

## Self-Regulated Learning Behaviors of Pre-School Teacher Candidates in Flipped Learning

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### Abstract

The aim of the study is to examine pre-school teacher candidates' self-regulated learning practices in a flipped learning environment and to explore the educational factors in flipped learning influencing pre-school teacher candidates' self-regulation skills development process. This study examines how pre-school teacher candidates use self-regulation strategies during the implementation of flipped learning. This case study was carried in the fall semester of the 2022-2023 academic year with 55 first-year Early Childhood Education department teacher candidates. A structured interview form was used as a data collection tool and the data of the research is composed of pre-school teacher candidates answers to the interview form consisting of open-ended questions. The data were analyzed by thematic analysis method. The study would shed light on how the results may be used to flipped learning approaches for teaching and learning.

**Keywords:** Self-Regulated Learning, Pre-School Teacher Candidates, Flipped Learning

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## Introduction

Faculty members at the universities have recently given flipped learning a lot of attention in an effort to improve the quality of teaching and learning in higher education (Awidi & Paynter, 2019; Murillo-Zamorano et al., 2019). It is a proper decision considering 21st century learner characteristics as they need to be actively involved in the learning process and education practices should be evaluated and updated in light of the knowledge and characteristics of the students. In addition, according to studies on higher education, it's important for students to be in charge of their own learning processes and actively engage in educational activities (Hannafin et al., 1997). Unlike in traditional classes, where students listen and take notes while the teacher tells the lesson, flipped learning strategies can support the learning process of the students of the modern era. In a flipped learning environment, the theoretical part of the lesson is performed outside of class, while the practical part is finished in class (Hwang et al., 2015).

The Flipped Learning Network [FLN] (2014) defined "Flipped Learning" as learning when the teacher serves as a guide and the student is free to discover the content. According to Bretzmann (2013), Flipped learning is the process of ensuring that students are prepared to learn the material by watching videos at home and then engaging in activities connected to these subjects in the classroom. Thus, the flipped model creates a flexible and student-centered learning environment. In the classroom, the flipped learning model offers greater chances for practice, direction, collaboration, and interdisciplinary study (Roehl et al., 2013; Strayer, 2012). According to the model, the flipped classrooms facilitate learning and increase permanency while allowing students to go at their own speed (Turan & Göktaş 2015). It allows students to learn at their own pace, as well as gives them opportunity to re-access the content. In addition, flipped learning has a positive effect in terms of communication and interpersonal interaction (Bishop & Verleger 2013; Kim et al., 2014). In conclusion, flipped learning aims to enhance students' success, provide a more effective learning experience, and encourage active learning. These skills are also closely related to self-regulated learning processes. In both cases, student-centered learning, independence, personalization of learning processes, and interactive learning experiences are integral components.

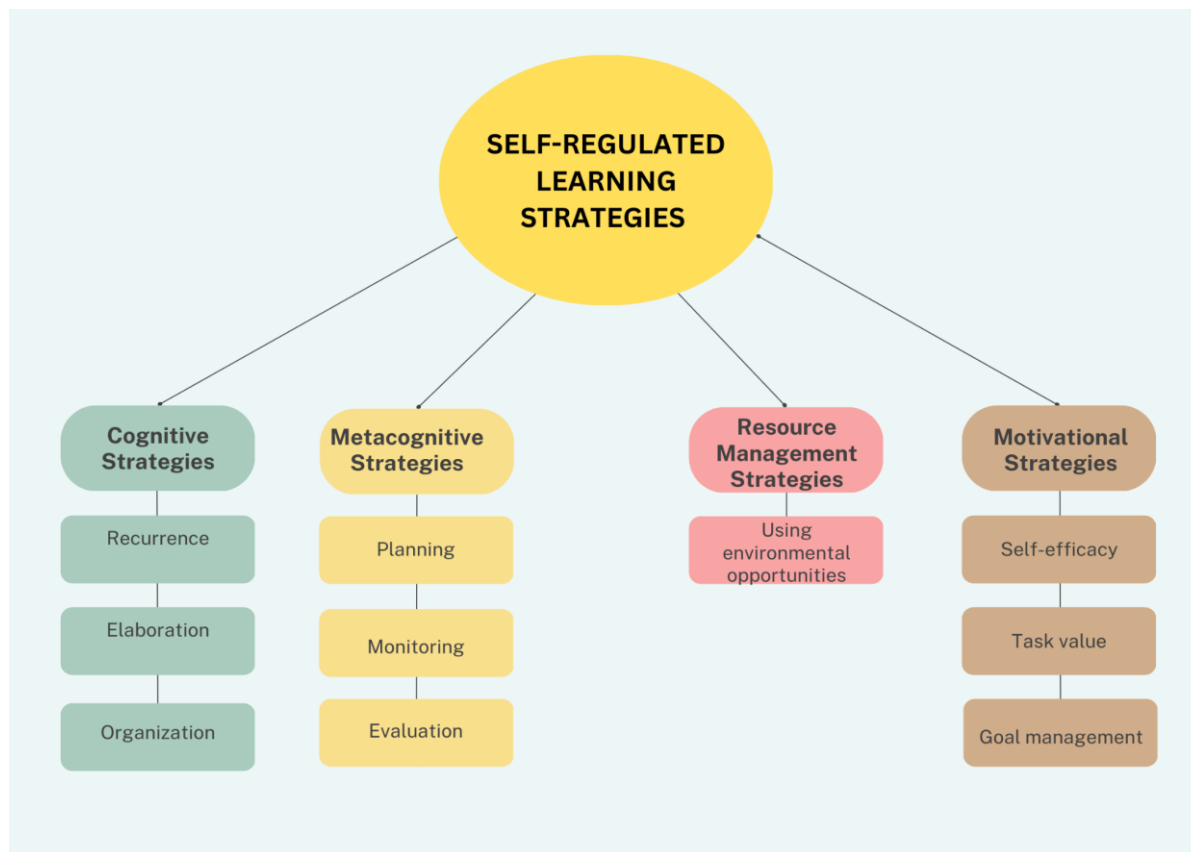
Self-regulation is the process of transforming mental abilities into academic skills and transforming learning into lifelong learning (Zimmerman, 2022). Self-regulated learners are those who have an influence on their learning (Boekaerts et al., 2021). Self-regulated learners can manage and direct the cognitive and motivational processes in their own learning (Boekaerts & Cascallar, 2006) and thus have a more positive outlook on their own future (Zimmerman, 2022). At the same time, self-regulated learners exert endeavors to change their thoughts, feelings, and behaviors towards information (Demir, 2022; Inzlicht et al., 2021). The duties of teachers in the acquisition of self-regulation skills are to enable students to complete their knowledge deficiencies in their learning and

