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Original Article

Exploring the Interplay of Distance Education, Learning Styles, and Emotional Experiences in High School Students: A Structural Equation Modeling Perspective

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ABSTRACT

Background: Distance education is an opportunity to overcome the limitations of face-to-face education and has provided the idea of education for everyone and everywhere. The current study aimed to examine the correlation between distance education and learning styles, incorporating the mediating influence of emotional experiences among high school students.

Methods: The research methodology was correlation type. The statistical population comprised all the first-year high school students in Shiraz City during the academic year spanning November 2023 to 2022, with a sample size of 300 individuals selected through convenience sampling. The research tools included Kolb's Learning Styles Questionnaire, Sekou and Samson's Distance Space Questionnaire, and Pekrun et al.'s Emotional Experiences Questionnaire. The data analysis involved utilizing Pearson's correlation coefficient, path analysis, and structural equation modeling through SPSS V26 and Amos V24 software.

Results: The results of the present study showed a significant and positive correlation between learning styles and positive emotions. The coefficients indicated a significant correlation between positive emotions with concrete experience (r=0.21, P=0.01), reflective observation (r=-0.25, P=0.01), conceptualization (r=0.18, P=0.02), and concrete experience (r=0.32), (P=0.01). Negative emotions showed a weak correlation with objective experience (r=-0.19, P=0.02) and observation of reflection (r=-0.21, P=0.01), while no significant relationship was found between negative emotions and the abstract conceptualization learning style (r=0.07, P=0.09). There was also a significant correlation between learning styles and distance education. There was a negative correlation between distance education and objective experience (r=-0.18, P=0.02), while there were positive correlations with reflective observation (r=0.35, P=0.01), abstract conceptualization (r=0.42, P=0.01), and another positive correlation with reflective observation (r=0.29, P=0.03).

Conclusion: The results showed that positive emotions can help improve distance education even when the student's learning style is objective experience or active experimentation.

Keywords: Distance, Education, Learning Styles, Emotional Experiences, E-learning, Students

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Introduction

Distance learning offers live interactive communication to students, and the COVID-19 pandemic has increased focus on this educational approach (1). As a result, distance learning has become one of the most commonly used educational methods, from elementary to university levels (2). One possible way to implement this approach is through delivering training via distance networks (3). Therefore, there is a need to examine distance educational methods, as it has become a critical issue in the development of educational technology (4).

Researchers argue that incorporating modern information technologies is essential in education (5). Before implementing new technologies in education, it is crucial to assess the efficacy of utilizing virtual space in teaching and learning, as well as the advantages it provides to the learner (6). According to some research, virtual education has the potential to facilitate the acquisition of advanced skills and tasks in a secure and controlled virtual setting (7).

On the other hand, it can be undoubtedly said that most learners are interested in the technical aspect of digital activity in education. Experience has shown that they need time to develop the readiness to use the vast possibilities of cyberspace consciously. In this way, experts are convinced that improving the educational environment to use digital tools should be recognized as one of the essential conditions for improving the quality of education (8). Therefore, the emergence of the Internet has changed teaching and learning methods (9). Using distance learning platforms results in a rise in the utilization of various databases. Distance education allows interaction between the learner and the factors involved in the education process, even when they are not physically present (10).

With the use of "distance learning" it is possible to overcome the limitations of the educational system in the best way (11). This educational method is the right way to achieve the goal of education for everyone and everywhere, in the sense that with the help of this method, high-quality education can be provided to the public, and learners have access to appropriate education wherever they live. Distance education can be referred to as an industrial method of teaching and learning. (12). this educational method can also be defined as a subset of educational methods in which the teacher and student communicate through electronic devices (13).

