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Attitudes of students towards distance learning environments after distance computer courses

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ABSTRACT

This study aimed to assess students' perceptions of flipped learning environments after they participated in inverted computer courses. A mixed-method approach was used for the research. The sample included 197 ninth-grade students from two high schools in Almaty, Kazakhstan. In the study, the students were given computer education that was turned upside down. The research data were collected with the "flipped learning student engagement scale" (FLSES) and student interview form applied after the education was given to the students. The data collection tools used in the study were developed by the researchers. The independent samples t-test was used in the analysis of bivariate data, and one-way analysis of variance (ANOVA) was used in the analysis of data with more than two variables. It was deemed appropriate to use the content analysis method in the analysis of the qualitative data of the research. The results obtained from the study reveal that students' scores on the reverse learning student engagement scale were higher after the flipped computer training. The majority of the students who joined the research stated that they preferred flipped learning environments to traditional learning environments in the computer course. While providing the opportunity to reinforce the subject was shown as the advantage of the flipped learning environment, most of the students said that they did not recognize any disadvantages of the flipped learning environment.

Contribution/Originality: This study, which contributes new information to the existing literature, was conducted using a mixed research method. As is well known, cause-and-effect relationships emerge more clearly when quantitative and qualitative research are used together. Furthermore, it is an original study that contributes new insights to the field.

1. INTRODUCTION

In the realm of computer education, flipped learning, an instructional approach that flips conventional ideas of classroom dynamics, is becoming more and more popular. A key component of this strategy is pre-class engagement with the material, typically via online resources or instructional videos, which enables students to utilize class time for group projects and problem-solving activities. This pedagogical shift promotes a more engaged and motivated

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learning environment by emphasizing student-centered learning and encouraging the deeper exploration of computer science subjects (Uzunboylu & Karagozlu, 2015).

1.1. Theoretical and Conceptual Framework

One of the most important prerequisites for successful learning outcomes is classroom participation. It discusses how students' psychological involvement in their education affects both their overall enjoyment of the learning process and their academic success. High levels of participation in computer classes can lead to improved critical thinking skills, better comprehension of complex technical topics, and enhanced memory retention. According to research, students who are actively engaged in their education experience richer learning outcomes (Fredricks, Blumenfeld, & Paris, 2004).

Numerous studies highlight how flipped learning increases student participation in computer classes. In a thorough analysis of flipped classroom models across a range of educational contexts, Bond (2020) found that students typically demonstrated higher rates of participation and showed more satisfaction with the educational process. Similar findings were made by Subramaniam and Muniandy (2019), who discovered that flipped learning methodologies greatly improved student collaboration and interaction in computer classrooms, which in turn enhanced overall academic achievement. The dynamic and fast-paced nature of computer education is especially well-suited to the active learning environment that flipped learning fosters, as these studies demonstrate.

The primary features of the flipped classroom style are crucial in encouraging pupils to participate actively. Jenkins et al. (2017) stress that following preparatory learning, incorporating collaborative group work into class time promotes conversations and point-to-point instruction. In addition to encouraging the growth of teamwork, this structure fosters a sense of community among students by establishing a shared learning environment. According to Steen-Utheim and Foldnes (2017), students who feel more agency in the flipped model are able to take charge of their education, which leads to a high degree of motivation and accountability. These classroom characteristics work in concert to increase student engagement and improve the learning environment in computer classes.

Technology is a key driver of increased student engagement in flipped learning. According to Lin (2019) digital platforms enable the ideal distribution of educational resources, promoting personalized rhythm learning and allowing students to review the subject whenever necessary. Furthermore, Hwang, Lai, and Wang (2015) recommend the use of a variety of technical tools that facilitate collaborative learning, including project management software and discussion boards, which are especially well-suited for computer education. These resources support the development of important skills necessary for success in the contemporary workforce in addition to knowledge retention. As a result, incorporating technology into the flipped classroom model increases student engagement and makes learning more dynamic and applicable in a world that is becoming more digital. Because it places a higher priority on student commitment and the development of collaborative abilities, flipped learning has emerged as a revolutionary educational strategy, particularly in computer sessions. According to Lo and Hew (2021) and Jamaludin and Osman (2014) flipped learning fosters an educational atmosphere that encourages active participation; hence, this educational style has several benefits. More time in class is devoted to group projects and hands-on activities because of video conferencing and online resources that students review prior to the course. In addition to strengthening students' comprehension of difficult ideas, this modification fosters peer interaction and enhances their ability to work together.