to try new learning strategies (Biber, 2022; Eren et al., 2023; Yarnall et al., 2019). Self-regulation is also defined as the ability of students to respond appropriately to environmental factors and to self-regulate by taking responsibility for these reactions (Vaughn, 2014).

While self-regulated learning strategies are considered under 3 main categories; cognitive, metacognitive and resource management strategies (Pintrich et al., 1993; Pintrich, 1999), motivational strategies are also accepted as self-regulated learning strategies (Pintrich, 1999). Cognitive strategies generally include recurrence, elaboration, and organization strategies, which are the skills required to process information (Boekaerts, 1997). Recurrence strategies include content such as reworking, taking notes, and underlining the learned content (Weinstein & Mayer, 1986). Elaboration strategies include summarizing, associating new information with previous learning, creating analogies, productive notetaking, and asking and answering questions (Pintrich et al., 1991; Weinstein & Mayer, 1986). Organization strategies are the strategies that enable the student to restructure and organize the material to be learned and reorganize the information according to himself (Senemoğlu, 2005). Organizational strategies include grouping, schematizing, identifying the text's core idea, making diagrams, and building concept maps (Pintrich, 1999).

Metacognitive strategies are a cognitive process that includes how learners think about their own learning and how they learn. Learners develop a way of reflection and experience on monitoring their own learning (Boström & Lassen, 2006; Kitchner, 1983). Metacognitive strategies include planning, monitoring, and evaluation (Boekaerts, 1997). Planning strategy is the process of describing ways of thinking, identifying alternative ways of solving problems (Costa, 1984), choosing appropriate strategic ways before performing a given task, and identifying resources (Panduranga & Kalapala, 2023). The monitoring strategy is to enable the learner to regulate learning behaviors by spending more time on the subject content and using more useful strategies for learning (Händel et al., 2023). The evaluation strategy is to evaluate the learner's learning products and regulatory processes and reevaluate the learner's goals and review their predictions (Schraw et al., 2006).

Resource management strategies are the strategies that the learner uses to manage and control her environment (Pintrich, 1999) and are the learning environment that the learner uses to achieve her goals (Boekaerts, 1999). Motivational strategies are the learner's self-efficacy, which is the judgment of his abilities in the learning process; task value, which includes the value of the learned subject, beliefs and interest in the subject, and goal orientation, which includes external reasons such as social comparison, skill control for the learned subject (Pintrich, 1999). As a result of this literature review, figure 1 was created by the authors.



**Figure 1.** Classification of self-regulated learning strategies

While some aspects of self-regulated learning seem like a personal skill, it is affected by contextual factors such as course structure and design (Paris & Paris, 2003). Therefore, the design of learning environments has an influence on students' use of self-regulated learning strategies. Adopting innovative learning strategies and implementing new practices in the learning environment can make the learning process more active for students (Weinstein & Mayer, 1986) and therefore influence their use of self-regulated learning strategies. As an innovative learning strategy, flipped learning requires students to take responsibility for their pre-class learning and encourages them to manage their time effectively. Thus, by model it fosters a sense of self-regulation by encouraging students to plan their study schedules and adhere to deadlines (van Alten et al., 2020). Flipped learning also requires students to take ownership of their learning process and it promotes self-regulated learning behaviors as students engage with the content (Jung et al., 2021). In addition, the in-class activities in a flipped environment are designed to be interactive and collaborative, which fosters deeper engagement with the content (Wang, 2019). This active participation enables students to exercise greater independence and control over their own learning (Abdullah et al., 2019).

### **The Purpose of the Study**

The purpose of the research paper is to investigate self-regulated learning behaviors of pre-school teacher candidates in a flipped learning environment. The study aims to explore the educational

factors in flipped learning influencing pre-school teacher candidates' self-regulation skills development process. As limited research has been dedicated to understanding the specific effects of flipped learning on self-regulated learning behaviors among teacher candidates, this study aims to delve into the self-regulation skills development process of pre-school teacher candidates as they engage with a flipped learning approach. The study would also provide insights into the implications of the findings for teaching and learning practices in flipped learning. The subsequent research questions have been investigated:

(1) What kind of self-regulated learning behaviors did pre-school teacher candidates use during the implementation of flipped learning?

