

# Mapping the First Twenty Years of the Flipped Classroom Model in Primary School Education: A Systematic Review\*

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## Abstract

This systematic review of flipped classrooms examined the trends, purposes, results, and recommendations of relevant research conducted in primary schools. The study evaluated 20 articles that met the eligibility criteria obtained from publications in the Web of Science, ERIC, Scopus, Science Direct, ProQuest Dissertations & Theses Global, TR Index, and Turkey Council of Higher Education Thesis Center databases between 2000 and 2020. The results revealed that the first study on this subject was published in 2014, and although most of the studies were carried out in the fourth grade, no studies were found with first-grade students. The studies were mostly conducted in the fields of language and mathematics education. The results also revealed that videos prepared by the researcher-teacher were mostly used as digital learning materials, and that content sharing was predominantly used in online environments. The most frequently examined purpose in the studies was academic achievement, followed by students' and parents' opinions. In these studies, the use of flipped classrooms positively affected the academic achievement of primary school students. Furthermore, offering fun learning and increasing student-student interaction were the common positive results. The most common negative results were that students needed parental support in extracurricular processes, that preparing and finding digital learning materials was a workload for teachers, and that parents had various concerns. The prominent suggestions made in these studies were long-term studies, parents' education, and cooperation with parents.

## Keywords:

Flipped Classroom, Primary School, Systematic Review, Blended Learning



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## Introduction

The interest in the flipped classroom (FC), which emerged as a concept in 2000 (Baker, 2000; Lage et al., 2000), continues to increase (Ağırman & Ercoşkun, 2022). The pervasive employment of technology and student-centered and active learning are effective in fostering this model. As seen in Figure 1, FC is a teaching model within the hybrid zone of blended learning between distance and face-to-face

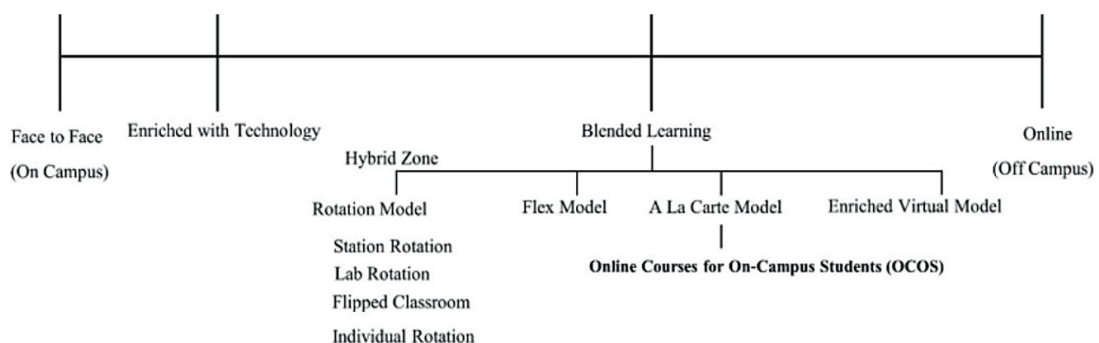
education. (Üstün et al., 2024). With FC, which is a type of blended learning model, students learn the basic and theoretical parts of a subject with the assistance of educational technologies outside of class time (Bergmann & Sams, 2012; Horn & Staker, 2015). Teachers become engaged in higher-level activities such as in-depth discussions, experiments, and problem-solving with students who come to class knowing the subject to a significant extent (Baker, 2000; Lage et al., 2000). The purpose of this model is to prevent class time from the content that is appropriate for individual learning. In this way, it is possible to use the lesson for higher-level instructional activities that require teacher guidance (Lage et al., 2000; Zownorega, 2013). Thus, teachers and students have the opportunity to use the classroom more effectively.

FC has several benefits in addition to creating time for an active learning environment. This model provides a learning environment appropriate for the students' learning style and individual pace (Lage et al., 2000), and it can be useful for students who may miss some lessons for some reason and then do not have the opportunity to relearn from the teacher with all the details (Bergmann & Sams, 2012). According to the results of relevant systematic reviews and meta-analyses, this model was found to increase academic achievement in the majority of studies (Chen et al., 2018; Fornons & Palau, 2021; Talan & Batdi, 2020; Tatal & Yazar, 2021; Zhang et al., 2021).

Research findings have shown that FC increases students' motivation (Abeysekera & Dawson, 2015; Zainuddin et al., 2019) and self-efficacy beliefs (Enfield, 2013), reduces the cognitive load in the learning process (Turan & Gökteş, 2016), reduces anxiety levels (Abdullah et al., 2021; Chen & Hwang, 2020), increases positive attitudes toward learning content (González Gómez et al., 2017; Yılmaz, 2017), and assists in permanent learning (Boyraz & Ocak, 2017; Tatal & Yazar, 2021). The opinions of those who implemented and participated in this model at different levels and areas of the educational process are predominantly positive (Cilliers & Pylman, 2020; Gao & Hew, 2021; Li

& Jiang, 2017; Nayci, 2017). The barriers to overcome in FC are categorized under four headings: "Flipping Your Thinking", "Technological Barriers", "Finding the Time" and "Training Students, Parents, and Yourself" (Bergmann & Sams, 2015). FC is the first and foremost method that requires the use of technology and may be a problem for teachers and students who do not have the necessary facilities and competencies (Touchton, 2015; Tully, 2014). Even with the necessary competencies, according to Enfield (2013), teachers spend considerable time preparing lesson videos and finding materials to present rich content. Checking whether students watch the course content, the possibility of the presence of students who may have not watched the videos (Bergmann & Sams, 2012), and the lack of opportunities for learners who have not understood the course content in the FC model (Enfield, 2013) are considered limitations. However, Bergmann and Sams (2012, p.13) state that this limitation can be, to a great extent, eliminated by providing students with the habit of taking notes, and these questions can be asked in the lesson. Pengfei and Mingxuan (2015) state that it should not be considered only in terms of spontaneous questions; an example that a student can give during a lecture in the classroom can contribute to the understanding of the course content, and therefore, FC appears to be weak for these situations. Given its strengths and weaknesses together, the FC model is thought to be important to start with which has many benefits compared to conventional teaching in primary school. However, since FC requires individual work habits, it is largely used in classes with older students (Fornons & Palau, 2021; Özbay & Sarıca, 2019; Satparam & Apps, 2022; Wright & Parkı, 2021). The use of FC in primary schools is more recent compared to other educational levels. Moreover, Bergmann and Sams (2015) stated that, due to their young age, primary school students' abilities and educational needs differ from those of students at other educational levels; therefore, the use of FC in primary schools differs in certain aspects from its use at other levels. These differences include teacher training, the use of videos, and the involvement of parents in the process.

**Figure 1.**  
*Blended learning models spectrum (Üstün et al., 2024)*



Primary school students are in “The Concrete Operational Stage”, which is one of Piaget’s cognitive developmental stages (Ginsburg & Opper, 1969). Therefore, learning processes should primarily consist of concrete content. Lessons should include activities in which students are active and learn through doing and experiencing. In addition, primary school is a period in which egocentrism among students decreases and is appropriate for cooperative learning (Erbil & Kocabaş, 2020). FC is suitable for primary school students since it takes simple parts of the subject out of the classroom and makes room for such activities in the classroom. Given that primary school students are currently composed of children in the alpha generation who come into the world intertwined with technology, FC is assumed to be appropriate for primary school (Koç Akran, 2018). According to the opinions of primary school teachers who use FC, this model increases teacher and student interaction in the classroom and transforms the classroom into a place where students become more active (Hultén & Larsson, 2018). With respect to the use of FC in primary school, it can be assumed that students cannot independently study due to their age, and this may become an impediment. Children at this level may have difficulties accessing the internet, subscribing to some internet-based applications, and using some materials alone. However, Yang (2014) stated that these situations, which can be perceived as limitations for primary school students, can be eliminated with parental support. According to Yang, FC gives more responsibility to parents in primary school, and for this reason, parents should monitor, encourage, and

accompany the students as they perform their tasks at home.