Effective flipped class techniques, such as interactive online platforms and asynchronous video assignments, have been shown to significantly increase student involvement in computer courses. Chen, Hwang, and Chang (2019) give an example of a case study in which students had to watch instructional videos and complete a test before class. Group problem-solving exercises that required pupils to use their knowledge practically had taken up subsequent class sessions. This method encouraged dedication and gave pupils the freedom to choose how they want to learn. Similarly,

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Awidi and Paynter (2019) emphasize how gamified components in flipped classrooms help students take an active role in their education, which raises motivation and engagement levels.

By addressing the cognitive and emotional aspects of education, flipped learning has emerged as a cutting-edge teaching strategy that encourages student dedication. According to Li and Li (2022) students are more actively engaged in their learning processes while using the inverted class model, which significantly increases learners' commitment and encourages the long-term growth of language abilities. This idea is supported by Zhou (2023) who emphasizes that inverted learning successfully enhances professional learners' emotional and cognitive states, resulting in a more dynamic learning environment.

Numerous elements, such as possibilities for collaboration and intrinsic motivation, affect commitment to flipped learning. According to Lee, Park, and Davis (2022), analysis of the factors influencing students' commitment: active engagement in group projects is a strong predictor of learning outcomes. Because it enables students to collaborate, enhance their comprehension, and actively participate in problem-solving activities, the inclusion of collaboration skills is especially important in inverted classrooms. Furthermore, Cevikbas and Kaiser (2022) found that students' participation in an inverted secondary mathematics class significantly improved. This suggests that this strategy enables students to take charge of their educational path, which in turn improves their motivation levels. In conclusion, by addressing cognitive and emotional aspects, flipped learning successfully raises students' commitment, which eventually results in learning outcomes, motivation, and teamwork in educational settings.

Notwithstanding these benefits, there are certain difficulties in putting flipped learning into practice. According to Maher, Latulipe, Lipford, and Rorrer (2015) student resistance is a significant obstacle, with some students expressing unease with the self-directed nature of pre-class papers and possibly lacking internal motivation. Furthermore, Elmaadaway (2018) draws attention to the issues surrounding technological availability, particularly for pupils from low-income families. The educational inequalities that already exist in different classes can be worsened by a reliance on gadgets and internet access for learning activities. These difficulties may therefore limit the potential effectiveness of flipped learning techniques.

Furthermore, research on the efficacy of flipped learning has produced conflicting findings. According to Li and Li (2022) investigation, while some students benefit from flipped learning models in terms of their academic performance and commitment, others either show little interest in the technique or react poorly to it. These discrepancies are further supported by Huang, Hew, and Lo (2018) who point out that particular circumstances, such as class size and demographic characteristics, are critical in deciding how successful flipped learning is. When assessing this educational model's efficacy, several factors need to be considered.

In the light of the findings listed so far, there are several benefits to incorporating flipped learning into computer training, especially when it comes to enhancing students' dedication and fostering their teamwork abilities. The model's performance may be hampered by significant obstacles that educators must overcome, such as pupils' resistance and varying degrees of access to technology. Comprehensive studies on flipped learning continue to provide a wide range of findings, highlighting the significance of contextual factors. Teachers can more effectively utilize flipped learning to increase students' dedication to their classes by critically examining its benefits and drawbacks. However, when we look at the literature, it can be emphasized that research gaps constantly arise when the developments in technology reflected in computer courses are taken into account.

Investigating this subject will contribute to a more thorough understanding of how flipped learning environments influence student engagement, motivation, and academic performance in computer courses. The growing integration of technology into modern education has transformed learning environments, promoting innovative approaches such as flipped learning. This model encourages active student participation while facilitating access to resources and fostering collaboration. However, its long-term impact on students' attitudes and academic success remains an area that necessitates further research. This is particularly significant in disciplines requiring technical and practical expertise, such as computer studies.