(2) What kind of educational factors in flipped learning are affecting pre-school teacher candidates' self-regulation skills development process?

### **Method**

In this study, the case study method, one of the qualitative research methods, was used. Case studies are a study method that helps in examining the events in depth (Büyükoztürk, et al. 2022). According to Merriam (1985), a "case" in a case study might be an individual, a program, a community, or a process. In this study, the aim was to explore teacher candidates' self-regulated learning strategies used in a flipped learning environment. The views of teacher candidates were examined regarding the effect of flipped learning models on teacher candidates' self-regulation learning skills.

#### **Participants of the Study**

This study was carried out at a public university in Türkiye with 55 first-year Early Childhood Education department teacher candidates who are taking an introductory computer course (Information Technologies) in 2022-2023 Fall term. Out of 66 students taking the course, 55 of them took part in the study.

#### **Application Process**

The study was conducted as part of a course on information technologies that aimed to teach teacher candidates the fundamentals of technology use in education. The study took a 14-week application period. Prior to the implementation phase, the course syllabus was created based on the flipped learning model approach. The course materials were developed in compliance with the curriculum by the course instructor. The flipped learning strategy was introduced to the students at the very first few weeks of the course. During the rest of the course, students were required to watch videos before each class every week. The videos were recorded by the course instructor before the class and were shared with the students weekly through the Learning Management System (LMS). The students were required to complete one assignment in each class session. These tasks were

finished by the students during the class and uploaded to the LMS. The instructor of the course facilitated the class sessions and responded to students' questions while they worked on their assignments during the in-class meetings.

### **Data Collection**

A structured interview form was used as a data collection tool within the scope of the research. In the interview form, there were 8 open-ended questions in order to measure the effect of the flipped learning model on the self-regulation skills of the teacher candidates. While preparing the interview questions, opinions were received from 3 faculty members (2 faculty members in the Early Childhood Education field and 1 faculty member in the field of instructional technology).

The data obtained within the scope of the research were analyzed using the thematic analysis method. Thematic analysis method is used to identify, analyze and report themes (Braun & Clarke, 2006). Categories and codes were created based on the themes obtained as a result of the data obtained from the teacher candidates and the literature review made by the researcher. Categories were created over 4 themes: cognitive strategies, metacognitive strategies, resource management strategies, and motivational strategies. Categories for cognitive strategies include recurrence, elaboration, and organization. Categories for metacognitive strategies include planning, monitoring and evaluation. Categories for resource management strategies include using environmental opportunities. Categories for motivational strategies include self-efficacy, task value, and goal management. To present the findings obtained with this approach, frequency values were given, and the findings were explained and interpreted by supporting direct quotations from the participants. Teacher candidates' information was kept confidential and pseudonyms such as P1, P2 were used while quoting.

### **Findings**

Self-regulated learning behaviors of the teacher candidates participating in the study are presented under four headings of cognitive strategies, metacognitive strategies, resource management strategies, and motivational strategies.

#### **Cognitive Strategies**

The categories are determined from the literature review on cognitive strategies, recurrence, elaboration, and organization. The answers given by the teacher candidates were analyzed based on these categories and codes were created.

Eight codes were obtained for the **recurrence category**, which is the first of the categories for cognitive strategies. These practices involve "utilizing the provided learning resources", "approaching the class with prior readiness", "adhering to timely completion of assignments", "using additional resources", "obtaining preliminary information about the subject", "understanding/reinforcing the

subject”, “investigating the subject’s facets”, and “taking notes on important points.” The coding and frequency values for the recurrence category are shown in Table 1.

**Table 1.** Encodings for the recurrence category

Codes	Frequency
Utilizing the provided learning resources	55
Approaching the class with prior readiness	35
Adhering to timely completion of assignments	17
Using additional resources	11
Obtaining preliminary information about the subject	4
Understanding/reinforcing the subject	3
Investigating the subject’s facets	2
Taking notes on important points	2

As seen in the Table, all the teacher candidates reported that they utilized the provided learning resources given by the instructor. 35 of them approached the class with prior readiness, 17 of the teacher candidates adhered to timely completion of assignments, 11 of them used additional resources (such as Youtube videos, PDF files, search engines, etc.), 4 of them obtained preliminary information about the subject, and 3 of them made an effort to understand/reinforce the subject, 2 of them investigated the subject’s facets and 2 of them took notes on important points.

Within the scope of flipped learning structure, the teacher candidates have used various recurrence strategies. Between these strategies, for example, approaching the class with prior readiness was found to be specifically related to the course structure of flipped learning as the candidates had to watch the videos before the class to complete the assignments. Following is an example where a candidate explains the process of flipped learning related to recurrence category. *“Before I come to the class, I watch the videos and lecture notes uploaded to the module, read them and do the exercises, if any”* (P6). Similarly, P54 explains how the structure of the flipped learning helped her to resolve any misconceptions by recurrence. *“The fact that the course is taught is flipped learning, which motivates me more because if there is a place that I do not understand, I can open the videos and watch it over and over. If it were the opposite, I would not be able to look back at the places I did not understand or the places that stuck when I was doing the assignment.”*

78 codes were obtained for the **elaboration category**, which is the second of the categories for cognitive strategies. “employing interrogative engagement with peers”, “seeking guidance from subject experts”, “actively participating and experimenting with the subject” and “acquiring mastery through iterative experimentation”. The coding and frequency values for the detailing category are shown in Table 2.