To better carry out the teaching-learning process individually in education, researchers such as Keefe (14), Kolb (15), and Musa (16) have tried to examine individual differences, and after numerous studies and examination of behavioral models, they have arrived. The conclusion is that students' learning styles should be considered in the learning process. Attention to learning styles improves the educational situation (14-16). The concept of "learning styles" means which method of teaching or studying is more effective for people, and in these cases people are different. Proponents of studying learning styles believe that optimal education requires identifying people's learning styles and tailoring education. (16). In learning styles assessments, people are asked what type of information they prefer (verbal or visual instruction) or which type of mental activity they find more engaging or appropriate (analyzing or listening). The perspective of learning styles has gained much influence in education and is often essential at different levels, from kindergarten to graduate education (15, 16).

Many institutions provide educational workshops for teachers to establish classroom settings that align with the theory of learning styles (17). One of the common styles is Kolb's theory of learning styles (18). This theory was developed to help improve learning. According to Kolb (19), the process of learning involves four distinct stages, which include actively engaging in an action and then reflecting on the experience (thinking about that action), abstract conceptualization (building a theory), and active experimentation (testing a theory). From the combination of these stages, four learning styles have emerged: divergent

style (examining objective situations from different angles and organizing them), convergent style (solving problems using thinking and practical reasoning), absorption style (organizing information and getting help from Abstract concepts). to understand the situation). Active experimenter style (doing practical work, implementing plans, and gaining experience) (20).

Experts in the field of education have pointed out the influence and importance of learning styles in traditional education and realized their importance; however, limited research has been conducted on the significance of students' learning styles in virtual learning environments (21). Learning preferences vary among individuals. Students' behavioral patterns may be determined through their interaction with the educational environment, whether a traditional or distance classroom. Therefore, examining the dominant learning style in connection with distance education is necessary. According to researchers, everyone uses different learning styles, although one usually dominates (22). Therefore, all learners develop learning styles, but one is more dominant. What is important is that people's learning styles are recognized and considered in the learning environment. Learning is impacted by one's learning style, yet it is crucial to consider the impact of emotional factors on the learning process. Emotional orientation can affect learning style, and paying attention to it helps professionals and teachers to adopt the best teaching techniques and approaches (23).

Li et al. believe that emotions and feelings are effective in the educational process, so it is essential to pay attention to emotional issues in education (24). Negative emotions can impact a student's learning and academic advancement and cause hostile, dangerous, and unbearable feelings in the learner, so it is necessary to pay attention to them (25). Positive learning experiences lead to more participation in school activities (26). On the other hand, negative emotional experiences can increase a person's desire to stay away from the educational environment. Those who have negative experiences in school are not interested in the educational environment and eventually drop out (27). The dropout problem has increased, especially in distance education, and this issue has been reported by various educational institutions and environments (28). In general, research shows that negative educational experiences can affect the learning process more than positive experiences (29).

The teaching and learning method itself can affect the level of excitement experienced. About this issue, Dhawan points out that face-to-face training can bring more positive excitement to learners and be more challenging (30). Therefore, in the case of distance and digital education, it is necessary first to provide the ground for its implementation. Although the educational system tries to optimize education through distance space, the students, teachers, and schools are not ready for education. Distance teachers do not have the necessary preparation, and as a result, mental state, mental and emotional distress should be considered in connection with distance education, so what is important is to examine the best method of online education (31, 32). Several research findings indicate worries regarding the psychological well-being of students in the context of online learning, especially when learners are forced to suddenly switch to virtual education, which can lead to increased depression and anxiety. Therefore, it is necessary to pay attention to emotional experiences. It seems that the online teaching method can intensify the negative feelings of fear and anxiety of the learners (33). It is essential to mention that the condition of emotions and mental health about distance education during the COVID-19 pandemic has been a significant topic of discussion at the university level. However, a wider perspective on the emotional state of students still needs to be created (34). Therefore, considering the importance of distance education, the ambiguity of its advantages and disadvantages, and the lack of research on the impact of academic emotions and learning styles on distance education, the present study attempts to test and model the

correlation between distance education and learning styles to deal with the mediating role of positive and negative emotions in first-year high school students (Figure 1).

Methods

Study Design and Setting

The current research is a descriptive-correlation study based on the Structural Equation Model (SEM). This research was conducted in the academic year of 2022-2023 in November among the first high school students of Shiraz City.