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Conducting research in this field is crucial for developing effective instructional strategies and enhancing the integration of technology in education. Additionally, analyzing the effects of flipped learning on diverse student populations is essential for promoting educational equity and addressing individual learning needs. Ultimately, exploring the implementation of flipped learning in computer courses can offer valuable insights for shaping future educational frameworks and establishing a system aligned with technological advancements.

1.2. Related Research

A review of existing literature reveals a number of studies examining the flipped classroom model. For instance, Bi and Ye (2024) explored the advantages and feasibility of integrating flipped classroom methods with information technology in English language instruction within a 6G network environment. Their findings indicated that this approach enhanced both learning efficiency and student engagement.

Similarly, a meta-analysis conducted by Strelan, Osborn, and Palmer (2020) investigated the impact of the flipped classroom model on student performance, demonstrating a significant and positive effect on academic achievement. In another study, Agyeman and Aphane (2024) employed action research to assess the influence of the flipped classroom approach on student participation. Their results highlighted that this method fostered a supportive learning environment and encouraged deeper engagement.

Baig and Yadegaridehkordi (2023) identified key technological tools central to the flipped classroom model, including video creation platforms, learning management systems, content repositories, collaboration tools, podcasts, and online assessment mechanisms. Additionally, Zainuddin and Halili (2016) conducted a systematic review of flipped classroom applications in higher education, concluding that the model positively influenced both student motivation and academic performance.

Further, Olakanmi (2017) examined the effects of the flipped classroom approach on the academic achievement and attitudes of 66 first-year middle school students studying chemistry. The study found that this model significantly enhanced students' conceptual understanding of chemical reaction rates compared to traditional teaching methods. Lastly, Pattanaphanchai (2019) investigated the impact of the flipped classroom on programming students' learning outcomes and perceptions. The findings indicated that students responded positively to this instructional approach, which effectively contributed to the development of their programming skills.

Upon reviewing the existing literature and research, it becomes evident that there is a lack of sufficient studies on the effectiveness of implementing flipped learning environments in computer (Information Technology) courses. This indicates a significant gap in research within this field. Consequently, the focus of this study is to assess students' attitudes towards flipped learning and computer courses by establishing an alternative learning environment, distinct from the conventional classroom setting to which students are accustomed, through the flipped learning model.

1.3. Purpose of the Research

This study aims to examine students' perceptions of flipped learning environments after completing computer courses delivered through this approach. To achieve this objective, the research aims to answer the following questions.

1. How do students engage in flipped learning?
2. What are the students' views on computer courses being taught in a flipped learning environment?

2. MATERIALS AND METHODS

This section covers the research method, study group, development of data collection tools, data collection, and evaluation stages. In addition, the ethical principles of the research are explained here.

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2.1. Research Method

This study was conducted using a mixed-methods research design, which integrates both quantitative and qualitative approaches to provide a comprehensive analysis. In this type of research, the approaches and concepts of the two methods are combined. Thus, the advantageous sides of both methods are strengthened. Mixed methods research aims to use multiple approaches in seeking answers to research questions rather than limiting the researcher's options (Greene, 2005). Mixed method; it allows the creation of a comprehensive and complementary research design with a pluralistic approach. Many research questions can be fully answered with the solutions offered by the mixed method (Johnson & Onwuegbuzie, 2004). The use of mixed methods in research offers significant advantages, as it allows for a more comprehensive understanding that cannot be achieved through a single method alone. For instance, qualitative data complement quantitative findings by providing a deeper context for interpreting research results (Clark & Ivankova, 2015). Based on this perspective, a mixed-methods approach was considered appropriate for evaluating the impact of flipped learning environments on computer courses. Quantitative data were gathered using the flipped learning student participation scale. After the flipped computer training was delivered to the students, qualitative data were collected through student interviews, providing more detailed insights into their experiences.

2.2. Participants

The study sample comprises 197 ninth-grade students from two distinct high schools in Almaty, Kazakhstan, during the 2023-2024 academic year. The first institution is the Almaty Physics and Mathematics School, which emphasizes science and mathematics education and prepares students for national and international competitions. The second institution is Almaty Gymnasium №159, a high school that offers a diverse curriculum and prioritizes both the academic and personal development of its students. Convenience sampling relies entirely on what is available, quick, and easy to access. This sampling is also referred to as chance, random, or accidental sampling (West, 2001).

Table 1 presents the demographic distribution of students participating in the study based on gender.