### *The purpose of the study*

FC in primary school has some discrepancies from FC at other levels (Bergmann & Sams, 2015). Therefore, the results of research on FC in primary schools are assumed to considerably contribute to researchers and practitioners working on this subject. However, in previous systematic reviews, it was revealed that the research on FC was mostly conducted with students in the older age group, and the research on the use of FC in primary school was limited (Fornons & Palau, 2021; Özbay & Sarıca, 2019; Satparam, & Apps, 2022; Wright & Park, 2021). Although limited, systematic reviews synthesizing these studies provide valuable insights. When the literature was examined, it was found that systematic reviews focusing on FC in primary school (Susanti et al., 2024; Utami et al., 2024) focused on the effects of FC on student learning (Utami et al., 2024), its effects on learning outcomes and its challenges (Susanti et al., 2024). Unlike previous systematic reviews, this study adopts a distinct purpose and methodology.

The aim of this study is to present a systematic review of the first 20 years of literature on this subject by examining the trends, purposes, results, and recommendations of studies conducted in primary schools on FC. In this way, it is aimed to contribute to the field by showing the big picture of the use of FC in primary school (Petticrew & Roberts, 2006). The research questions and relevant categories to be examined are shown in Table 1.

**Table 1.**  
*Research questions and subcategories*

Research questions	Subcategories
RQ1. What are the trends in FC research in primary schools?	Year
	Country
	Method
	Grade
	Lesson
	Number of students
	Implementation time
	Digital learning material
Content sharing platform	
RQ2. What are the purposes of FC research conducted in primary schools?	
RQ3. What are the results of FC research conducted in primary schools?	
RQ4. What are the recommendations of FC research conducted in primary schools?	

## Method

The systematic review method is an unbiased review of the literature on a subject following predetermined criteria and a synthesis of the studies obtained (Newman & Gough, 2020). In systematic reviews, it is important to determine a protocol to ensure the replicability of the research and the verifiability of the results (Grant & Booth, 2009; Mulrow, 1994). In this study, the PRISMA statement was used as the systematic review protocol (Moher et al., 2009).

### Literature Search Process

The concepts that are variations of the FC model and the concept of elementary schools in English and Turkish languages were initially determined through a preliminary search in the Web of Science, ERIC, Scopus, Science Direct, Proquest Dissertations & Theses Global, TR Index, and Turkey Council of Higher Education Thesis Center databases, and the keywords to be used in the database search were determined. The

keywords related to the concepts of primary school and FC were searched in the databases through “and” and “or” boolean operators. The concepts used in the search are given in Table 3.

### Eligibility criteria

The determination of the publications to be included in this research was fulfilled according to the criteria in Table 2.

### Data sources and search strategies

Data were obtained from the Web of Science, ERIC, Scopus, Science Direct, ProQuest Dissertations & Theses Global, TR Index, and Turkey Council of Higher Education Thesis Center databases on January 20, 2021. These databases were selected since they are SSCI-indexed and contain peer-reviewed journals and graduate theses related to education in the Turkish and English languages. An example of the search in English and Turkish is shown in Table 3.

**Table 2.**

#### Inclusion/exclusion criteria

Criteria	Inclusion	Exclusion
Scope of the studies	Flipped classroom research conducted in primary school (first, second, third, and fourth grade/ 6-10 years students)	Flipped classroom research conducted in primary school fifth and sixth grade/ 11-12 years student and other education levels
Document Type	Research articles and theses	Book chapters, technical reports, and proceeding papers.
Article type	Research articles published in peer-reviewed journals.	Reviews, meta-analyses, and conceptual articles
Thesis type	Master and doctoral theses	Others
Databases	Article databases: Web of Science, ERIC, Science Direct, Scopus, and TR Index	Articles published outside of these five databases
	Thesis databases: ProQuest and Turkey Council of Higher Education Thesis Center	Theses published outside of these two databases
Publication date	Until January 20, 2021	Research after January 20, 2021
Language	English and Turkish	Other languages

**Table 3.**

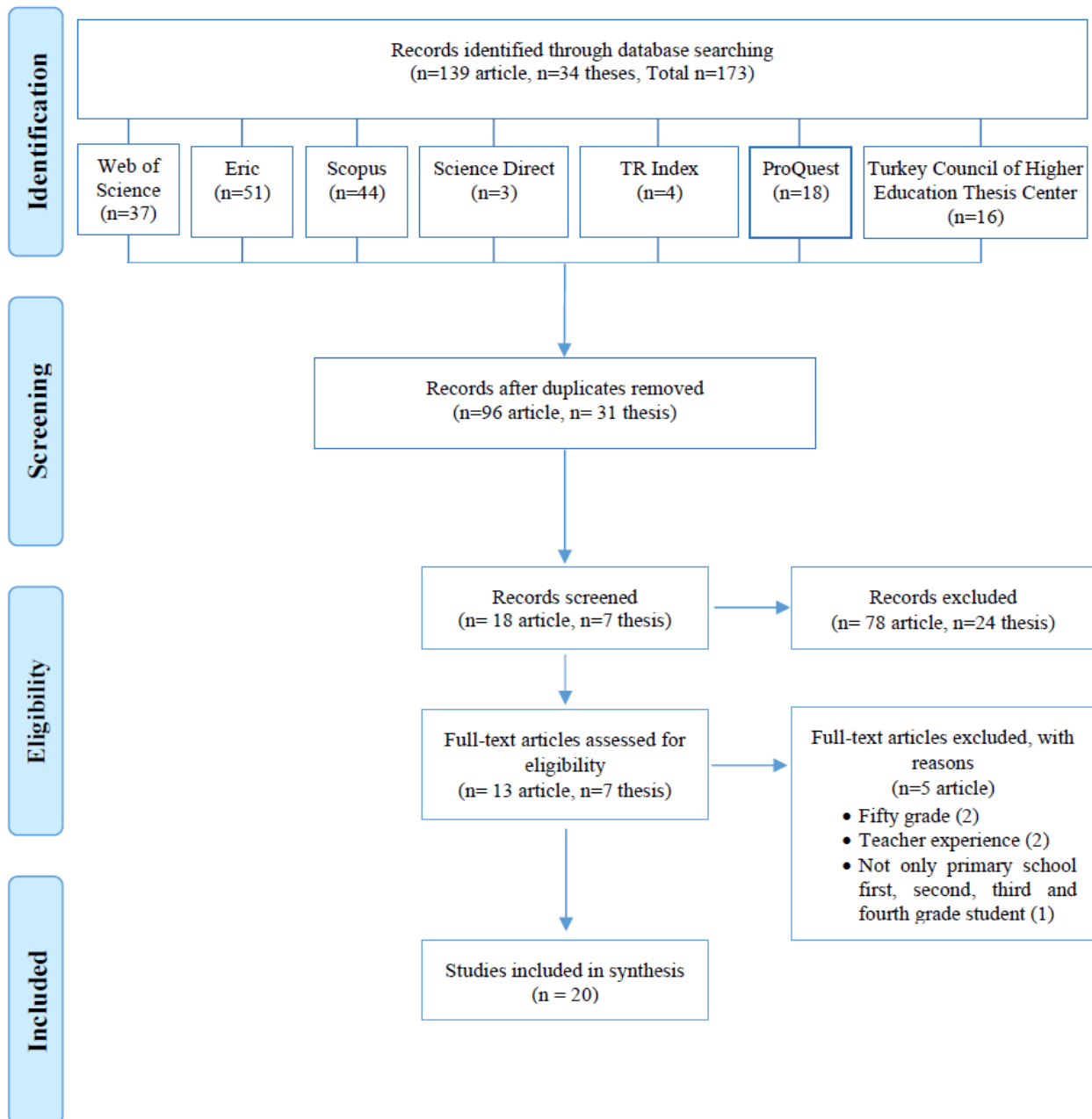
#### Database search strategy

	Search Terms
Database	Web of Science
Search Fields	Topic
Document Type	Article
Languages	English
Database	TR Index
Search Fields	Searches title, abstract and keywords.
Document Type	Article (research article)
Languages	Turkish and English