Participants and Sampling

The population was the students in the first grade of secondary school in Shiraz city. Also, the entry criteria included 1: full consent to participate in the research, education level (first high school), and exit criteria were not interested in completing the research.

The present statistical population is the first secondary-level students of Shiraz city who were studying in public schools. Their number was 47967, and they were selected by the available sampling method. Because the SEM has been used in this research, in this type of research, the number of samples should be 2.5 to 7 times the number of items (35). (150 students were female, and 150 were male), and their average age was 14.

Tools / Instruments

In this research, three standard questionnaires have been used:

Q1. Distance Space Questionnaire: Sekou and Samson's questionnaire (36) was used to questionnaire distance education. This questionnaire measures readiness for virtual education, such as learning through virtual space or readiness to accept the education process through technology. This questionnaire, which measures readiness for distance education in the form of 49 items and on a five-point Likert scale in the range of very low (1) to very high (5), was used. This questionnaire was standardized by Ahmadian et al., and its reliability was obtained using Cronbach's alpha (0.89), which shows good reliability. The method used to determine validity was factor analysis, and the fit indices were GFI=0.91, RMSEA=0.04, CFI=0.90, and AGFI=0.91.

Moreover, it shows that the reliability index of this questionnaire is suitable for measuring virtual education. The validity of this questionnaire was assessed using confirmatory factor analysis.

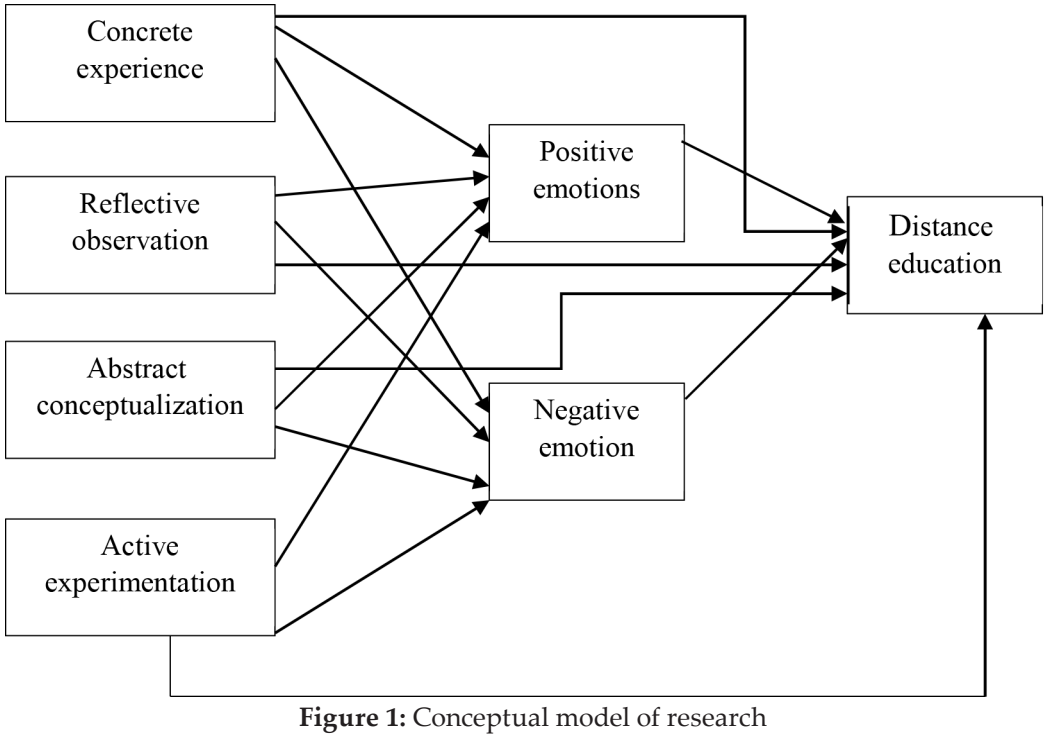

Figure 1: Conceptual model of research

In this research, the Cronbach's alpha coefficient was found to be 0.79. Also, content validity was checked and calculated using the CVE method. For this purpose, the questionnaire was sent to 18 experts, 15 of whom chose the options "need to be investigated" and "are completely relevant". Considering the obtained value was higher than 0.79, the content validity was acceptable, with a CVE of 0.83.