Table 1. Demographic distribution of students.

Gender	f	%
Girls	104	52.8
Boys	93	47.2
Total	197	100

In Table 1, demographic distributions of the students participating in the research regarding gender are given. 52.8% of the students participating in the research are girls, and 47.2% are boys.

2.3. Data Collection Tools

The research data were collected using the Flipped Learning Student Engagement Scale (FLSES), developed by the researchers, and the student interview form.

2.3.1. The Flipped Learning Student Engagement Scale (FLSES)

2.3.1.1. Creating the Trial Form of the Scale

While developing the FLSES, research on flipped learning environments was conducted in the field, and the scale was developed in line with this research. The item pool for the research was created, consisting of 39 items. To evaluate the grammatical and semantic compatibility of the scale items, a linguist was consulted to assess all 39 items. As a result of this evaluation, the scale was created in a 5-point Likert format with the items that were corrected. The rating scale is as follows: 1 = strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree, and 5 = strongly agree. Validity Studies: Validity studies were carried out in two stages, namely content validity and construct validity.

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2.3.1.2. Scope Validity

A rigorous process was employed to establish the content validity of the scale, with expert consultations serving as a critical component. The content validity was assessed to determine the extent to which the scale items accurately represented the construct they aimed to measure. Four experts independently reviewed each item in the item pool to evaluate its relevance in capturing the capacity of flipped learning environments to assess student engagement. Experts were asked to assess each item based on content, clarity, relevance, and its alignment with the targeted construct. The evaluation process considered both the meaning and explanatory power of the items in relation to the relevant construct. Items were classified as "appropriate," "partially appropriate," or "not appropriate."

Following this evaluation, 17 items that were unanimously deemed "appropriate" by all experts were included in the pilot version of the scale. Based on expert feedback, grammatical and structural revisions were made to certain items to improve clarity and ensure a more accurate representation of the intended meaning. Additionally, redundant or unnecessary items were removed, resulting in a more concise and focused scale. The revised items were re-examined and refined to enhance consensus among the experts. The content validity process, supported by expert feedback, ensured that the scale accurately represented the construct it was designed to measure, thus enhancing its overall validity. Ultimately, 17 items from the original pool of 39 were selected, forming the pilot version of the scale. This meticulous process ensured that the scale met scientific validity standards and enhanced its reliability before implementation.

2.3.1.3. Pilot Scale Sample Group

The pilot scale application consisted of 209 students studying in 9th grade in various high schools in Kazakhstan. The students who participated in the scale development phase of the research were not included in the sample group of the research. Of the students participating in the research, 125 were girls and 84 were boys. The application with the students who participated in the scale development stage was carried out online.

2.3.1.4. Construct Validity

The Bartlett's Sphericity test and Kaiser-Meyer-Olkin (KMO) test were used to determine the construct validity of the piloted scale. The KMO value was calculated as 0.891. Bartlett's Sphericity test value is 3474.019 (sd = 300; $p < .05$). These values indicate that the developed scale is suitable for factor analysis.

SPSS 25.0 for exploratory factor analysis and SPSS Amos programs for confirmatory factor analysis were used in the analysis of the pilot scale data. Additionally, the item-total correlation was examined to determine item discrimination strengths for 17 items on the scale. Pearson correlation coefficients were calculated for item analysis. The Pearson correlation test was employed to assess item discrimination strengths, and exploratory factor analysis was applied to identify the factor structure. In the exploratory factor analysis, items with factor loadings greater than 0.30 were included in the process; one item was excluded because it did not meet this criterion. To determine the number of factors in the exploratory factor analysis phase of the FLSES, the variance explained by each factor was examined. It was found that the variance explained by the factors was significant, with two factors having eigenvalues greater than 1. The total variance explained by these two factors was 81.592%. The Promax rotation method was used to interpret the factor loadings. Based on the component matrix rotated by the Promax method, 8 items loaded onto the first factor, and 7 items loaded onto the second factor. One item was excluded from the scale because it measured a single component. The resulting scale, consisting of 2 factors and 15 items, was then prepared for confirmatory factor analysis.

