clips, educational flashes, presentations and worksheets that could be prepared in different formats and styles to be used in different ways as learning tools; participants watched the lessons at home before the session [46]. Watching video and taking quizzes allow students to learn actively [54] as well as watching video and taking tests can help students to identify and understood the topics as well as allows to learn actively.

Teachers play a vital and important role in successful implementation of flipped classroom K-12 grade education in enhancing active learning. The flipped classroom concept can only be successfully applied if teachers meticulously plan their instructional materials both in and out of class [43]. Addition is unable to meet its own definition of hip being inclusive, wider and more diverse without specific support. This means that arranging for a minority, such as a course design including how to promote the course to this target group is more conscious [42]. Teacher using classroom time to establish an active, interactive learning environment, with teacher-guided practice and application. According to [52], during in-class learning, the teachers have more options for engagement and could utilize the questioning method to encourage students to learn actively, as well as they encourage student's independence and active participation in learning [59]. Therefore, teacher's role cannot be ignored in the flipped classroom approach, especially for active learning.

## **6. Discussion**

The purpose of this review was to examine the impact of flipped classrooms on students' engagement, motivation, and active learning in K-12 education. The results confirm the impact of flipped learning on these domains, but several valuable insights and implications arose when integrated within educational literature. First, student engagement is related to technology use and the design of classroom interactions. The flipped teaching model places students into the driver's seat of their own course, ahead of class, while providing collaboration amongst peers and teacher support during class. This also, is consonant with [60] who stresses that for enhancing behavioural, affective and cognitive engagement, digital tools are equally critical. Yet even if the benefits are clear, the degree of engagement may be substantially predicated on the quality of the implementation an aspect that future research might be able to measure more systematically.

Regarding student motivation, the review supports previous research [61], [62] that suggested that flipped classrooms enhance intrinsic motivation by promoting self-regulated learning and boosting autonomy. Motivation was also seemingly affected by the newness and the variety of tools whether gamified tasks or recorded lectures. Nevertheless, in many of the studies, the line between short-term motivational (interest) and long-term academically motivated (commonly described in the literature as academic motivation) was somewhat blurred which might be a concern that should be further explored. Third, active learning is promoted within the flipped model due to structured pre-class work and taught in-class. Our results correspond with those of [63], [64] reinforcing the role of teacher design in the mediation of participation, problem solving, and co-operation. This benefit, however, presupposes a particular degree of digital literacy and access, which may not be uniformly distributed in schools or regions, but was not explicitly discussed in most of the studies reviewed.

Teachers' role was particularly central in this method, however, was not made explicated in all reports. Teachers who organized their lectures well, gave support for pre-lecture learning and encouraged in-class discussion were seen to better enhance engagement and learning. This underscores that implementers may benefit from professional development specific to flipped instruction. In addition, the vast majority of studies reviewed were concentrated in primary and junior secondary settings, with limited studies at the upper secondary level or with parents and school leaders. This is a major void in the literature, particularly given the impact that school culture and home encouragement can have on the effectiveness of the flipped classroom.

Ultimately, while this review contributes to a growing body of evidence in support of the flipped classroom in K–12 education, it also calls to mind concerns surrounding equity, long-term effects, and implementation concerns. Access to technology, inadequate training for teachers, and varying levels of readiness among students for self-directed learning are challenges that need to be addressed through planning and policy direction.

## 7. Limitations and Recommendation

This systematic literature review has a few limitations that should be acknowledged. First, the study is limited by its exclusive focus on peer-reviewed articles published between 2020 and 2024, which may have excluded relevant studies published outside this time frame. Second, only three databases, Science Direct, ProQuest, and Scopus, were used for data collection, which may limit the comprehensiveness of the review.

Third, this review did not include grey literature, such as dissertations or reports, which might offer additional insights into flipped classroom practices in K–12 education. Finally, while the study categorizes findings according to key themes, the analysis is dependent on the level of detail provided in the original studies, which may limit the depth of interpretation.

In this study, the benefits of the flipped classroom model in K-12 educational environments were investigated. The methodology is empirically more efficient when the number of issues and the context are broadened, and calls for further works. Further studies should consider the effect of flipped classrooms in other educational settings, such as colleges, training, and professional development and, vocational/technical education, where the expectations of the educator(s) and students may differ. This research focused on the tools and technology used for K-12 education. Such work might investigate how changes in classroom technology are shaped by various factors, including pedagogical research, technology innovations, student and teacher needs. The report did not look at the deployment of technologies of the future, such as augmented reality, and artificial intelligence in schools. Future research might examine how such technologies affect student involvement and success.

The purpose of this paper was to investigate the short-term effects of using flipped classrooms in K-12 education. It is unclear what effect this will have on student learning, achievement, and retention in the long-term. Schools should provide teachers with more support and resources to record their own videos, loosening restrictions. Collaborative, teacher professional development on flipped learning is a joint pain that can turn into a gain by having families and schools work together in implementing flipped learning effectively. Collaboration among schools, including feeder schools, can improve student self-regulation and prepare them for middle school. Additionally, flipped learning communities of practice can be strengthened. School professional development policies should prioritize enabling instructors to use technology for teaching and learning, including flipped learning, regardless of faculty. This research suggests that schools should expand their technology policies to incorporate collaborative tools like Google Docs and brainstorming tools to promote peer engagement and critical thinking skills. This may result in more fair classroom interactions increased homework completion, involvement, and effort.

It may wish to search other databases, such as documents from underdeveloped regions of the world and national/institutional theses repositories.

Additional research might examine the effect of educational training of students, parents, school authorities, and the community in the flipped learning process. This could include instruction on effective collaboration, note-taking, and group learning. The study might examine how teachers use the method to ensure student accountability and determine the most effective strategies. Educators must embrace technology to meet the needs of 21st-century learners. Advancements in technology can enable personalized learning for learners and educators alike.

## 8. Conclusion

The research showed that students' attitudes toward flipped classroom were positive, which significantly affected their comprehension. To put it another way, students' experiences and understanding were enhanced by the flipped classroom approach in K-12 education. This study shows that students who attended courses where the learning process was guided by flipped classrooms in primary and secondary education both improved their learning and their level of engagement, motivation, and active and effective learning. The flipped classroom model promoted mastery learning by allowing students to learn at their own space and concentrate on mastering one topic before moving on to more complex topics.

Addressing flipped classroom concept, this study utilizes technology and digital learning materials to provide course content outside of the classroom. Thus, interactions between teachers and students, as well as interactions between peers, were at a high level, resulting in active and effective learning in the flipped classroom in K-12 education settings. Most studies found that using collaborative tools like Google Docs led to increased engagement, enjoyment of learning, and positive relationships between students and teachers. Several studies found that flipped classroom had a favorable impact on student engagement, motivation, and active and effective learning.

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