**Table 2.** Encodings for the elaboration category

Codes	Frequency
Employing interrogative engagement with peers	38
Seeking guidance from subject experts	17
Actively participating and experimenting with the subject	16
Acquiring mastery through iterative experimentation	7

As seen in Table 2, 78 statements from the answers given by the teacher candidates are related to the elaboration category for cognitive strategies. It has been determined that 38 of the teacher candidates' statements are for employing interrogative engagement with peers, 17 for seeking guidance from subject experts, 16 for actively participating and experimenting with the subject, and 7 for acquiring mastery through iterative experimentation.

Under the elaboration category, it was found that most of the teacher candidates stated that they had employed interrogative engagement with peers. While a few reported that they got help from their peers out of class, most of them reported that they asked their peers' help in class while they completed the assignments. For example, P6 and P 37 explained this by saying: *“During the lesson, I solved problems by discussing with my friends”* and *“I ask my friends for help. When they have something, they don't know, they also ask me for help.”* One of the candidates explains how the course structure allows them to have interrogative engagement with peers: *“In flipped learning, we have more time to discuss the topic with our friends”* (P42).

In addition to engaging with peers, the candidates also stated that they have sought guidance from subject experts. This usually included asking questions to the instructor during the class but some stated that they have also sought help outside of the class via email or in-person communication. Following quote explains how seeking guidance happened and how this motivated a teacher candidate: *“The fact that our teacher helps us where we get stuck and is very interested in us increases our motivation”* (P52). However, as stated by P48, it was found that the candidates sought help from their peers firstly, if they could not solve the issue, they asked for the instructor's help: *“I easily solved my problems that I could not solve with my friends by asking the instructor.”*

Most of the teacher candidates reported that they also actively participated and experimented with the subject. While there are mostly positive opinions about the peer support, a few candidates stated that they had difficulty communicating with their peers. For example, P12 stated that *“When I asked my friends for help, I realized that they did not want to help me, and I tried to do it myself by iterative experimentation.”*

No code was obtained from the teacher candidates for the **organization category**, which is the third of the categories for cognitive strategies.



### Metacognitive Strategies

The categories determined from the literature review on metacognitive strategies; planning, monitoring and evaluation. The answers given by the teacher candidates were analyzed on the basis of these categories and codes were created.

3 codes were obtained for the **planning category**, which is the first of the categories for metacognitive strategies. These encodings are "planning the timeline", "determining a learning strategy," and "procrastination." The coding and frequency values for the planning category are shown in Table 3.

**Table 3.** Encodings for the planning category

Codes	Frequency
Planning the timeline	32
Determining a learning strategy	25
Procrastination	8

As seen in Table 3, 65 statements from the answers given by the teacher candidates are related to the planning category of the metacognitive strategies. It has been determined that 32 of the statements of the teacher candidates are about planning the timeline, 25 of them are about determining a learning strategy, and 8 are about procrastination.

Most of the teacher candidates stated that they tried to plan the timeline based on the course structure. As the course was structured based on a flipped learning approach, the teacher candidates were required to study course content outside of class time and complete the assignments during the class time. Thus, arranging their timeline based on this general structure was a primary code under the planning category. A quote from a teacher candidate explains how she made an effort to plan the timeline: *"Every week, for this lesson, I watch the videos of our teacher at home and try to understand. Then, when our lesson time comes, I go to the classroom and try to complete the homework. If the lesson is not finished in time, I go to the library and complete the assignment and send it to the teacher"* (P15).

There were also statements where the teacher candidates mentioned procrastination behaviors. While some candidates stated that they were able to manage their timeline according to flipped learning structure, others had difficulty about time. For instance, following statements are positive comments about scheduling:

*"I upload the weekly assignments to the system on time. I watch the videos as soon as our teacher uploads them."* (P23)

*"I usually try to do homework as soon as possible."* (P32)

*“I take care not to leave the assignments to the last moment and I use my time efficiently within the course.” (P44)*

A few candidates also stated that they had difficulty managing their timeline. Some of these negative situations happened because not all of the teacher candidates had their own computers at home or dormitory to complete their homework. As stated by many participants, they had to use computers at the library or a friend’s laptops which caused delays completing assignments. Following are a few quotations about timeline and schedule issues:

*“I manage my work time by leaving everything to the last minute.” (P9)*

*“There were times when I had a hard time completing the homework.” (P16)*

*“I think I could be faster and manage my time better when doing homework.” (P43)*

*“I do my weekly homework. I do not leave the homework to the last minute voluntarily, but since I do not have my own computer, it can sometimes be delayed because I do it with the facilities at school.” (P53).*

In addition to the schedule and planning strategies, it was found that the teacher candidates determined individual learning strategies according to the course structure. For example, while some of them only come to class by watching the course videos, some search the Internet to obtain more information about the subject, and some try to find extra videos on the Internet. In addition, it was found that a few candidates checked the assignments rubric before coming to the class. Following are a few examples of how the teacher candidates determined a learning strategy.