It was aimed to verify the structure of the 2-factor scale created in confirmatory factor analysis. As a result of the modifications applied to the scale, 1 item was removed from the scale. In this case, a total of 14 items remained on the scale, 7 in the first factor and 7 in the second factor. The perceptions of the FLSES confirmatory factor analysis goodness-of-fit index, along with acceptable fit values and good fit values, are given in Table 2.

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Table 2. The goodness of fit index of the FLSES.

	X^2	df	X^2/ df	GFI	CFI	RMSA
Scale	280.61	142	1.976	0.995	1.284	0.043
Good fit values			≤ 3	≥ 0.90	≥ 0.97	≤ 0.05
Acceptable fit value			≤ 4 - 5	0.89 – 0.85	≥ 0.90	0.06 – 0.08

Note: X^2 = Chi Square; df = Degrees of Freedom; GFI = Good Fit Index, CFI = Comparative Fit Index, RMSA = Root Mean Square Errors of Approximation

In Table 2, the indices of the FLSES goodness of fit are given. Results are X^2/df (1.976), GFI (.995), CFI (1.284), and RMSA (0.043). These results reveal that the scale has good fit values.

Following confirmatory factor analysis, the factor loadings of the scale items were found to range between 0.477 and 0.691. In the final stage, Cronbach's Alpha coefficients were calculated for the FLSES scale, revealing reliability values of 0.88 for the flipped education sub-dimension, 0.84 for the informatics sub-dimension, and 0.85 for the overall scale. These findings confirm that the scale is suitable for implementation. The scale was designed using a 5-point Likert format, with evenly distributed item score ranges: 1.00–1.80 (Strongly Disagree), 1.81–2.60 (Disagree), 2.61–3.40 (Partially Agree), 3.41–4.20 (Agree), and 4.21–5.00 (Strongly Agree).

2.3.2. Student Interview Form

Interviews were planned with 25 randomly selected students from the research participants to provide an in-depth evaluation alongside the data collected through the FLSES. To facilitate this, the researchers developed a student interview form containing three questions for face-to-face discussions. The form was reviewed by two experts to assess the clarity of the questions, and revisions were made accordingly. Following expert feedback, the finalized interview form was deemed ready for implementation. The findings section of the study presents the semi-structured interview questions along with students' responses.

2.3.3. Flipped Computer Training

The training is designed to last approximately 5 weeks. Participation of all students who constituted the sample group of the research was ensured. During the education process, computer lessons were given to the students with the flipped classroom model. The course contents were provided by the training field expert, who created the curriculum by editing. Videos have been prepared for use in flipped classroom model applications. The videos were prepared according to the principles of creating teaching materials. Care has been taken to ensure that they are simple and clear, suitable for the purpose and behavior of the course, considering the developmental characteristics of the students, and including important points and summary information.

Week 1: The interface and features of the block-based programming tool were introduced. In the course contents, it was ensured that the students came by watching the videos on the subject at home. After watching the subject, the students were prepared for the computer lessons in their classrooms. They noted the points they did not understand about the subject at home.

Week 2: Functions of a program presented in a block-based programming tool were explained, and debugging was taught. The students took notes by watching the video in advance and asked questions they noted in the classroom environment. The project explained in the course and the video was implemented in the classroom environment, and students were allowed to reinforce the subject.

Week 3: It is designed to debug a program presented in a block-based programming tool. A program presented in the block-based programming tool was developed and edited according to the given criteria. A different project was carried out to reinforce the subject in the classroom environment with a group of students who know the subject. Students' questions were answered, and parts of the subject that were not understood were completed.

Week 4: Programs containing linear logic structures were created. Errors were debugged by testing programs that contained linear logic structures. Programs containing decision structures were created. Programs containing

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decision structures have been tested. In the classroom environment, the students were divided into groups, discussed the subject, and then reinforced the subject with the question-and-answer technique.

Week 5: Programs containing linear logic structures were created. Programs containing linear logic structures have been tested. Programs containing the decision structure were created and debugged. Programs containing multiple decision structures have been created and tested. Programs containing the loop structure have been tested. In last week's lesson, a brief repetition of the subject was made in the classroom process; important points were highlighted. Group studies were carried out on the use of detection and transaction blocks.

For 5 weeks, the students were provided with the opportunity to access the course contents by preparing at home, and the projects were carried out by explaining the points that were not understood in the classroom environment. At the end of the 5-week training, the students applied the FLSES scale and the student interview form.

