

Views of mathematics teachers regarding creating classroom climate

Nurdan Ozreberoglu Kirikkaleli¹, Neşe Serol²

¹Department of Primary School Mathematics Teaching, Faculty of Education, European University of Lefke, Mersin, Turkey

²Alsancak Kindergarten, Mersin, Turkey

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ABSTRACT

The fear of failure stops students from thinking logically and processing information in mathematics. Creating an appropriate classroom climate based on every student's ability is crucial to overcoming the prejudices associated with mathematics. In this regard, this study aims to create the best classroom climate approach that will increase interest in mathematics and ensure academic success. For this purpose, mathematicians' views on the classroom climate approach and how they create them were discussed by using qualitative techniques. It was considered that teachers participating in this research are working in 9th grade in state high schools affiliated with the Turkish Republic of North Cyprus Ministry of Education, accepting students through examination. The researchers collected teacher views through a semi-structured interview form and analyzed them using context analysis. The findings showed that teachers were in a hurry to teach and generally paid attention to creating a comfortable classroom climate in which students could express their thoughts and opinions. This situation also revealed a lack of adequate classroom climate approach skills among teachers. Therefore, the classroom climate approaches discussed in this study are expected to make a significant contribution to this field by offering solutions to teachers in creating a supportive classroom climate.

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Corresponding Author:

Nurdan Ozreberoglu Kirikkaleli

Department of Primary School Mathematics Teaching, Faculty of Education, European University of Lefke
Mersin 10, Turkey

Email: nozreberoglu@eul.edu.tr

1. INTRODUCTION

The word classroom climate, derived from Greek, means tendency and guiding [1], and it expresses students' perceptions of their classmates as well as teachers in positive and negative situations [2]. In every classroom, there are climate, perception, or ambiance that affect learning positively and negatively. Accordingly, classroom climate is very important for learning and teaching [3]. Having the relevant literature analyzed, it is determined that classroom climate relates to students' output in the cognitive and affective fields [4]. The positiveness of classroom climate gives opportunity to students to behave positively in the classroom and to share their views easily as well as providing them the opportunity to express their thoughts or views and set rules with their teachers [5].

Since an effective classroom climate is only possible with an effective teacher, teachers should create various classroom climates by taking into consideration appropriate course aims [6]. The classroom climate can be divided into three categories: competitive, collaborative, and individual [7]. It is thought that classroom climate as one of the social system dimensions, scrutinises the effective classroom conditions inside the classroom, and this is only possible with teacher's manners and attitudes inside the classroom. A competitive

classroom climate, in which teachers demonstrate active participation, may assist certain students in being more focused. However, facilitating high-level discussions within a collaborative classroom environment will allow students to reveal their innovative ideas, while a more individualistic environment will allow them to demonstrate their latent power. Moreover, it is also important to organize a regular classroom, to be sensitive to in-class relationships, to provide cooperation when necessary, and to stimulate a competitive climate [8]. For instance, motivating students, creating a democratic learning environment, determining the learning standards, and implementing a cooperative, constructive, and productive classroom management style are considered elements to be considered by teachers [9], [10]. Walfgang and Glickman [11] stated in their study that classroom styles are separated into three interventionist, non-interventionist, and productive classroom management methods and that interactive classroom management significantly affects student success.

In addition, they remarked on the necessity of creating a promotive and productive classroom climate that helps students to express themselves through interactive classroom management by taking into consideration every teacher's different classroom attitudes. In this way, while the socialization of students and revealing their latent powers gives them the opportunity to improve their abilities, teachers play a significant role in creating a climate for its implementation. It is thought that effective learning in creating a positive classroom climate is possible by creating a democratic classroom environment. More effective teacher-student communication, a cooperative classroom climate, and active classroom management can be provided in a democratic classroom environment [12]. It can also be said that teachers' democratic cultural levels influence the creation of a democratic classroom environment. Furthermore, Godfrey and Grayman [13] stated that two principal dimensions should be taken into consideration in creating a classroom climate and a democratic environment considered to be taking learning as an encouraging factor. The dimensions to be considered are said to be the social environment and the environment towards classroom regulation [14]. It can be stated that social ambiance describes the classroom environment, in which interaction takes place, and an environment describes the physical and visual aspects of the classroom.