*“Before coming to the class every week, if our teacher has sent a video that talks about the subject of the lesson that we will teach, I come by watching them. If there is something that bothers me or I do not understand, I search it on the internet.” (P6)*

*“I watch the videos before we come to the class, so I know what we will cover that week, so I go with an idea about the subject and try to attend the lesson more.” (P28)*

*“If it's something I don't understand or don't know, sometimes I listen to the videos twice, and sometimes I am trying to apply them on my own computer.” (P41)*

Two codes were obtained for the **monitoring category**, which is the second of the categories for metacognitive strategies. These encodings are “regulation of learning behaviors” and “seeking feedback.” The coding and frequency values for the monitoring category are shown in Table 4.

**Table 4.** Encodings for the monitoring category

Codes	Frequency
Regulation of learning behaviors	32
Seeking feedback	24

As seen in Table 4, 56 statements from the answers given by the teacher candidates are related to the evaluation category for metacognitive strategies. It has been determined that 32 of the statements of the teacher candidates are about regulation of learning behaviors and 24 of them are about seeking feedback.

According to the results of the study, most of the candidates stated that they have regulated their learning behaviors according to the flipped learning structure. A quote from the candidate explains how he used various techniques to complete the assignments: *“I watch the videos one more time before going to class and before doing the homework. When homework is given, I look at the instructions for preliminary information. When I do the homework later, I try to complete my homework a few days before the deadline by following the instructions again.”* (P33). Similarly, as P45 explains how she solved a learning issue she faced: *“When I had a problem during the lesson, I first tried to solve it myself because I want my learning to be more permanent. But if I still could not solve it, I received help from my friends.”*

Generally, most of the teacher candidates stated that they have seek feedback when they complete their assignments or when they do not understand the content. As seen in the following quotes, while some seek feedback from the instructor some get help from their peers.

*While doing homework, I usually ask the instructor at every stage. It feels better for me to move forward by getting feedback from her.”* (P2)

*“I’m trying to learn how to do it by consulting my friends about things I don’t know. We work on the assignment together in class anyway.”* (P12)

*“With my friends, we compare our assignments with each other and try to find and correct the missing mistakes.”* (P21)

No code was obtained from the teacher candidates regarding the **evaluation category**, which is the third of the categories for metacognitive strategies.

### **Resource Management Strategies**

The category determined from the literature review on resource management strategies, using environmental opportunities. The answers given by the teacher candidates were analyzed based on this category and codes were created.

4 codes were obtained for the category of using **environmental opportunities**, which is the category for resource management strategies. These encodings are peer support, instructor support,

timing, and work environment. The encodings related to the category of using environmental opportunities were handled in 2 separate categories as positive and negative coding. These encodings and frequency values are shown in Tables 5 and 6.

**Table 5.** Positive coding for the category of using environmental opportunities

Codes	Frequency
Peer support	38
Instructor support	21
Timing	17
Work environment	14

As seen in Table 5, 90 statements from the answers given by the teacher candidates are related to the category of using environmental opportunities for resource management strategies. The statements of the teacher candidates were evaluated in separate categories as positive and negative. When the positive categories in Table 5 are examined; it was determined that 38 of the teacher candidates' statements were about peer support, 21 were about instructor support, 17 were about timing, and 14 were about the work environment.

As stated in the previous section, resource management is intended for learners to effectively use the opportunities in their environment to achieve their goals. These could include learners managing their time, work environment and effort, collaborating with peers, seeking help from teachers, peers, or other resources. The teacher candidates usually stated that they effectively used time during the flipped learning. This was explained by P34: *“Flipped learning leaves a little more time to us because there will be lectures in traditional classroom education, because we would have to allocate time to complete assignments, so flipped learning is much more advantageous in terms of time saving.”* P16 explained how they manage their time and work environment and effort. *“After moving on to the application part, I started to find both the lesson and the application method productive because I did the assignment myself. Since there were few students in the class, my motivation increased, and I believe I learned in a healthier way.”*

While the candidates' comments about the work environment's influence on self-regulated learning skills are usually negative, there were also positive comments about how the class environment and their out-of-class study environment influenced their work. For instance, the following is a quote from P43: *“I have a desk and a computer to study, the good thing is that I use the dormitory's internet without interruption”* and *“The environment of our class is nice, we finish our homework in silence as everyone is working on their own assignments.”*

**Table 6.** Negative coding for the category of using environmental opportunities

Codes	Frequency
Work environment	20
Timing	6
Instructor support	4
Peer support	1

As seen in Table 6, 31 of the statements of the teacher candidates were about resource support, 20 of them about the work environment, 6 of them about timing, 4 of them about instructor support and 1 of them about peer support.

Negative comments about the environmental opportunities were usually about the work environment such as lack of technological tools, connection problems, and crowded class sessions. Following are some examples of the negative quotes about environmental opportunities:

*“Unfortunately, I don't have a computer for now. I used to have a very quiet work environment at home, but now as I stay in the dormitory that is unlikely unless I go to the library.”* (P11)

*“Giving homework from the computer constantly reduces my motivation because I don't have a computer and I have trouble finding it. I would like to change this.”* (P15)

*“I can't talk much about the working environment in the dormitory.”* (P40)

*“There are not enough technological tools for everyone due to the crowded classroom environment.”* (P50)

In addition to the work environment issues, the teacher candidates complained about the problems with instructor and peer support. This was stated by P29: *“The intensity of the information to be given in the course decreases because of my other friends who encounter problems while completing their assignments as they have too many questions and the instructor has to deal with it.”* Aiming at the instructor P37 said *“I think our questions should be helped more.”*

While the teacher candidates usually stated that they effectively used time during the flipped learning, there were also negative situations where the teacher candidates had difficulty with time management. As stated by P42 and P55, the timing issues were all about candidates' own time management skills: *“I have a problem with my time management, I think I have to speed up during the rest of the lesson because I move slowly and I do the assignments slowly, but I think that if I act a little more practically and quickly at the beginning of the lesson, I will be successful in my time management.”* and *“Since I use the computer slowly, I worry that I will not have enough time and I panic even more. This negatively affects my time management.”*

### Motivational Strategies

Categories determined from literature review on motivational strategies are self-efficacy, task value, and goal management. The answers given by the teacher candidates were analyzed based on these categories and codes were created.