Q2. Learning Styles Questionnaire: The learning styles questionnaire is designed based on the theory of experiential learning. It includes two dimensions of objective experience - abstract conceptualization and reflective observation - active experiment, and there are four convergent, divergent, and adaptive learning styles. This questionnaire consists of 12 sentences, and four options are suggested for each sentence. The subject rates the proposed answer according to his learning style from 1 to 4. The highest score and the lowest score were 4 and 12, respectively. Also, content validity was checked and calculated using the CVE method. To this end, the questionnaire was sent to 15 experts, 8 of whom chose the options "need to be investigated" and "are completely relevant". The content validity was acceptable, considering the obtained value was higher than 0.79 with a CVE of 1.87.

In 1985, Kolb (19) investigated the content validity of this questionnaire with research he conducted on 1446 male and female students in the second year of the university. He believes that this questionnaire has good validity and is a suitable tool for identifying learners' learning methods and styles. In the most recent research conducted by Wilcoxon, the content validity of this test was examined and the results showed that the questionnaire has suitable validity. (37). This means that a question was asked for each subscale (area), that a question was asked for each subscale (area) that measures the content of that area; Kolb also, in his research, the reliability coefficient of the learning style questionnaire. Objective experience 0.80, reflective observation 0.75, abstract conceptualization 0.79, active experimentation 0.70 has been reported in the present study, Cronbach's alpha coefficient for objective experience is 0.77, reflective observation 0.70, abstract conceptualization 0.75, active experimentation 0.73 was obtained. Also, content validity was checked and calculated using a CVE method. Thus, the questionnaire was sent to 18 experts, 16 of whom chose the options "need to be investigated" and "are completely relevant". The content validity was acceptable, considering the obtained value was higher than 0.79 with a CVE of 0.88.

Q3. Academic Emotions Questionnaire: The academic emotions questionnaire is designed by Pekrun et al. (38). This questionnaire consists of 75 items that measure academic emotions with a five-point Likert scale. The questionnaire contains questions about emotions related to the exam, emotions related to the class, and emotions related to learning. Items 1 to 22 belong to positive emotions (for example, I enjoy acquiring new knowledge), and items 23 to 75 belong to negative emotions (for example, studying makes me angry). The lowest score is 22, and the highest score is 110. This questionnaire was adapted by Kadivar, Farzad, Kaousian, and Nikdel in 1388. Cronbach's alpha was 0.94 and it was obtained through Gutman (halving) 0.95. This questionnaire has been validated in Nikdel et al.'s research (39). This research found that the Cronbach's alpha coefficient of the research questionnaire was reported as 0.88. In the present study, Cronbach's alpha coefficient was 0.77. Also, the CVE method was used to calculate the content validity of the questionnaire. For this purpose, the questionnaire was sent to 18 experts, 17 of whom chose the options "need to be investigated" and "are completely relevant". The content validity was acceptable, considering the obtained value was higher than 0.79 with a CVE of 0.94.

Data Collection

The participants engaged in the research by providing written informed consent and responding to the questionnaires voluntarily.

The research objectives were explained to them, and the questionnaires were collected and analyzed anonymously. Additionally, all ethical considerations were upheld, including the authors' and participants' rights and study design.

Data Analysis

The obtained data were analyzed using Pearson's correlation coefficient, path analysis, and structural equation modeling (SEM). SEM combines path analysis with factor analysis and allows for examining complex correlations between variables. The analysis was conducted using SPSS 26 and AMOS 24 software, which are commonly used for statistical analysis and SEM.