After the literature was reviewed, 173 publications were obtained from seven databases. Publications with the same author and year were re-examined. The 46 publications identified as duplications were excluded. If an article was derived from a thesis (3 publications), the article was included and the theses were accepted as duplicates. The title, abstract, and keywords of the other 127 publications were read first. The obtained publications were evaluated according to eligibility criteria. Seventy-eight studies of the 102 publications that did not meet these criteria were conducted with students other than primary school first, second, third, and fourth-grade students. Ten studies were conducted with only teachers, and one

study involved other school staff. Three of these studies were conducted with students from upper grades in addition to primary school fourth-grade students. One study was a theoretical article, one study was a meta-analysis, and eight studies were not the focus of this research. The full texts of 25 publications that met the eligibility criteria determined within the scope of the research and 25 publications that did not fully meet the eligibility criteria were read. Five publications did not meet the eligibility criteria. This study was conducted with 20 publications that met the eligibility criteria. The list of publications included in the study is shown in Appendix A. The review procedure is displayed in Figure 2.

**Figure 2.**  
PRISMA flow diagram, based on Moher et al. (2009)



**Data Analysis**

Content analysis was used to analyze the data. The 20 publications identified within the scope of the research were labelled from 1-20. Microsoft Excel was used for coding. The information about the research questions was coded on the opposite side of the relevant publication in the Excel program. One of the researchers coded all the publications twice with an interval of one month. In this way, the accuracy of the coding was checked. The points that could not be clearly coded in the first phase were corrected. The other researcher randomly selected 20% of the publications and independently coded them. The coding agreement between the results was compared. According to Miles and Huberman's (1994) intercoder reliability formula ( $\text{Reliability} = \frac{\text{Agreement}}{\text{Agreement} + \text{Disagreement}}$ ), 97% similarity was found in RQ1, 88% in RQ2, 71% in RQ3 and 73% in RQ4. Given that a value above 70% indicates reliability (Miles & Huberman, 1994), the intercoder agreement for all coding was found to be acceptable (88%). Within the scope of RQ1, while coding regarding the years of the studies, grade level, course, number of students, and content sharing platform information, one-to-one coding was performed in all studies, as information was given. In the studies where sufficient information about the country, method, implementation period, and digital learning material was given, one-to-one coding was performed. In the case of inadequate information obtained regarding the country of the research, the name of the school was used, and the needed information was reached. To prevent any inaccuracies that may arise from school name similarities, coding was performed by checking the country information of the authors, and the schools in the contents were verified. If the method type was not explained, coding was done by determining the research methods, data collection tools, and data

analysis procedures. To code the implementation periods of the studies, only the implementation period of the model within the research process was coded.

For example, if 4 weeks of research implementation were stated as 6 weeks in a research study as the experimental process and 2 weeks as the data collection process, the implementation period of this research was coded as 4 weeks. In the studies in which information about the duration of the application and who prepared the digital learning material used was not clearly explained, the researcher was contacted, and coding was accurately completed. To increase the reliability of the coding, screenshots of some of the interviews with the researchers are shown in Appendix B. Despite these, in cases where clear information could not be reached while coding for RQ1, coding was labelled "not specified". For RQ2, the main aims of the studies and the research questions were formed accordingly; for RQ3, the results, discussion, and conclusion sections of the studies; and for RQ4, the recommendation sections of the studies were coded and analyzed. The codes were then grouped into comprehensive categories according to their similarities. The results of the research are presented in graphs and tables.

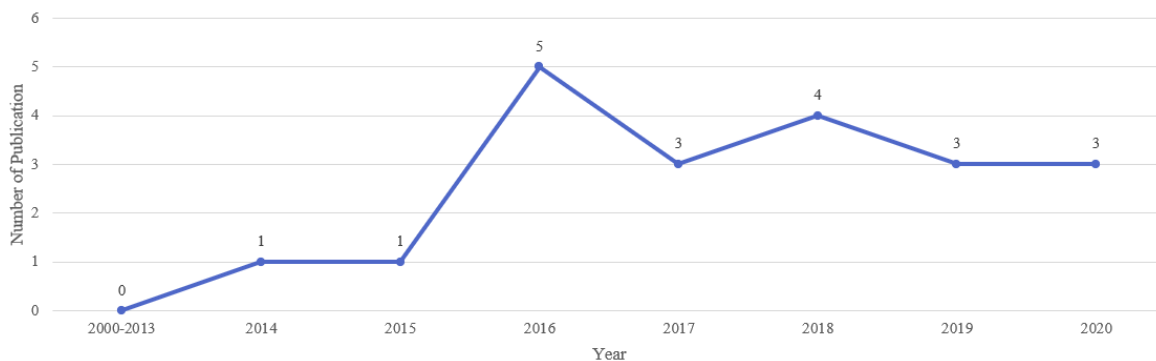
**Results**

*Trends in FC Studies Conducted in Primary School*

*Distribution of the studies according to year*

The distribution of FC research conducted in primary schools by year is shown in Figure 3. The first research on the subject was published in 2014. Most of the publications were published in 2016. Since 2015, the number of studies has increased.

**Figure 3.**  
*Distribution of the studies according to year*



**Distribution of the studies by country**

The distribution of studies according to country is shown in Figure 4. Most of the studies were conducted in Turkey (30%) or the US (30%). This is followed by China (10%), Libya, Malaysia, Romania, Jordan, Taiwan, and Indonesia.

**Distribution of the studies according to methods**

The distribution of studies according to their methods is

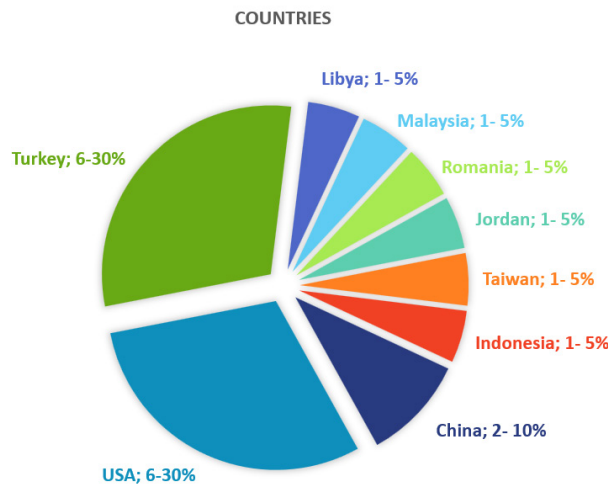
shown in Figure 5. The studies were mostly conducted with quantitative, mixed-methods, action research, and qualitative methods respectively.

**Distribution of the studies according to primary school grade level**

The distribution of the studies according to primary school grade level is shown in Figure 6. Most of the studies were conducted in fourth grade. There were no studies conducted with first-grade students.