Two codes were obtained for the **self-efficacy category**, which is the first of the categories for motivational strategies. These encodings were “self-belief” and “self-confidence”. The coding and frequency values for the self-efficacy category are shown in Table 7.

**Table 7.** Positive coding for the self-efficacy category

Codes	Frequency
Self-belief	30
Self-confidence	35

When the positive categories in Table 7 are examined; it was determined that 35 of the teacher candidates' statements were about self-confidence and 30 of them were about self-belief. The teacher candidates expressed their positive thoughts about self-belief by saying: *“I listen to the lesson very excitedly if it is a subject that I do not know and will learn a new one”* (P24), *“I should participate more in the subjects covered in the lesson and turn my focus to the subject, so that the lesson will be more efficient and appropriate”* (P32) and *“I generally try to regain my focus by clearing my head for two minutes and watching the surroundings”* (P39).

Examples of the statements of teacher candidates who feel competent about self-confidence can be given as follows: *“Actually, I am more motivated and more focused in an environment where everyone is concentrated on a task”* (P47), *“Doing homework with my friends is both more fun and memorable for me”* (P54).

**Table 8.** Negative coding for the self-efficacy category

Codes	Frequency
Self-belief	13
Self-confidence	12

When the negative categories in Table 8 are examined; it was determined that 13 of the teacher candidates' statements were about self-belief and 12 of them were about self-confidence. P2, who had negative thoughts about believing in himself, said, *“I feel very bad when I can't do my homework”*, P27 said, *“The course can be a bit heavy for me because my computer knowledge is limited, and we cover advanced stages. P32, on the other hand, states that “although I had trouble concentrating due to the narrow and hot environment, this problem disappeared when the students were divided into two groups.”*

Teacher candidates also stated that they felt inadequate about self-confidence as P34 said, *"It doesn't happen when I try to do it even though I've watched the video."* Similarly, P35 said *"Giving homework from the computer constantly reduces my motivation because I don't have a computer and I have a hard time finding it"*. In addition, P46 said *"I experienced fear and tension of not being able to complete my homework."*

Two codes were obtained for the **task value category**, which is the second of the categories for motivational strategies. These encodings are "meaningfulness of the learned subject" and "value of the learned subject." The coding and frequency values for the task value category are shown in Table 9.

**Table 9.** Encodings for the task value category

Codes	Frequency
Meaningfulness of the learned subject	10
Value of the learned subject	8

As seen in Table 9, 10 of the teacher candidates' statements were about the meaningfulness of the learned subject, and 8 of them were about the value of the learned subject. Under the code of meaningfulness of the learned subject, the teacher candidates reported that they create a sense of meaningfulness for a learned subject. For instance, P1, P11, and P15 explained that their interest on the course subject motivates them to study. *"I think that my interest in the computer and dealing with the computer more will increase my motivation"*, *"Since I learned new information in our lesson, it is very effective in maintaining my motivation, there is nothing that prevents me from focusing"* and *"Since the computer is always a part of my life, I am motivated in a different way."*

In addition to the meaningfulness of the learned subject, the candidates reported that the value of the learned subject also increased their motivation. Following are some quotes from the teacher candidates.

*"The assignments we do add me very valuable knowledge and skills and I focus more to learn. I learned a lot of methods that I did not know. As I learned the methods, I started to try to do activities related to my field. This course added a lot to me and continues to add. When I do it lovingly and willingly, I have no problem focusing."* (P6)

*"The more information and methods I learn from this course, the better it will be for me because when I become a teacher in the future, I will prepare activities, resources and many more applications for my students."* (P28)

*"Knowing that what I learn in the course will be very important for my future profession increases my focus."* (P41)

The third category of motivational strategies, **the category of goal management**, has been examined as 2 subcategories. Goal management category is divided into 2 subcategories as intrinsic factors and external factors. 3 codes for intrinsic factors and 2 codes for external factors were obtained. Coding of intrinsic factors; interest, skills, and curiosity. Coding of external factors; competition and teaching method. These encodings and frequency values are shown in Tables 10 and 11.

**Table 10.** Encodings for goal management's intrinsic factors

Codes	Frequency
Interest	9
Skills	6
Curiosity	3

As seen in Table 10, 9 of the teacher candidates' statements were about interest, 6 of them were about skills and 3 of them were about curiosity. As explained by P21, P47, and P50, the candidates' motivation was also related to the intrinsic factors. *"I am interested in the topics of the course because I love the computer"*, *"Within the course, I had to do things that I did not want to do, and it helped me learn. I worked hard not to fall behind with my peers and this increased my motivation in the course"*, and *"The only thing that brings me down in the course is that I am not interested in the information technologies course."*

**Table 11.** Encodings for goal management's extrinsic factors

Codes	Frequency
Competition	10
Teaching method	8

As seen in Table 11, 10 of the teacher candidates' statements were about competition and 8 were about teaching method. Following are quotes from the teacher candidates explaining how peers are influencing their motivation.