Results

The demographic information of the participants (300 first-grade high school students) is reported in Table 1. Descriptive information such as the average, skewness, and kurtosis of the variables studied is reported in Table 2.

Table 2 shows the highest dispersion in negative emotion and the lowest dispersion in distance education. The coefficients of skewness and kurtosis were between -2 and +2, which indicates the normal distribution of the research variables.

To determine the correlation between research variables, Pearson's correlation coefficient test was used. The correlation coefficients are reported in Table 3.

As shown in Table 3, most of the correlations between model variables are significant. The highest coefficient (0.87) was related to positive and negative emotion, and the lowest was related to absorbing learning and negative emotion (0.05). The significance of the correlation between the variables is a license to carry out further analysis.

Before entering the research conceptual model test, the basic assumptions of modeling, including missing data, outliers, and the normality of the distribution of variables, were examined. Since multiple collinearity can distort the multiple interpretations, it is necessary to check it.

Table 1: Demographic information of participants

Variables		Frequency (percentage)
		N
Gender	Female	125 (50)
	Male	125 (50)
Parents' Education	Father	
	Diploma	52 (20.8)
	Bachelor's degree	134 (53.6)
	Master's degree/Ph.D.	64 (25.6)
	Mother	
	Diploma	63 (25.2)
	Bachelor's degree	141 (56.4)
	Master's degree/Ph.D.	46 (18.4)
Age (Year)	Mean (For males 14.7±1.8), (For females 14.7±1.8)	

Table 2: Descriptive statistics on the variables studied

Variables	Mean (SD)	CV	Skewness	Kurtosis
Distance education	138 (2.34)	1.96	0.23	0.88
Concrete experience	8.32 (3.41)	0.4	-0.92	0.39
Reflective observation	9.05 (4.65)	0.51	-0.80	0.22
Abstract Conceptualization	8.79 (5.14)	0.58	0.49	-0.87
Active experimentation	10.03 (3.76)	0.37	0.73	0.34
Positive emotions	58 (5.39)	0.09	0.36	0.58
Negative emotion	75 (5.44)	0.07	-0.86	0.77

Table 3: A matrix showing the relationships between the variables studied in the research

Variables	1	2	3	4	5	6	7
Distance education	1						
Concrete experience	-0.19*	1					
Reflective observation	0.34**	-0.26**	1				
Abstract conceptualization	0.29**	-.21**	0.51**	1			
Active experimentation	-0.20**	0.44**	0.47**	0.09	1		
Positive emotions	0.48**	0.35**	0.59**	0.22**	0.46**	1	
Negative emotion	-0.26**	-0.29**	-0.37**	0.05	-0.26**	0.87**	1

Therefore, to check the multiple collinearity of predictor variables between tolerance statistics and variance inflation coefficient, based on the obtained results, the variance inflation values obtained for the variables are above 0.01, which indicates the absence of multiple collinearity. The value of the variance inflation factor obtained for each variable was smaller than 10, which indicates the multiple non-linearity of the predictor variables. Then, the parameters for measuring the direct effects of the variables in the modified final model were calculated, and the result is reported in Table 4.

As shown in Table 4, all the path coefficients related to the final model are significant except the abstract conceptualization style for negative emotion. Resampling was used to investigate the significance of indirect paths through emotional experiences on distance space. The results are shown in Table 5.

Table 5 shows the results obtained from the bootstrap test. The proposed model was confirmed, as it was the mediating role of emotional experiences in distance space. A range of measures was employed to assess the model's fit (Table 6).

As shown in Table 2, several indicators have been examined to check the model's fit. Chi-square degrees of freedom (x2/df), goodness-of-fit index (GFI), adjusted fit index (AGFI), P-value, comparative fit index (CFI), and root mean square error of approximation (RMSEA) are presented. The path diagram and estimated parameters of the fitted model are shown in Figure 2.

Discussion

The current study was carried out with the objective of modeling distance education about learning styles with the mediating role of students' emotional experiences. A total of 300 students entered the study (150 people were girls and 150 were boys), and their average age was 14 years.