2.4. Data Collection Process

Following the flipped computer training, the scale was administered online to the participating students. For the qualitative component of the study, student interview forms were implemented through face-to-face interviews. The data collection process, encompassing both quantitative and qualitative methods, was completed within approximately three weeks. The completion time for the FLSES was around 20–25 minutes, while the face-to-face interviews lasted approximately 15–20 minutes per student.

2.5. Compliance with Ethics

This research was approved by Sh. Ualikhanov Kokshetau University, Kazakhstan, in 2023, with the approval number "2023/213". All stages of the research were carried out with the knowledge of the school administrators and computer lesson teachers, where the students who constituted the sample group of the research were educated. The participants in the present research were informed about the content of the research. A voluntary participation form stating that all students voluntarily participated in the research was completed. A commitment has been made to the students that their personal information will be kept confidential while the research findings are shared.

2.6. Data Analysis

The quantitative data analysis was conducted using SPSS 25.0. To assess the normality of the data distribution, the Kolmogorov-Smirnov test was applied. In addition to the test result ($p<0.05$), the Skewness-Kurtosis test was found to have values between Skewness = -0.55 and Kurtosis = 1.11. The results obtained indicate the normal distribution of the data. In this context, parametric tests were applied to the data obtained in the FLSES. The independent samples t-test was used in the analysis of bivariate data, and one-way analysis of variance (ANOVA) was used in the analysis of data with more than two variables.

Qualitative data are analyzed using the content analysis method. Content analysis primarily focuses on the collected data. The parts of the data that are repeated frequently and that the sample group of the research emphasizes are identified and coded. Codes with similarities are grouped into categories, and categories are organized under themes to be considered within a broader framework. Thus, the views of the participants are systematized (Bengtsson, 2016). By following the steps of this method, the answers given by the students to the questions in the student interview form were converted into tables with frequency and percentage calculations.

3. RESULTS

3.1. Findings on the FLSES

In Table 3, the sub-dimensions of the FLSES and the weighted average and standard deviations of the overall scale are given.

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Table 3. Weighted mean and standard deviations of the FLSES scale.

	M	SD
1. Sub-dimension: Cognitive	3.78	0.684
2. Sub-dimension: Emotional	3.86	0.677
The Total FLSES	3.82	0.654

Table 3 shows the cognitive sub-dimension (M=3.78, SD=0.684), the emotional sub-dimension (M=3.86, SD=0.677), and the FLSES (M=3.82, SD=0.654) weighted means and standard deviations are provided. These data reveal that students have a high degree of attitude in the cognitive sub-dimension, the emotional sub-dimension, and the FLSES.

In Table 4, the results of the FLSES independent variables t-test, which were analyzed based on the gender variable of the students participating in the research, are provided.

Table 4. T-test results of independent variables according to gender variable.

Scale and sub-dimensions	Gender	N	*M*	SD	t	p
Cognitive	Female	104	3.75	4,645	2,557	0.493
	Male	93	3.8	4,832		
Emotional	Female	104	3.81	6,740		
	Male	93	3.89	6,932		
Overall Scale	Female	104	3.78	4,432		
	Male	93	3.84	4,751		

In Table 4, the general and sub-dimensions of the FLSES of the students participating in the research are given according to the gender variable as a result of the t-test. There was no significant difference between female students (M=3.75, p>0.05) and male students (M=3.80, p>0.05) in the cognitive sub-dimension. In the emotional sub-dimension, there was no significant difference between female students (M=3.81, p>0.05) and male students (M=3.89, p>0.05). There is no significant difference between female students (M=3.78, p>0.05) and male students (M=3.84, p>0.05) across the FLSES.

3.2. Findings on the Student Interview Form

In Table 5, the opinions of the students participating in the research regarding their preference between the flipped learning environment and the traditional learning environment in teaching the computer lesson are evaluated.

Table 5. Opinions of the students on which of the flipped learning environment and traditional learning environment they prefer in the computer lesson.

Category	f	%
Flipped learning environment	18	72
Undecided	4	16
Classroom environment	3	12
Total	25	100

In Table 5, the views of the students participating in the research regarding their preferences for the flipped learning environment versus the traditional learning environment in teaching the computer lesson are discussed in three categories: flipped learning environment, undecided, and classroom environment. Among the students participating in the study, 72% expressed a preference for the flipped learning environment, while 16% remained undecided, and 12% favored the traditional classroom setting.