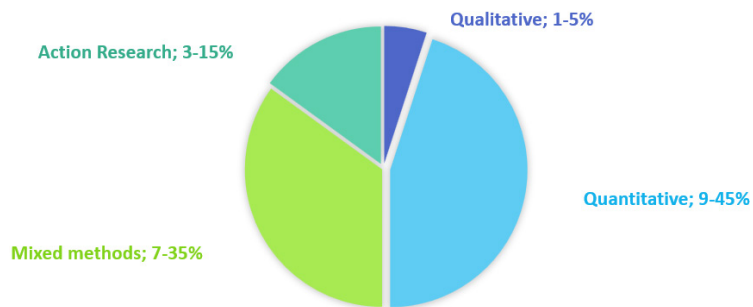
**Figure 4.**

*Distribution of the studies by country*



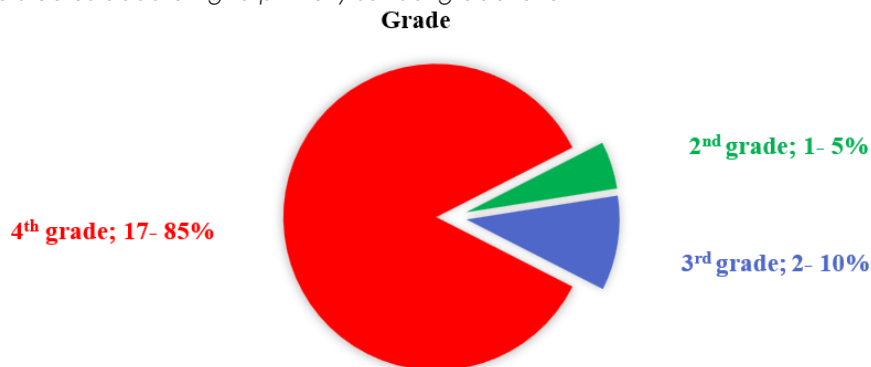
**Figure 5.**

*Distribution of the studies according to methods*



**Figure 6.**

*Distribution of the studies according to primary school grade level*



**Distribution of the studies according to course**

The distribution of the studies according to course is shown in Figure 7. Most research has been conducted in language education followed by mathematics education.

**Distribution of the studies according to number of students**

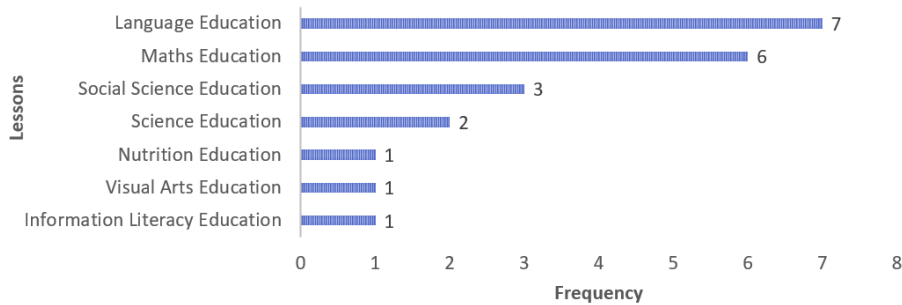
The distribution of the studies according to the number of students participating in the implementation is

shown in Figure 8. It is seen that FC, traditional model, and other FC were used in the studies. FC is mostly conducted with 20-24 students.

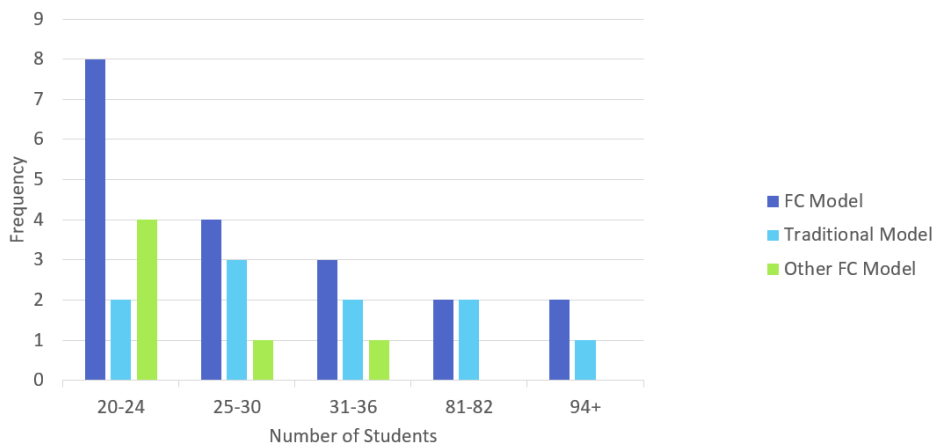
**Distribution of the studies according to the duration of FC implementation**

The distribution of the studies according to the implementation duration of FC is shown in Figure 9. The duration of implementation in the studies lasted between once and 16 weeks. Most of the implementations lasted for 4 weeks.

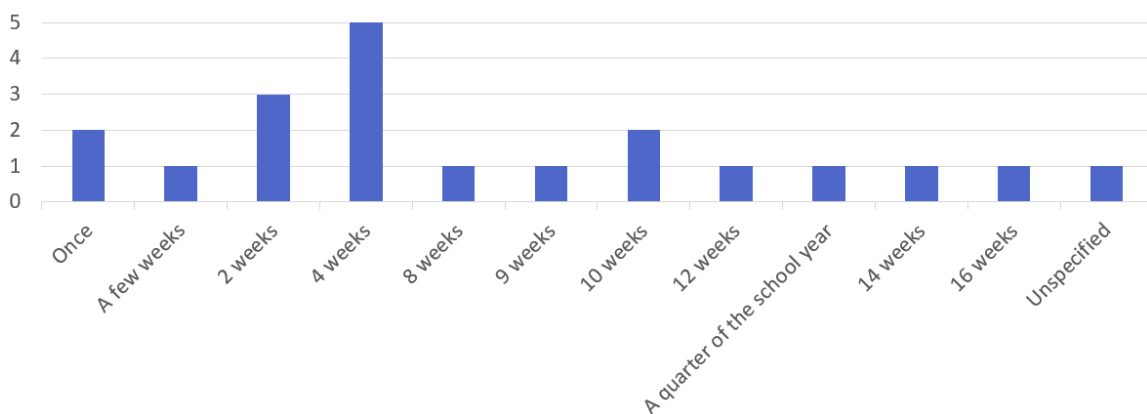
**Figure 7.**  
*Distribution of the studies according to course*



**Figure 8.**  
*Distribution of the studies according to number of students*



**Figure 9.**  
*Distribution of the studies according to the duration of FC implementation*



**Distribution of the digital learning materials used in the studies according to their preparation/selection status**

The distribution of the studies according to the digital learning materials used is shown in Table 4. Videos, e-books, e-learning content, slides, tutorials, animations, and online tasks were used as digital learning materials. These tools were prepared by various people and directly selected from among the ready-made tools. Videos were mostly used as digital learning materials. Among these, the videos prepared by the teacher-researchers were used the most. This was followed by the videos selected from YouTube.

**Distribution of the studies according to content sharing platform**

The distribution of the studies according to content sharing platforms is shown in Figure 10. In these studies, 75% of the content sharing was performed over the internet, 15% was directly uploaded to technological tools, and 10% of the sharing platforms provided no information. Most of the content was shared through websites created by the researchers.

**Table 4.**

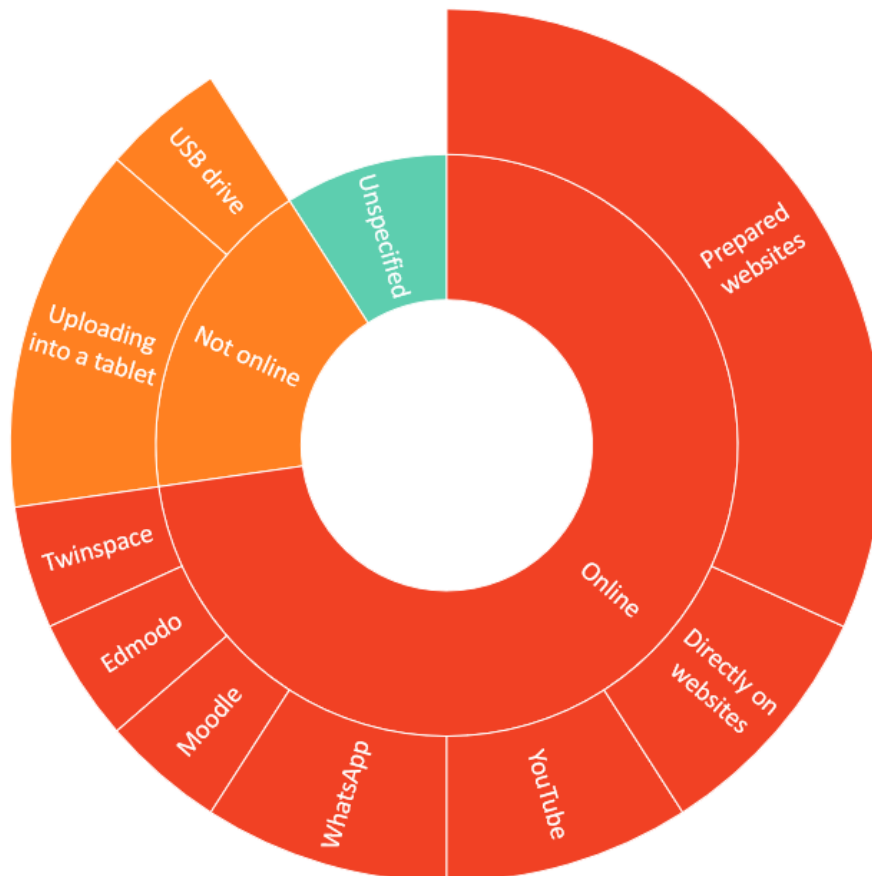
*Distribution of the digital learning materials used in the studies according to their preparation/selection status*