Table 4: Measurement parameters of the direct effects of the modified final model variables

Parameter routes	β Standard estimate	B Non-standard assessment	P value
Concrete experience to positive emotion	0.21	0.35	0.01
Reflective observation to positive emotion	0.25	0.41	0.01
Abstract Conceptualization to positive emotion	0.18	0.27	0.02
Active experimentation to positive emotion	0.32	0.5	0.01
Concrete experience to negative emotion	-0.19	-0.26	0.02
Reflection Observing to negative emotion	-0.21	-0.24	0.01
Abstract conceptualization to negative emotion	0.07	0.12	0.07
Active experimentation to negative emotion	0.25-	0.30	0.01
Concrete experience to distance education	-0.18	-0.32	0.02
Reflective observation on distance education	0.035	0.52	0.01
Abstract conceptualization to distance education	0.42	0.61	0.01
Active experimentation to distance education	0.29	0.44	0.03
Positive excitement to distance education	0.51	0.73	0.01
Negative emotion to distance education	-0.53	-0.78	0.01

Table 5: Bootstrap results between independent, dependent, and mediator variables

Components	Estimated value	Lower limit	Upper line	P value
Concrete experience in distance education through positive emotion	0.03	0.008	0.07	0.02
Reflective observation on distance education through positive emotion	0.05	0.005	0.06	0.01
Abstract conceptualization of distance education through positive emotion	0.04	0.03	0.08	0.03
Active experimentation of distance learning through positive emotion	0.03	0.006	0.07	0.02
Concrete experience to distance education through negative emotion	0.04	0.01	0.06	0.02
Observing reflection on distance education through negative emotion	0.05	0.03	0.06	0.03
Abstract conceptualization of distance learning through negative emotion	0.02	0.01	0.07	0.01
Active experimentation of distance learning through negative emotion	0.05	0.02	0.054	0.02
P<0.05				

Table 6: The final fit indicators of the research

Index	Estimation	Optimal values
(x2/df)	2.57	<3
TLI	0.91	>0.90
CFI	0.93	>0.90
GFI	0.91	>0.90
NFI	0.92	>0.90
AGFI	0.91	>0.90
RMSEA	0.05	<0.80

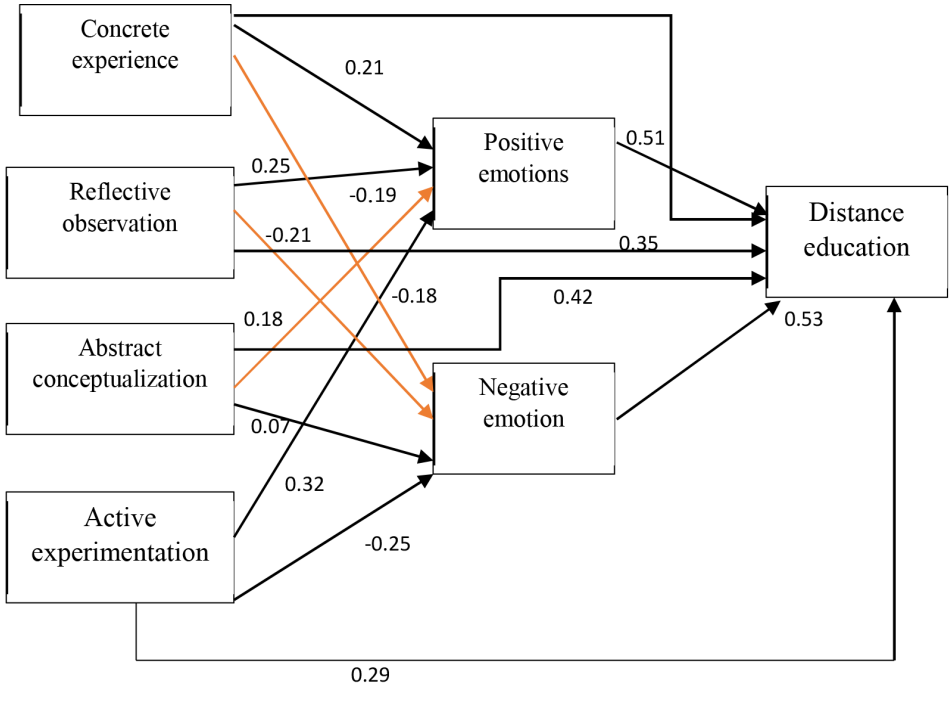

Figure 2: Diagram of the direct effects of the path and parameters of the fitted model.