In Table 6, the views of the students participating in the research on the advantages of computer lessons in a flipped learning environment are evaluated.

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Table 6. Students' views on the advantages of teaching computer lessons in a flipped learning environment.

Category	f	%
Provide an opportunity to reinforce the topic	20	80
Ensuring persistence in learning	18	72
Increasing motivation	15	60
Saving time	11	44
Enabling working with the group	8	32
Strengthening communication	5	25
Active participation	2	8

In Table 6, the views of the students participating in the research on the advantages of computer lessons in a flipped learning environment are categorized. 80% of the students answered that it provides the opportunity to reinforce the subject, 72% indicated it offers permanence in learning, 60% stated it increases motivation, 44% mentioned it saves time, and 32% noted it facilitates group work. Additionally, 25% of the students stated that it strengthens interaction, and 8% of the students expressed active participation as the advantages of teaching computer lessons in a flipped learning environment.

In Table 7, the views of the students participating in the research on the disadvantages of computer lessons in a flipped learning environment are evaluated.

Table 7. Students' views on the disadvantages of teaching computer lessons in a flipped learning environment.

Category	f	%
No disadvantages	14	56
Difficulty adapting to the new form of education	7	28
Not being able to find immediate answers to questions	4	16
Having difficulty in situations where there is no internet and a computer	3	12
Not understanding the subject when you go to class unprepared	1	4

In Table 7, the views of the students participating in the research on the disadvantages of computer lessons in a flipped learning environment are categorized. 56% of the students stated that there is no disadvantage to teaching computer lessons in the flipped learning environment. 28% of the students answered that it was difficult to adapt to the new education style, 16% could not find answers to the questions immediately, 12% had difficulties when there was no internet and computer, and 4% did not understand the subject when they went to the lesson unprepared.

4. DISCUSSIONS

Students participating in the study have been determined to have a high degree of attitude in the cognitive sub-dimension, the emotional sub-dimension, and the FLSES. When the research on the subject is reviewed, it is seen that studies show that the model has a positive effect on student success in the relationship between the flipped learning model and success (Fulton, 2012; Overmyer, 2014). Lin (2019) also revealed in his study that the achievement levels of the groups trained with the flipped classroom model were higher than the success levels of the other groups. When the findings from this study are considered alongside existing research in the field, it becomes evident that flipped learning has a positive impact on students. The beneficial effects of the flipped learning model on students' cognitive and emotional development contribute to their overall academic success. This model significantly enhances achievement by fostering active student engagement in the learning process and providing materials that align with individual learning paces. The implementation of this model not only facilitates students' access to information but also helps them cultivate critical thinking, relational understanding, and the ability to apply knowledge effectively. As such, the impact of flipped learning on overall academic success is intricately linked to both cognitive and emotional factors. It was clear that there was no significant difference between male and female students in students' attitudes towards the FLSES scale, and similarly, there was no major difference in terms of students' course

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achievement variable. Kalafat's (2019) study investigating the effect of the flipped classroom model on academic achievement, it was revealed that gender did not make a significant difference. Research indicates that the flipped learning model does not result in significant gender differences. In their study, "Gender-Wise Comparison of Flipped Classroom Strategy on the Performance of Prospective Teachers", Minaz, Tabassum, and Ahmad (2018) discovered that the performance of male and female students was comparable following the implementation of the flipped classroom strategy in mathematics classes. The findings suggest that the structural characteristics and implementation approach of the flipped learning model mitigate potential gender disparities, enabling both male and female students to exhibit similar levels of academic achievement and engagement.

The vast majority of the students who participated in the research stated that they preferred flipped learning environments to traditional learning environments in the computer course. Souza and Rodrigues (2015) compared the flipped classroom method with the traditional classroom method in programming education in their study. The research findings indicate that classes designed using the flipped learning model have a more positive impact on students' academic achievements. Consequently, students' preference for flipped learning environments suggests that this approach better addresses their needs and fosters a more interactive learning experience. The flipped learning model emerges as a highly effective educational strategy, enhancing student success by offering more efficient learning opportunities, particularly in disciplines that demand analytical skills, such as computer courses.