	Prepared by						Selected from		f
	R	T	RT	R&T	T&O	O	YouTube	Other websites	
Video	1		4	1	1	1	3	1	12
e-book		2	1						3
e-learning contents	2								2
Slide		1							1
Tutorial			1						1
Animation	1								1
Online tasks		1							1
f	4	4	5	1	1	1	3	1	

Note. R = researcher; T = teacher; RT = researcher who also teacher; R&T = researcher and teacher; T&O = teacher and others (not researcher or teacher); O = others. e-learning contents includes material that visual, video, listening text, reading text, etc.

**Figure 10.**

*Distribution of the studies according to content sharing platform*



### The Purposes of The Studies

For the purposes of the studies shown in Table 5, in addition to FC, teaching models blended with different teaching models/strategies and labelled "Other FC" were also investigated. In these studies, the effect of the teaching model (FC-Other FC) on the academic achievement of primary school students was most frequently examined (75%). Quantitative methods were preferred in most of these studies. These studies aimed to reveal the effects of FC on academic achievement by comparing conventional models. Whether there was a difference in the results

in terms of gender (10%) and the effect on the retention of learning (5%) were investigated. After academic achievement, the opinions of students (45%), parents (25%), and teachers (15%), and the benefits and difficulties of FC (15%) were frequently examined. These studies also aimed to reveal the effects of the instructional model (FC Model-Other FC Model) on self-efficacy (10%), motivation (10%), self-regulation (5%), and planning skills (5%), student engagement (5%), student behaviors (5%), student satisfaction (5%), applicability (5%) and the use of FC with other instruction (5%).

**Table 5.**

*Purposes of the studies*

Inductive-categories	Sub-categories		Quantitative	Qualitative	Mixed	Action Research	
Academic achievement	FC		P7-P9-P13-P14-P16-P17-P18	P5-P11		P3	
	Comparison of FC and Traditional Model	Gender	P1-P2-P6-P7-P9-P11-P14-P16-P17-P18	P5			
		Retention of learning		P2-P6			
	Other FC	AT-FC		P1			
		R-FC			P5		
		CL-FC		P7			
	Comparison of FC and Other FC	AT-FC		P1			
		R-FC			P5		
		CL-FC		P7			
	Comparison Other FC and Traditional Model	IB-FC		P10			
SR-FC			P12				
CL-FC			P7				
Students' opinions	FC			P5-P8-P14-P17	P4-P11-P15-P18-P20		
Parents' opinions	FC			P8-P14-P17	P4-P11		
Teachers' opinions	FC		P13	P17-P18			
Benefits and challenges	FC			P11		P4-P8	
Self-efficacy	Comparison of FC and Other FC	IB-FC	P10				
		SR-FC	P12				
Motivation	FC		P7-P9				
	Comparison of FC and Traditional Model		P7-P9				
		Other FC	CL-FC	P7			
	Comparison of FC and Other FC	CL-FC	P7				
		Comparison Other FC and Traditional Model	CL-FC	P7			
Planning skills	Comparison of FC, Other FC and Traditional Model	R-FC	P5				
Self-regulation	Comparison of FC and Other FC	SR-FC	P12				
Student engagement	FC					P4	
Student behaviors	FC and Other FC	R-FC		P5			
Student satisfaction	Other FC	AT-FC	P1				
Applicability	FC		P13				
Use of FC with other instructions	Reform-Based Math Instruction			P19			

AT-FC= Adaptive technique in the FC Model (FC Model where different contents are prepared according to student-level differences); R-FC=Revised FC Model (FC Model where videos are watched at school, not at home); CL-FC=Cooperative learning in the FC Model; IB-FC=Interactive E-Book-Based FC Model (FC Model using interactive e-books instead of videos); SR-FC= Self-regulated FC Model (FC Model in which students set their learning objectives before out-of-class learning activities)

**Results of the studies**

*Results of the studies on academic achievement*

The results of the studies on the effect of the teaching model on the academic achievement of primary school students are shown in Table 6. Fifty percent of the studies examined the effect of FC on the academic achievement of primary school students. In all of these studies (100%), FC was found to be effective in improving the academic achievement of primary school students. Compared with the traditional model 55% of the studies examined the impact of FC on academic achievement. In 82% of these studies, FC was more effective than the traditional model; in 18% of these studies, it made no difference. There was no significant difference between the FC and traditional models in terms of gender. In research aiming to reveal its effect on learning retention (5%), FC was significantly more effective than the traditional model was. Fifteen percent of the studies examined the effect of Other FC (AT-FC, R-FC, and CL-FC) on the academic

achievement of primary school students. In all of these studies, Other FC was found to be effective in the academic achievement of primary school students. The results of this research (25%), revealed that the AT-FC, IB-FC, and SR-FC models from Other FC were more effective than the FC model in primary school students although there was no significant difference between them and the R-FC and CL-FC models. In all of the studies (15%) that revealed the effects of Other FC on academic achievement by comparing them with the traditional model, Other FC (AT-FC, R-FC, and CL-FC) was found to be more effective than the traditional model.

As a result, no studies have revealed that the traditional model is more effective than FC or Other FC for primary school students' academic achievement. In other words, FC has positive effects on the academic achievement of primary school students in all the studies examined and is even more effective than the traditional model is.

**Table 6.**

*Results of studies on the effects of teaching models (FC, Other FC, and Traditional Model) on primary school students' academic achievements*

		Effective	No difference
FC	FC	P3-P5-P7-P9-P11-P13-P14-P16-P17-P18	-
	FC	P1-P5-P6-P7-P9-P11-P14-P16-P17	P2-P18
Between FC and Traditional Model	Traditional Model	-	-
	Gender as a variable	-	P2-P6
	Learning retention as a variable	P17	-
Other FC	AT-FC	P1	-
	R-FC	P5	-
	CL-FC	P7	-
Between FC and Other FC	FC	-	-
	AT-FC	P1	-
	R-FC	-	P5
	CL-FC	-	P7
	IB-FC	P10	-
	SR-FC	P12	-
Between Other FC and Traditional Model	Traditional Model	-	-
	AT-FC	P1	-
	R-FC	P5	-
	CL-FC	P7	-

### Results of the studies on students' opinions

Table 7 shows the results of the studies on student opinions. Students had certain opinions on learning, interaction, extracurricular processes (video), classroom activities, personal development, learning environment, and extracurricular processes (short tests). The most frequently mentioned positive student opinion is that the model provides them with effective learning. This is followed by the view that the model provides fun learning and increases student-student

interaction. In addition, the view that the model provides easy learning, supports learning, provides an opportunity to watch the videos again, and encourages active participation in classroom activities was frequently mentioned. The most frequently stated negative opinion is the need for parental support in extracurricular processes. The most frequently mentioned suggestion is to use it in different courses. As a result, students have predominantly positive opinions about FC.