Due to the possibility of not completing the questionnaires, 350 people were given questionnaires and 50 questionnaires were discarded due to being distorted, so 300 people were considered as the sample group. The study findings indicated a correlation between emotional experiences and learning styles. Positive emotional experiences have a positive correlation with all learning styles, and negative emotional experiences have a negative correlation with objective experience, reflective observation, and active experimentation. Also, negative emotional experiences have no significant correlation with abstract conceptualization style. These results are consistent with other researchers' studies (16, 17, 23). However, it does not agree with some research results (42-44). Noteborn et al. believe that if the learner feels the assignment or class is valuable, he/she will feel positive. However, if they feel that the lesson or class is worthless, they feel negative. Especially in cyberspace, if students feel that the assignment is valuable, they experience a positive emotion, and if they feel the assignment is worthless, they experience a negative emotion (43).

The results of Habibi et al.'s research (23) showed the relation between different listening, visual, and reading/writing learning styles with emotional orientation and feelings. The findings of the study revealed a strong and positive correlation between all learning styles and positive emotions.

In explaining this finding, students with positive academic and emotional experiences enjoyed learning and used their learning style to learn course topics. Students regarding the type of learning style were the same. When students with any learning style entered the classroom with positive emotions and feelings, the learning process was attractive.

Therefore, the presence of positive educational emotions can make class sessions attractive for students. Students who have a positive attitude toward their academic affairs, regardless of their learning style, participate responsibly, independently, and with interest and perseverance in their learning process and pursue their academic and learning activities. However, students with negative emotional experiences, instead of learning, get involved in negative emotions, and as a result, they avoid school. Positive experiences help the student to learn how to deal with the material, and negative experiences lead to escape from the learning environment. Negative academic emotional experiences create a negative attitude towards all academic matters (classroom, course materials, teacher, school, and the like). Therefore, a student with a negative attitude is not interested in lessons, learning, and active presence in the classroom, and his presence is only due to compulsion and homework completion. Regardless of this student's learning style, his negative academic emotions hinder his movement, activity, participation, and learning in the classroom.

The findings indicated a correlation between emotional experiences and the way of distance education in such a way that positive emotional experiences have a positive correlation with distance education and negative emotional experiences have a negative correlation with distance education. The stated findings are consistent with the research results of other researchers (21, 24, 34, 40). However, it does not agree with the results of some research (43, 44). Aballay et al. believe that although emotions can be effective in learning, they pointed out that, especially in virtual learning, various factors can be practical, and the emotions and experiences of the learners are not always effective (44). Shernoff et al. investigated the correlation between emotional states and academic performance in 339 students (4). The results showed that academic emotions are effective and valuable in teaching and learning. Salvador et al. (34), in a study on students regarding the correlation between emotions and distance education, concluded that distance education can be affected by positive academic emotions and can create positive emotions such as hope in a person. An unplanned distance education without

considering the conditions and characteristics of the students and especially their learning styles, can create negative feelings in students (34). Based on the results of this research, positive academic emotional experiences in education can create positive academic attitudes in students. The critical point of this study is the importance of creating a conducive environment in schools to foster favorable attitudes among students towards all aspects of school, including curriculum, teaching methods, teacher behavior, assignments, and evaluation. Therefore, according to the results of this part of the research, positive emotional experiences of students, regardless of learning style, lead to active participation and effective participation of students in distance education classes. Therefore, it is necessary first to identify the root of the formation of a negative attitude towards lessons and education in these students through expert consultants, and the main factors, control, and necessary reforms should be carried out to form the basis for the formation of positive thoughts towards school affairs in the students. The requirement of such a change is the need for the comprehensive cooperation of school staff, parents, and students' coaches, and the diligent follow-up of students' behavioral and academic status.