Students learn the advantages of computer lessons in a flipped learning environment; they listed them as providing the opportunity to reinforce the subject, ensuring permanence in learning, increasing motivation, saving time, enabling group work, and strengthening interaction and active participation. Vojinovic, Simic, Milentijevic, and Ciric (2020) revealed in their study that flipped classroom environments are effective in providing permanence in learning. In their research, Awidi and Paynter (2019) determined that the flipped classroom model had a positive effect on motivation. Davies, Dean, and Ball (2013) revealed that with the flipped classroom model, individual learning opportunities and time savings are provided to students without space and time limitations. These findings reveal that the model offers not only cognitive benefits but also emotional and social advantages. The ability for students to learn at their own pace, coupled with the use of class time for practical activities, has made the learning process more efficient and engaging. This model stands out as a method that enriches the learning experience and increases students' success, especially in technical courses. Students, the disadvantages of computer lessons in the flipped learning environment are difficulties in adapting to the new education style, not being able to find answers to questions immediately, experiencing difficulties when there is no internet and computer, and not understanding the subject when they go to the lesson unprepared. The majority of the students participating in the research stated that there is no disadvantage to teaching computer lessons in a flipped learning environment. Strayer (2007) revealed in his research regarding the flipped classroom model that students could not easily give up their old habits and therefore could not easily adopt the new model. Talbert (2012) on the other hand, it was stated that with the flipped classroom model, when students watch the videos at home, they cannot immediately ask teachers questions about the points they do not understand, so this situation can create a disadvantage for the realization of learning. The findings and the results of the present research reveal that there are some difficulties in the implementation of the model, but these are generally temporary and can be solved with appropriate support mechanisms. The reverse learning model will continue to increase students' success and enable them to participate more actively in the learning process when appropriate guidance and technological support are provided.

5. CONCLUSION

In the age of technology, education and training practices are also changing due to technological advancements. Students must receive education through the flipped education model, which is one of the new educational approaches influenced by modern technologies in computer courses. Therefore, this study aims to evaluate the effect of flipped learning environments on computer lessons.

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The results obtained from the research reveal that after the flipped computer education, students' FLSES scores are high. There is no significant difference in the attitudes of the students towards the FLSES according to the variable of gender.

The vast majority of the students who participated in the research stated that they preferred flipped learning environments to traditional learning environments in the computer course. By students, the advantages of computer lessons in a flipped learning environment are expressed as providing the opportunity to reinforce the subject, providing permanence in learning, increasing motivation, saving time, enabling group work, strengthening interaction, and active participation. This indicates that the reverse learning model is a particularly suitable and successful method in computer courses where technology is used intensively.

The disadvantages include difficulty in adapting to the new education style, expressed as not being able to find answers to questions immediately, having difficulties in the absence of the internet and computer, and not understanding the subject when going to the lesson unprepared. The majority of the students participating in the research stated that there is no disadvantage to teaching computer lessons in a flipped learning environment. Despite the advantages, students have also identified certain limitations that highlight areas requiring improvement to enhance the applicability of the flipped learning model. Challenges such as difficulties in adjusting to the new educational approach, issues with access to technological infrastructure, and the inability to immediately reach the instructor are critical factors that must be addressed to increase the model's effectiveness. However, these drawbacks are outweighed by the benefits the model offers to students and do not diminish its overall success.

Ultimately, the flipped learning model demonstrates significant potential in education by making students' learning processes more dynamic, participatory, and individualized. Designed to meet the demands of the technological era, this model not only boosts academic achievement but also provides students with greater responsibility and flexibility in their learning journeys. These findings underscore that implementing the flipped learning model in computer courses not only aligns with the current educational system but also holds the potential to transform learning experiences.

6. RECOMMENDATIONS

This research was carried out with 9th-grade students. Evaluating the effects of flipped learning environments on students at different educational levels will contribute to the field. In addition, the effect of flipped learning environments on students was evaluated in this study. Evaluations by teachers and other stakeholders will reveal the effectiveness of flipped learning environments more comprehensively. The findings obtained as a result of the research show that computer training provided in flipped learning environments is effective. Although it is not possible to generalize the results to all course groups, it is recommended to implement similar applications in different courses.

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