**Table 7.**

*Results of the students' opinions on FC*

	Positive Opinions	Negative Opinions	Suggestions
Learning	Effective (P5-P8-P11-P17-P18-P20) Fun (P5-P8-P11-P14-P20) Easy (P14-P11-P17-P20) Supportive (P11-P14-P17-P18) Permanent (P5-P14-P17) Flexible (P11-P14-P20) Personalized (P17) Active (P14) Effective (P5) Satisfaction (P11)		In different courses (P5-P14) Other issues (P18) In other classes (P14) To friends (P20) Continued use (P20)
Interaction	Student-student (P4-P8-P14-P17-P20) Student-teacher (P14-P20)		
Extracurricular Processes (video)	Replay facility (P11-P14-P17-P20) Enabler of learning (P8-P14-P20) Easy learning (P5-P14-P20) Fun learning (P5-P14) Satisfaction with learning (P15-P20) Preliminary preparation for the course (P14-P17) Learning according to individual pace (P17-P20) Positive attitude toward the course (P14) Permanent learning (P14) Active learning (P11) Willingness to do homework (P8) Developing technology skills (P8) No need for parental support (P15)	Need for parental support (P17-P15-P20) Inability to ask questions (P11-P17) Lack of immediate teacher feedback (P11-P17) Long time (P11-P14) Technological problems (P14-P17) Concerns about technological problems (P17) Fear of making mistakes when working alone (P17) Time-consuming when there are other assignments (P11) Boring (P14) A little homework stress (P11)	Short duration (4-5 min.) (P11) Song at the end of the video (P17) Game orientated studies (P14)
Classroom Activities	Active participation (P4-P8-P14-P17) Fun learning (P4-P5-P8) Enhancing learning (P8-P17) Cooperative learning (P5-P8) Fast learning (P5-P8) Satisfaction (P4-P15) Developing technology skills (P5) Preparing for real life (P11) Reinforcing learning (P5) Easy learning (P17) Instant teacher support (P14) New activities (P5)		
Personal Development	Individual learning skills (P4-P17-P18) Self-management skills (P17-P18) Sense of autonomy (P4-P20) Intrinsic motivation (P4-P20)		
Learning Environment	Silent (P17) Comfortable (P17)	Home environment sounds (P11)	
Extracurricular Processes (Short tests)	Active participation in the lesson (P14) Opportunity for self-assessment (P14) Learning motivation (P14) Ensuring success (P14) Opportunity to correct mislearning (P14)		

### Results of the studies on parents' opinions

Table 8 shows parents' opinions about learning, FC, students', and parents' concerns and suggestions. For positive results, the most frequently mentioned parental opinion is that FC provides effective learning. This is followed by the view that it increases students'

interest in the lesson, reduces homework stress, provides easy learning, and that the model is a tool for students to learn technology. For negative results, FC is assumed to increase parental responsibility and is merely appropriate for students who can work independently. However, parents have predominantly positive opinions about FC.

**Table 8.**

*Results of parents' opinions on FC*

	Positive Opinions	Negative Opinions	Neutral Opinions
Learning	Effective learning (P4-P8-P11-P17) Easy learning (P8-P11) Learning without distractions of the classroom environment (P11) Activities to prepare for the real world (P11)		
Student	Increased interest in the lesson (P4-P8-P14) Reducing homework stress (P4-P11) Improved individual learning skills (P4) Increased responsibility (P17) Increased autonomy (P17) Active while watching a video (P11) Spends more time studying (P14) Cognitive, affective, and psychomotor development (P8) Development of disadvantaged students (P8) A positive experience (P4)	Only suitable for students who can work independently (P11)	
FC	Tool for learning technology (P8-P17) Parents and students' collaborative work (P11) The benefit of pausing and rewatching a video (P11)		
Parent	Reduced responsibility (P14) Reducing homework stress (P4) Digital learning materials enable them to understand what their children are learning (P4) Satisfaction (P8)	Increased responsibility (P14)	No change in responsibility (P14)
Anxiety		Technology addiction (P14) Making studying boring (P14) Increasing student load (P14) Loss of control over their child's learning (P4) New and unfamiliar (P4)	
Suggestions			Practice in specific courses (P14)

### Results of the studies on teachers' opinions

Teachers stated that FC provided effective learning (P13-P17-P18), was applicable in primary schools (P13-P17), and improved students' independent learning skills (P18). With respect to limitations, they mentioned that preparing and finding digital learning materials is a workload for teachers (P17-P18), but working as a team is important in this regard (P18), and despite this difficulty, they recommended the use of FC to diversify teaching (P17). They also suggested that parental support is important (P18) and that students and parents should be informed about FC (P17).

### Results of the studies on the benefits and challenges of FC

Table 9 shows the benefits and challenges of the FC. The most frequently cited benefit is that FC enables students to actively participate in the lesson and improve their collaborative work skills. The most frequently cited challenge is the increase in the teacher's workload. As a whole, FC is seen to have more benefits than challenges.

### Other research results (self-efficacy, motivation, planning skills, self-regulation, student engagement, student behavior, student satisfaction, applicability of FC, use of FC with other instructions)

According to the results of the studies on self-efficacy, the IBFC (P10) and SRFC (P12) from other FCs were found to be significantly more effective than the FC in developing primary school students' self-efficacy.

Given the results of the studies on motivation, FC and CLFC had a similar effect on primary school students' motivation in 5% of the studies and were statistically significantly more effective than the traditional model was (P7); in 5% of the studies, there was no difference within the group and compared with the traditional model (P9). The results of the studies on planning skills, revealed that FC and Other FC were not effective in improving students' planning skills (P5). Other FC (SRFC) was significantly more effective than FC in improving primary school students' self-regulation skills (P12). According to the results of the studies on student participation (P4) and student behaviors (P5), FC and Other FC enabled students to actively participate in out-of-class and in-class processes. With respect to student satisfaction with Other FC (AT-FC), the majority of the students were satisfied with the model; they sought to continue and recommend it to other students (P1). FC was found to be appropriate and applicable for the students given their age (P13). With respect to the use of FC with other instructions, there was a balance between FC and reform-based math instruction, they could be applied together and had positive effects on students' learning (P19).

### Recommendations of The Studies

Table 10 shows the suggestions for researchers, teachers, and administrators regarding the use of FC. The most frequent suggestion was to conduct long-term research for researchers and then provide training and cooperation with parents before the first implementation for teachers.

**Table 9.**  
*The benefits and challenges of FC*

	Benefits	Challenges
For the student	Active participation in the lesson (P4-P8-P11) Improvement in collaborative working skills (P4-P8-P11) Increased motivation toward the course (P4-P8) Learning to be sensitive to individual differences (P8-P11) Increase in higher-level learning activities (P4-P11) Effective use of teacher-guided time (P4-P11) Increase in academic achievement (P4) Improvement in taking responsibility for own learning (P11) Flexible working opportunity (P11) Development of 21st century skills (P11) Helps prepare for the real world (P11) Development of leadership skills (P4) Development of disadvantaged students (P8) Increased achievement of those with reading weakness (P11) Providing peer support (P4) Increase in parent support (P4)	Need for teacher and parent support at the beginning (P4)
For the teacher	Providing opportunities for collaborative activities (P4-P8) Providing opportunities for student-centered activities (P4) Opportunity to be informed about students' learning before class (P4) Ease in classroom management (P8) Providing professional satisfaction (P4)	Increased workload (P4-P11) Difficulty in finding appropriate digital learning materials (P4) Difficulty in preparing appropriate digital learning materials (P11) Disruption of teaching by coming without watching the videos (P11)
Technical aspects	Increased interaction with technology (P8-P11)	Necessity of technological equipment (P11)