An individual who develops problem-solving skills grows as a self-confident, creative person able to think independently [15]. It can be said that a society consisting of people who grew up in such a way, can solve every problem possible to be faced. Therefore, it is thought that abilities to make an observation, make an inference, communicate, predict, quantify, establish a relationship between place and time, do functional specification, hypothesize, interpret data, control variables, and do experiments can be improved, especially primarily by the classroom climate, effective classroom management, and learning. The important targeted achievements, particularly in the mental process in mathematics courses are attention, perception, memory, and cognitive skills leading to learning, and it is expected from students passing through a cognitive process to understand the necessary data in order to solve problems, to determine the appropriate way to find a solution and to understand relevant concepts [16]. In this context, it is believed that it is necessary to put emphasis on the classroom climate in which problem-solving skills are taught successfully. Even if it is known that every teacher creates their classroom climate, they should pay attention to encouraging teaching inside the classroom, making arrangements to keep attention, and being sensitive in relationships inside the classroom [14].

In addition, it is also possible to provide an environment that enables students to cooperate and compete when necessary. In this way, it is considered that, besides the teacher's classroom management ability, using different strategies allows for creating a cooperative, democratic, and positive classroom climate where students can feel not only part of the classroom but also feel safe. Adibah [17] stated that student's learning motivation is affected by the classroom climate and school atmosphere and drew attention that students' learning motivation and ways of behavior will be improved by creating an appropriate environment where they can feel safe. Active quality in class is one of the primary factors considered to contribute to creating an efficient education environment. Not only the classroom climate but also the teaching methods and strategies, curricula, and assessments are significant factors [10]. By taking into consideration that every educator can improve the current teaching practice, it is also important to ensure that students become aware of the strengths that develop according to changing needs. It is thought that the teacher's approach to the learning environment, the easy orientation of the students by interacting with them, and the effective teaching process will not be difficult. As such, the objective of this study is to create a classroom climate that will inspire students to succeed academically and increase interest in mathematics. For this purpose, answers were sought to the following questions: i) What are the classroom climate approaches adopted by teachers in their classrooms? ii) What kind of approaches do teachers adopt to create a positive classroom climate? iii) What are the classroom climate approaches that teachers follow in order to eliminate negativities in their classrooms?

2. METHOD

This study was conducted using qualitative research methods. Qualitative research is defined as the process in which people are asked to be questioned using special methods from the daily lives of people in the

social environment [18]. Teacher views were collected from the qualitative research methods by using case study in order to reveal the current situation, and they were provided to express their experiences in their classes. In other words, a case study was used to determine what approach teachers currently adopt in creating a positive classroom climate. As Patton [19] stated, the study aims to examine the questions designed for the study in accordance with the purpose of the research.

The population of the study consists of mathematics teachers working in schools under the Secondary Education Department under the Turkish Republic of North Cyprus (TRNC) Ministry of Education (MoE) in the 2021-2022 academic year. In this study, carried out by using criterion sampling as an objective sampling method, state colleges accepting students with special examinations were studied by aiming to provide a heterogeneous distribution of class levels, minimization of inter-school differences, and being close to each other. Consideration should be given to the fact that the study group to be chosen consists of individuals, objects, and events with the desired qualifications for the research [20]. It is also necessary to make sure that the sampling criteria to be taken into consideration in the selection of the criteria are in a way to provide specific criteria for the above-mentioned reasons [19].

The study group consists of mathematics teachers working in high schools in the Güzelyurt, Nicosia, Famagusta, and Girne districts. The teachers in the study group were assigned to 12 mathematics teachers in total by choosing two mathematics teachers randomly from each school depending on their attendance at school and willingness. The schools considered represent 85.71% of all public schools (with special entrance exams) in the TRNC, only one school did not give the necessary permission and this school was excluded from the research. Also, among the abbreviations determined for schools, C1 applies to the Güzelyurt district, C2, C5, C6 applies to the Nicosia district, C3 applies to the Famagusta district, and C4 applies to the Kyrenia district. T1 and T2 are used for the opinions of teachers within each school. The obtained data were collected through semi-structured survey forms prepared for teachers. The semi-structured survey forms were prepared to gather thorough information from the survey participants [21]. As it is aimed the answers of participants can be expanded and more detailed information can be obtained through this type of survey technique, it can be seen that this technique can influence the flow of the survey and it is the most preferred among all survey techniques.

The "semi-structured survey form", involving the demographic data of teachers and questions regarding classroom climate to be responded to by 12 participants, including two teachers from each school, took its final shape also by referring to expert opinion. Taking into consideration the opinions of teachers about the approaches that were applied or deemed necessary to implement, content analyses were included in the codes and themes. The reliability of content analysis was compared by two different experts in the education field. Experts were asked to look at teacher answers and create a theme and code. The similarities between each coder's themes were then discussed, and the coding was finalized with the theming process. The reliability ratio between the encoders was determined as 83%. The reliability between the encoders was calculated using the formula $[(\text{Number of views}/\text{total views}) \times 100]$. The similarity ratio of the data set coded by different encoders is important because the similarity ratio determines the qualitative research reliability [22]. According to Miles and Huberman [23], the obtained percentage is accepted as sufficient for reliability.