In explaining this finding, it can be said that in the first place, the educational system should justify the teachers and school staff regarding the consequences of their behavior on the student's attitude. If a student has negative academic experiences, his problems should be resolved under the guidance of a counselor. Creating positive emotions with the teacher's help and the educational system can prepare students for distance education. Suppose the educational system aims to help students improve their academic status. In that case, it is necessary to consider the characteristics of students and plan based on those characteristics and improve teacher-student interaction or teacher-school interaction. The educational system can reach this goal by paying attention to the factors related to academic emotions.

According to the results of this research, academic emotions as a mediating variable can cause a positive or negative correlation between learning styles and distance education. According to the results of this research, there are two critical points here. First, the students' academic emotions should be checked before providing distance education. In cases where a student displays a negative attitude, it is essential to provide appropriate counseling interventions to establish a more positive outlook. Positive emotional spaces must be created for active participation and the presence of learners in the learning process. Without emotional arousal, not only the level of involvement of people in learning tasks will decrease, but also the effectiveness of activities will be low due to the lack of use of all cognitive capacities. On the other hand, when emotions are involved in learning, information retrieval and accuracy happen faster. Therefore, teachers can create the necessary motivation to participate in the learning process with humor, fun, exploration, and so forth. (41). Besides identifying students' learning styles, teachers should design distance learning environments that strengthen students' positive emotions towards distance education following their learning style. For instance, students may have a learning style that includes objective experience, reflective observation, and active experimentation. Therefore, teachers must create a distance learning environment considering these learning styles to enhance students' educational experience. To make distance learning more engaging and effective, it is essential to use attractive visual images, along with audio and video content. The pages should also have concise and expressive text that's easy to understand. By doing this, students will be more interested in attending the classes and actively participating in their learning process, gaining valuable experiences. Indeed, a distance learning space that contains long, complex content and lacks the necessary standards for designing a suitable distance learning space cannot help students' active participation and

attendance in academic matters and arouse their enthusiasm for learning.

Limitations and Suggestions

Due to the novelty of the subject of this study, the research background needed to be improved, and there were few sources related to the topic. Using a questionnaire as the only tool for data collection increases the possibility of error. Considering that the sample group of this research was first-year high school students, generalizing findings to other samples should be done carefully and with caution. Conducting similar research in other countries and sample groups is suggested. Considering the increasing growth of virtual education, it is suggested to investigate the effect of various variables, such as personality and emotional and behavioral problems, on virtual education.

Conclusion

The findings of this study indicated that academic emotions can mediate the correlation between learning styles and virtual education. In this sense, while learning styles are an important aspect of virtual education, it is important to consider academic emotions before providing instruction. Therefore, it is necessary to check the student's learning style before providing educational content, but in addition, the student's academic emotions should also be considered because in virtual classes it is easier for students to leave the class and students can easily They can leave the class or it is easier not to pay attention to the content of the class. However, by creating positive experiences in the student, the willingness to attend the class can be increased, and as a result, the student attends the class with motivation and interest.

Acknowledgment

All participants who completed the questionnaires are gratefully acknowledged.

Authors' Contribution

AM was responsible for the design and conceptualization of the research, as well as the collection and analysis of the data. Additionally, he drafted the manuscript. PZ and KhP supervised the methodology and data analysis. All authors provided critical feedback and approved the final version of the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

Ethical Consideration

All participants involved in the research were provided with written informed consent and responded to the questionnaires voluntarily. The research objectives were clearly communicated to them, and the questionnaires were collected and analyzed anonymously to ensure privacy. Furthermore, all ethical considerations, including authors' rights and study design, were duly respected.

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