**Table 10.**  
*Recommendations of the studies*

Recommendations		Research Codes	
Suggestions for Re- searchers	Research duration	Long-term research	P7-P9-P12-P17-P19
	Working group	Large sample	P9-P12-P17
		Different levels	P6-P9-P14
		Primary school first, second, and third grades	P7
		Schools at different socio-economic levels	P14
	Courses	Courses other than social studies	P5-P7-P14
		Courses other than science	P5-P6
		All courses	P17
	Research Method- ology	Methods other than experimental research	P7-P18
		Experimental research with control group	P11-P13
		Mixed methods	P2
		Pre-test and post-test research for individual student development	P11
	Participants in the research	Longitudinal research	P17
		Involvement of parents in the research process	P14-P20
		Receiving student opinions	P2
		Involvement of all teachers in the school in the research process	P17
	Research topic	Involvement of school administrators in the research process	P20
		Meaning of FC	P2
		Combined use of different learning strategies appropriate with FC	P12
		Impact on affective dimensions of learning	P17
Data collection	Student effort before the lesson	P18	
	Factors affecting student engagement	P19	
LMS	Determining the impact of FC on academic achievement through process evaluation	P5	
	Observation of classroom activities	P18	
Different situations	Investigating the impact on academic achievement and planning skills using online classroom management platforms	P5	
	Impact on learning when applied in offline environments	P11	
	Classes with low motivation toward FC	P17	
Other FC	Students with lower prior knowledge	P13	
	(AT-FC) Impact on students with disabilities	P1	
	(AT-FC) Other subjects in English	P1	
	(AT-FC) Other levels	P1	
	Classrooms where FC and Other FC (R-FC) are effective	P5	

**Table 10.**  
*Continue*

	Recommendations	Research Codes	
Recommendations for teachers	Before the first application	Parents' education	P8-P14-P15-P17
		Piloting	P2-P15
		Identifying content that students can learn at home	P2
		Assessing the willingness of students and parents	P17
		Practical student education	P14
		Planning with the knowledge that preliminary preparation will take time	P11
	Cooperation	Cooperation with parents	P14-P17-P18-P20
		Cooperation with school administration	P20
	Course	English	P17-P18
		Science	P6
		Social studies	P7
		Courses that students can achieve individually	P14
	Video	Being flexible about the watching location	P11-P15
		4-5 minutes long	P11
		Technically and pedagogically adequate	P17
		Remarkable	P17
		Receiving feedback from parents and students for improvement	P17
	Classroom activities	Using digital story and game-based activities	P8-P17
		Preparation for classroom activities	P17
		Providing detailed instructions to students	P8
		Giving students sufficient time	P8
		Giving individual feedback to students	P8
		Use of cooperative and active learning activities	P17
	Teacher training	Providing practical teacher training	P14-P17
		Providing training to prospective teachers	P6
		Receiving practical teacher training	P11
LMS	Accessibility via tablets and computers	P15	
	Having the function of tracking students' participation in the course (Moodle)	P18	
Day	Specific days of the week	P11	
Extracurricular activities	Fun and learning reinforcing activities	P14	
	Online sessions to answer student questions after the video	P17	
Update	Updates to keep interest alive	P17	
Other FC	The combination of reform-based mathematics and FC	P19	
	(R-FC) Deciding on the type of model according to student characteristics	P5	
	(R-FC) Use in schools with students with technological facilities	P5	
	Use of IB-FC	P10	
	Development of an e-book system	P10	
Reducing Workload	Ministry of Education to prepare content suitable for FC	P17	
	Teachers' collaboration in finding and preparing videos	P18	
	Creating blogs where teachers can share materials online	P17	
Recommendations for administrators	Supports	Providing technological equipment	P6
		Supporting the use of FC	P11
		Providing technical support	P14

LMS\*Learning management system

## Discussion, Conclusion, and Recommendations

To identify the current situation, uncertainties, and gaps, a systematic review of research on the use of FC in primary schools encompassing the trends, aims, results, and recommendations of the studies was conducted. Although the emergence of FC occurred in the 2000s, research on its use in primary schools started in 2014 and continues. Notably, the majority of the studies were conducted with fourth-grade students, and no studies were conducted with first-grade students. The tendency of researchers to use FC in older age groups (Bond, 2020; Fornons & Palau, 2021; Özbay & Sarıca, 2019; Satparam & Apps, 2022; Wright & Parki, 2021) is also valid in primary school. There is a significant gap in the field in terms of its applicability, particularly for first-grade students, who need more teacher-guided activities. Another tendency of the research was to examine the effects of the model in language education and mathematics lessons. Examining the applicability of the model in the classes and whether it is worth implementing is assumed to contribute to the field. In these studies, FC was mostly implemented for four weeks, and the results were evaluated. It is thought that making evaluations after longer implementations, particularly to determine the real effects of a new model, will reveal better results (Rodrigues et al., 2022; Stoa & Chu, 2023). The possibility that FC may attract the attention of primary school students as a new approach should be taken into consideration. In these studies, the videos prepared by classroom teachers were the most frequently used digital learning materials. The results are similar to those of systematic review studies focusing on the K-12 education level (Bond, 2020; Satparam & Apps, 2022) and primary school (Susanti et al., 2024). Although Bond (2020) revealed that teacher-created videos increase the likelihood of completing tasks and ensuring participation, the possibility that teachers may not have found digital learning materials suitable for their students' ages may have led them to prepare their own materials. It was also determined that 75% of the digital learning materials were shared in online environments and that 15% were shared through nononline tools. This result is expected to encourage classroom teachers who do not have the opportunity to share content in online settings and who are encouraged to use FC.

Among the online tools, content sharing is mostly performed through websites created by researchers. In contrast to the preference for LMSs, which are widely known in the use of FC in adult education, researchers who prepare websites in primary schools consider the situation of the unavailability of LMSs appropriate for the level of primary school students and the needs of teachers. Therefore, digital learning materials and LMSs appropriate for primary school students can be developed. It is thought that this situation will also

contribute to distance education processes in primary school. This may also be a solution to the limitations of the studies which are often highlighted as "preparing and finding digital learning materials is a workload for the teachers" and "increase in the teachers' workload" within the scope of difficulties.

Given the aims and results of these studies, the effects of FC on academic achievement were mostly examined, and FC had positive effects on the academic achievement of primary school students in all of them. These studies revealed that the effect of FC on academic achievement was greater than that of the traditional model; however, in a few studies, no statistically significant difference between these two models was found. Therefore, the use of FC in primary school was more effective than the traditional model in terms of academic achievement. The results are compatible with and complementary to those of meta-analyses and systematic review studies conducted at primary school and other education levels. According to the results of systematic reviews and meta-analyses, the model increases academic achievement in the majority of studies (Chen et al., 2018; Çiftçi Seyhan et al., 2022; Fornons & Palau, 2021; Susanti et al., 2024; Talan & Batdi, 2020; Tural & Author, 2021; Utami et al., 2024; Zhang et al., 2021), and a systematic review conducted with only quantitative studies revealed that FC is as effective as other teaching methods in terms of academic success (Galindo-Dominguez, 2021).

Although the effect of FC on academic achievement is frequently examined in studies, only one study has investigated its effect on learning retention. Therefore, researching the effect of FC on the retention of learning is recommended.

Following academic achievement, students, parents, and teachers' opinions about FC, with the aim of revealing the benefits and difficulties of FC, have been frequently examined. Given these results, the model provided effective learning, as the most frequently mentioned opinion students, teachers, and parents had. FC provided fun learning, increased student-student interaction, increased students' interest in the lesson, provided active participation, and improved collaborative working skills. The most common negative results were the need for parental support in extracurricular processes for students, various concerns for parents, and the workload of preparing and finding digital learning materials for teachers. There were considerably fewer negative results regarding FC than positive results. The results are similar to those of systematic review studies examining primary school (Susanti et al., 2024), K-12 (Satparam & Apps, 2022) and different levels of education (Akçayır & Akçayır, 2018; Shnai, 2017) and it is assumed that these results are contributory. Considering that all

of the negative results, although few, are caused by the extracurricular processes of FC, it is thought that improvements in these points will also improve the asynchronous processes of distance education in primary school because the reasons why primary school teachers prefer face-to-face education compared to distance education are similar to these reasons (Aktay & Keser, 2023).