*"I think I need to be a little faster to do my homework, unfortunately I am not very good at time management, I think I will get used to it as time goes on. I feel like I'm behind the others."*  
(P4)

*"I get nervous when I have someone by my side, and they finish before me."* (P13)

*"I watched my friend's homework to clear my head, and it showed I was behind and gave me motivation to keep going."* (P52).

In addition to the competition, the teacher candidates said that the teaching method also influenced their motivation during the course. As P11, P39 and P53 expressed: *"The way the lesson is taught motivates me and it's fun. The pre-loaded videos save us from being bored in the class"*, *"In a*



*traditional classroom, if the student could not go to school that day or missed the lesson, there is no opportunity to listen to the lesson again. If there is something he doesn't understand, he still has the chance to ask his teacher at school. Thus, this different learning method motivates me” and “Since we are more individual in this education model, everyone focuses on their own work in the class and the discomfort we can hear from the outside environment is minimized. We can communicate with the teacher more easily and benefit from his knowledge more efficiently.”*

### **Discussion**

This study was conducted to understand what kind of self-regulated learning behaviors are used by pre-school teacher candidates during the implementation of flipped learning. The aim of the study was to examine in detail how teacher candidates organize and develop self-regulation skills cognitively, metacognitively, resource management and motivationally in a flipped learning class environment. Thus, this research aims to understand self-regulated learning behaviors of pre-school teacher candidates in the process of adopting innovative learning strategies. Flipped learning, by design, requires learners to take greater responsibility for their learning process, thus it creates a learning environment that is favorable for the development of self-regulation skills (Jung, 2021; Zarouk, 2020). Thus, the study also aimed to understand how educational factors specific to the flipped learning environment influence the development of self-regulation skills among pre-school teacher candidates.

According to the results of the study, teacher candidates applied different kinds of recurrence and elaboration strategies in the flipped class. It was found that teacher candidates used cognitive strategies to deepen their understanding, make connections, and enhance their overall learning experience. Employing interrogative engagement with peers and seeking guidance from subject experts were generally used by teacher candidates in the flipped learning environment. Engaging with the peers and the instructor was the method used by teacher candidates to obtain more detailed information about the subject. Thus, it can be concluded that teacher candidates preferred to get help, feedback, and additional information mostly from peers and the instructor, like Bakhtiar and Hadwin (2022) and Wolters and Brady (2020) studies. In this study, where innovative learning strategies were adopted, it was found that teacher candidates exhibited more inclination to seek guidance from both their peers and experts.

As found by Kostaris (2017), flipped learning inclusion in the teaching and learning process improved students' cognitive learning outcomes in a statistically meaningful way. While this study did not look at whether teacher candidates' cognitive learning outcomes improved or not, it was found that most of cognitive strategies to support self-regulated learning were used by teacher candidates during the flipped learning. Cognitive strategies were used by teacher candidates to navigate the pre-class preparation and in-class activities efficiently in the flipped learning. For pre-class preparation, teacher

candidates had to watch videos and it was found that the preparation encouraged proactive planning and time management as they needed to allocate time to engage with the materials before class (Susana & Brahma, 2021). In addition, in-class sessions in a flipped classroom involved assignment completion where they had to do collaborative activities, discussions, problem-solving, and application of knowledge (van Alten et al., 2019; Cheng et al., 2019).

These in-class activities demanded students to organize their thoughts, collaborate with peers, and contribute effectively, fostering cognitive strategies. However, according to the results of the study, teacher candidates did not use any organization strategies and they were not inclined to use traditional learning techniques. Although the literature offers various learning techniques, such as note-taking as a means for students to gain insight into their learning processes (Alvi & Gillies, 2023), the study found that within its context, most of teacher candidates did not display interest in such learning approaches. As explained in the method section of the paper, the study was conducted in an introductory computer course (Information Technologies) which usually does not require traditional learning techniques such as textbooks, note-taking, or memorization. This could be the reason for students' disinterest towards traditional learning strategies.

When the findings related to metacognitive strategies are examined, it was found that teacher candidates used planning and monitoring strategies but did not use evaluation strategies. As mentioned in the literature, the flipped learning environment supports metacognitive strategies of students (Khazai et al., 2023; Nurdianti & Wajdi, 2023). In this study, it was revealed that teacher candidates included planning and monitoring strategies from metacognitive strategies in their statements. Lee and Choi (2018) determined that students showed higher performance during the weeks they watched videos during the training they applied with the flipped learning environment. Like Lee and Choi's (2018) study, during the video watching process, teacher candidates were free to choose the time and place of their own learning, and they used self-regulated strategies to plan their learning. In this study, teacher candidates were found to use planning strategies frequently. The study also found that the planning and monitoring strategies from metacognitive skills were used more than the evaluation strategy.

In this study, teacher candidates did not express that they used evaluation strategies. In a flipped learning environment, students have more responsibility for their own learning and are encouraged to take control of their learning process (Lin, 2021; Robbins, 2020; Urquiza-Fuentes, 2020). Thus, it is difficult for students to control when and how to study as well as how to assess their learning both in-class and out-of-class activities. The reason why pre-service teachers did not use any expressions for evaluation strategy in this study may be that they are not familiar with using metacognitive strategies in this kind of an innovative learning environment.

As Zeitlhofer and colleagues (2023) stated, the motivation of students in supporting cognitive and metacognitive skills depends on the study environment and learning area. For this reason, the environment in which students attend the lesson and the atmosphere they are in during the lesson are effective in their use of these skills. In the study of Aksoy and Türker (2023), pre-service teachers stated that they experienced technical difficulties in the learning processes of self-regulation skills and that the environment affected their learning processes. Likewise, in this study, teacher candidates stated that they experienced technical difficulties and that the learning environments, including instructor and peers, influenced their use of self-regulation skills.

Teacher candidates' self-belief and self-confidence strategies, which are among their self-efficacy strategies, have an impact on academic success. Wijaya & Sandi (2020) found that self-confidence influences academic achievement in their study. Similarly, in this study, it was found that teacher candidates were confident and believed in themselves in the learning process. In other words, when students were motivated, they actively participated in all their academic tasks, using self-control techniques like time management, environment structuring, and persistence, which made them feel more comfortable seeking help and encouraging them to interact and learn with their peers (Bakhtiar & Hadwin, 2022; Wolters & Brady, 2020). Teacher candidates in this study were found to prefer to reach out to their peers and seek help. Thus, students in flipped learning appear to have a positive attitude toward their classmates (Lim et al., 2020; Zarouk, 2020).

The flipped learning approach offered teacher candidates an opportunity to go beyond traditional learning approaches. It helped them to deepen their professional values and sense of duty as it gave them an opportunity to see an innovative learning approach which can be used in their future classrooms. Teacher candidates stated that applying an innovative learning approach supported their self-development and motivation towards the teaching profession.

Internal and external factors also found to affect teacher candidates' goal management strategies. Internal factors mostly affect the participation of individuals in the course in line with their interests and curiosity. Asking intriguing questions about the subject content shows that students have an individual interest in that content (Hidi & Renninger, 2006). In this study, it was determined that pre-service teachers had interests, curiosity and skills in learning the course content. It shows that the pre-service teachers have an interest in the content of the course that they want to gain in-depth information about the content of the course by asking questions to both their friends and the instructor. External factors are the factors that occur outside the control of individuals and affect their learning. It was determined that the competitive classroom environment and the teaching method influenced the self-regulation skills of teacher candidates. Self-regulated learning strategies of students are affected by contextual factors such as course structure and design (Paris & Paris, 2003). It was found that the structure of the flipped learning approach fostered a sense of self-regulation by encouraging students

to plan their study schedules and adhere to deadlines (Abdullah et al., 2019; van Alten et al., 2020), taking ownership of their learning process (Jung et al., 2021), and fostering deeper engagement with the content (Wang, 2019). Thus, it is important for instructors to design the course in a way that the students gain self-regulated learning skills (Temel, 2013).

### **Policy Implications**

Within the scope of the research, employing the innovative flipped learning approach towards pre-service early childhood education candidates would enable them to acquire an in-depth understanding of this approach. Consequently, when these candidates become teachers, they will be able to incorporate this approach into their educational programs. The purpose of providing this training to teacher candidates is to enhance the quality and competence of teachers. As the quality of teachers improves, so does the overall quality of education. The flipped learning approach, by offering equal opportunities in education, facilitates students' access to learning materials at their convenience. Thus, regardless of their circumstances, every student can benefit from education in the most efficient manner. Furthermore, in the practical phase of the study, digital learning tools have been integrated into the process, and online resources have been made consistently accessible to students. Simultaneously, educational technologies within the flipped learning environment have been directly integrated to contribute to the learning process, aiming for teacher candidates to acquire digital proficiency skills.

In this study, aimed at assessing self-regulated learning behaviors of teacher candidates during the implementation of the flipped learning approach, it has been determined that students employ cognitive and metacognitive learning skills. These skills are supported within educational environments prepared through learner-centered learning strategies. Within flipped learning contexts, teacher candidates are required to exhibit a more active engagement compared to traditional instruction. The utilization of cognitive and metacognitive skills by teacher candidates also indicates their active participation in the learning process.

Furthermore, the study has identified that the flipped learning approach promotes proactive planning and time management. Through proactive planning, teacher candidates can optimize their learning processes, while effective time management facilitates a more structured work process. As a result, the quality of education is expected to increase proportionally. Within the framework of the study, teacher candidates were encouraged to come prepared for their lessons. Additionally, apart from traditional assessment tools, they were prompted to engage in performance indicators and project evaluations. This approach allows teacher candidates to measure their own achievements, monitor their learning processes, and seize opportunities for evaluation. Consequently, they become more aware of their learning levels and abilities.

### **Conflict of Interest**

No potential conflict of interest was declared by the authors

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### **Credit Author Statement**

Author 1: Conceptualization, Investigation, Data Collection, Methodology, Formal Analysis, Project Administration, Writing

Author 2: Conceptualization, Data Collection, Data Curation, Formal Analysis, Project Administration, Writing

### **Ethical Statement**

The study adhered to scientific ethical principles and regulations throughout its entirety. Emphasizing an unbiased perspective, the study concentrated on the exposition of data. It was composed within the boundaries outlined by the Committee on Publication Ethics (COPE) and was formulated in alignment with the principles of research ethics. Confidentiality was maintained regarding the personal information of the study participants.

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