In addition to conventional FC, studies have been conducted on the use of Other FC models in primary schools. According to the results of these studies, the FC and Other FC models were found to be effective in improving students' self-efficacy and self-regulation skills. Although the model improved students' planning skills according to the qualitative results, the model did not affect the quantitative results. Similarly, the research results regarding the effects of FC on primary school students' motivation are quite limited and differ from each other. To overcome the uncertainty of these issues, further studies on the effects of FC on students' planning skills and motivation are recommended. In addition, the fact that the FC enabled students to actively participate in in-class and out-of-class activities led to the consideration that it was an age-appropriate and applicable model for students. The most common suggestion in these studies was to conduct long-term research to provide parents with education and cooperation before the first implementation.

Given the findings of the current research, although research on the use of FC in primary schools is limited, it can be said that FC in primary schools is an effective teaching model for primary school students and has many contributions despite some limitations. For this reason, increasing the number of studies on the use of FC in primary schools and using the model in primary schools by making some necessary arrangements are strongly recommended. Based on this result, it can be said that since FC is a blended learning model and contains asynchronous processes of distance education in itself, the research results offer important implications for distance education processes that are widely used in primary schools in critical situations such as pandemic.

### Limitations

The current study is limited to research in which the FC model is conducted with students in the first, second, third, and fourth grades of primary schools. In addition, since the researchers were proficient in English and Turkish, the research was limited to publications in these two languages. The inclusion of publications in different languages may have affected the results.

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## Appendices

## Appendix A. List of Publications Included in the Study

Publication Code	Publication
P1	Ahmed, A. A. A. (2017). An adaptive educational model for flipped classroom (Publication No. 490287) [Master's thesis, Atılım University-Ankara]. Turkey Council of Higher Education Thesis Center.
P2	Cashin, M. (2016). The effect of flipped classrooms on elementary students' reading scores (Publication No. 10242069) [Doctoral dissertation, Northcentral University-Arizona]. ProQuest Dissertations & Theses Global.
P3	Crişan, G.I., & Albuşescu, I. (2018). Approaching landscapes in fine arts, with young schoolchildren, through flipped classroom strategy. Applications within the context of e-twinning projects. <i>Romanian Review of Geographical Education</i> , 7(1), 5-19. <a href="https://doi.org/10.23741/RRGE120181">https://doi.org/10.23741/RRGE120181</a> .
P4	D'addato, M., & Miller, L. R. (2016). An inquiry into flipped learning in fourth grade math instruction. <i>Canadian Journal of Action Research</i> , 17(2), 33-55. <a href="https://doi.org/10.33524/cjar.v17i2.261">https://doi.org/10.33524/cjar.v17i2.261</a> .
P5	Güven Demir, E. (2018). Ters yüz sınıf modeline dayalı uygulamaların ilkökul 4. Sınıf öğrencilerinin akademik başarı ve planlama becerilerine etkisi (Publication No. 519317) [Doctoral dissertation, Ondokuz Mayıs University-Samsun]. Turkey Council of Higher Education Thesis Center.
P6	Elian, S. A., & Hamaidi, D. A. (2018). The effect of using flipped classroom strategy on the academic achievement of fourth grade students in Jordan. <i>International Journal of Emerging Technologies in Learning</i> , 13(2), 110-125. <a href="https://doi.org/10.3991/ijet.v13i02.7816">https://doi.org/10.3991/ijet.v13i02.7816</a> .
P7	Erbil, D. G., & Kocabaş, A. (2020). Flipping the 4th grade social studies course in a cooperative way: Effects on academic achievement and motivation. <i>Studies in Educational Evaluation</i> , 66, 1-12. <a href="https://doi.org/10.1016/j.stueduc.2020.100878">https://doi.org/10.1016/j.stueduc.2020.100878</a> .
P8	Girmen, P., & Kaya, M. F. (2019). Using the flipped classroom model in the development of basic language skills and enriching activities: Digital stories and games. <i>International Journal of Instruction</i> , 12(1), 555-572. <a href="https://doi.org/10.29333/iji.2019.12i36a">https://doi.org/10.29333/iji.2019.12i36a</a> .
P9	Gökdaş, İ., & Gürsoy, S. (2018). The effect of flipped classroom model on academic achievement and motivation in mathematics course in primary schools. <i>Mediterranean Journal of Educational Research</i> 12(26), 159-174. <a href="https://doi.org/10.29329/mjer.2018.172.9">https://doi.org/10.29329/mjer.2018.172.9</a> .
P10	Hwang, G. J., & Lai, C. L. (2017). Facilitating and bridging out-of-class and in-class learning: An interactive e-bookbased flipped learning approach for math courses. <i>Educational Technology &amp; Society</i> , 20(1), 184-197. <a href="https://www.jstor.org/stable/10.2307/jeductechsoci.20.1.184">https://www.jstor.org/stable/10.2307/jeductechsoci.20.1.184</a> .
P11	Kinderman, K. A. (2015). The flipped classroom: An alternative to teaching models in an elementary classroom scores (Publication No. 10019483) [Master's Thesis, The Art of Education University-Osage]. ProQuest Dissertations & Theses Global.
P12	Lai, C. L., & Hwang, G. J. (2016). A self-regulated flipped classroom approach to improving students' learning performance in a mathematics course. <i>Computers &amp; Education</i> , 100, 126-140. <a href="https://doi.org/10.1016/j.compedu.2016.05.006">https://doi.org/10.1016/j.compedu.2016.05.006</a> .
P13	McEvoy, C. S., Cantore, K. M., Denlinger, L. N., Schleich, M. A., Stevens, N. M., Swavely, S. C., Odom, A. A., & Novick, M. B. (2016). Use of medical students in a flipped classroom programme in nutrition education for fourthgrade school students. <i>Health Education Journal</i> , 75(1), 38-46. <a href="https://doi.org/10.1177/0017896914561879">https://doi.org/10.1177/0017896914561879</a> .
P14	Nayci, Ö. (2017). The evaluation of implementation of flipped class model in the teaching of social studies (Publication No. 481748) [Doctoral dissertation, Ankara University-Ankara]. Turkey Council of Higher Education Thesis Center.
P15	Smith, D. (2016). Lessons learned from designing flipped lessons for fourth grade students: Implications for school librarians. <i>Library Hi Tech News</i> , 8, 19-23. <a href="https://doi.org/10.1108/LHTN-08-2016-0037">https://doi.org/10.1108/LHTN-08-2016-0037</a> .
P16	Sukasih, S., Zamzani, & Haryanto. (2019). The effect of the Flipped Classroom Model on the language skills of primary school students. <i>International Journal of Innovation, Creativity and Change</i> , 5(3), 1-19.
P17	Şık, P. (2019). The effect of flipped classroom on young learners' vocabulary learning in primary elt classrooms (Publication No. 594862) [Master's Thesis, Çanakkale Onsekiz Mart University-Çanakkale]. Turkey Council of Higher Education Thesis Center.
P18	Yang, C. C. R., & Chen, Y. (2020). Implementing the flipped classroom approach in primary English classrooms in China. <i>Education and Information Technologies</i> , 25, 1217-1235. <a href="https://doi.org/10.1007/s10639-019-10012-6">https://doi.org/10.1007/s10639-019-10012-6</a> .
P19	Young, L. L., (2014). Online Student Discussions in a Blended Learning Classroom: Reconciling Conflicts Between a Flipped Instruction Model and Reform-Based Mathematics (Publication No. 28103590) [Master's Thesis, Brigham Young University -Provo]. ProQuest Dissertations & Theses Global.
P20	Zakaria, S., & Yunus, M. M. (2020). Flipped classroom in improving ESL primary students' tenses learning. <i>International Journal of English Language and Literature Studies</i> , 9(3), 151-160. <a href="https://doi.org/10.18488/journal.23.2020.93.151.160">https://doi.org/10.18488/journal.23.2020.93.151.160</a> .

Appendix B. A screenshot of the interviews conducted with the researchers to increase the reliability of the coding