3. RESULTS AND DISCUSSION

This part of the study contains the findings and discussion of the research. While the obtained data were divided into themes and codes, the responses of the participant teachers within each school were determined according to the school climate type. In order to emphasize the participant's comments with detailed opinions, some views were tried to be conveyed directly as the participant wrote. The views given by the teachers to the interview forms are indicated in Table 1.

Having the demographic data of the teachers who participated in the study analyzed, it was observed that four of the twelve teachers hold a bachelor's degree, six hold a master's degree and two were studying at master's level. In addition, it was determined that the seniority of the teachers who have a bachelor's degree is 15-25 years, those who hold a master's degree is 10-20 years, and those who are studying at the master's level have a seniority ranging from 10-15 years. Having the views of teachers in Table 1 analyzed, it is stated that participant teachers working at C1 adopted a collaborative and competitive approach. They stated their views regarding using individualistic and collaborative approaches to acquire a positive classroom climate where students can be comfortable and active. It is seen that they draw attention to the necessity of solving problems together and creating a curriculum plan that will increase student motivation for problems in a negative classroom climate. Similarly, in the study conducted by Davidovitch and Yavich [24] it was determined that as students' motivation increased in a positive classroom climate, students' self-efficacy also increased.

In C2, it is seen that teachers, who prefer to implement a collaborative classroom climate, aim to create an environment where students can express themselves freely for a positive classroom climate and eliminate negative behaviors. They stated that a positive classroom climate is only possible by doing group activities that are based on collaboration. In C3, it is seen that teachers prefer a collaborative classroom climate. It is stated

that they follow an approach where students can express their opinions freely and discuss them in order to have a positive classroom climate. Based on the studies conducted, it is seen that teachers mostly aim to create a comfortable environment where students can express themselves freely [25], [26]. Among the teachers regarding solutions to problems resulting from a negative classroom climate, one stated that collaboration within a group can be effective in solving problems in such environments. The teacher supported this situation with the following statement. T2: "Classrooms that adhere to the competitive classroom climate do not even discuss a negative classroom climate."

Another teacher stated that determining the problems and resolving them can be helpful by using an appropriate classroom climate. In addition, when teachers' opinions about problem-solving in an appropriate classroom climate are examined, it is understood that the attitudes and behaviors in question will emerge not in the teacher's classroom practices, but in a classroom where such a climate is not adopted. As a result of interviews in C4, it is seen that one of the teachers adopted a competitive and individualistic classroom climate according to the subject types and curriculum plan, and the other teacher adopted all three classroom climates according to the subject integrity. One of the teachers stated that providing appropriate conditions is necessary and the other teacher stated that creating a comfortable environment where students can express their opinions is necessary for a positive classroom climate. It is seen that the teacher, who stated providing appropriate conditions is necessary, conveys how to do it by mentioning a smiling face in the classroom, healthy communication between teacher and student, enough materials, and the classroom size in detail as follows; T1: "Firstly, I want to state that the interest to the course is mostly through a positive manner and a smiling face. Of course, this is something that depends on student-teacher communication and an appropriate classroom climate. Moreover, it requires enough materials and appropriate time. At this point, the size of the classroom is important." On the other hand, having examined the other teacher's view, it is seen that the teacher has a different view as follows; T2: "For a successful implementation of classroom management, the rate of obeying the rules can be increased by determining the characteristics of the classroom climate and taking student demands into consideration."

Similarly, Kluemperin's [21] study stated that in classes where children have difficulties, when teachers adapt classroom management according to student goals or expectations, students have stronger critical thinking and the frequency of negative classroom situations decreases thanks to the acquisition of skills such as self-regulation. Finally, it is seen that one of the teachers mentioned attracting the attention of students who do not participate in the course and the other teacher mentioned increasing motivation as a solution to the problems in a negative classroom climate. Having looked at C5 mathematics teachers' classroom climate approaches, it is seen that teachers generally adopt individualistic and collaborative approaches. In the interview made with two teachers, it is stated that one of the teachers adopts an individualistic classroom climate and the other teacher adopts both an individualistic and collaborative classroom climate according to the subject integrity. Differences were observed in teacher views regarding the approach types followed to have a positive classroom climate.

One of the teachers mentioned paying attention to provide a comfortable environment where students can express their views and the other teacher mentioned paying attention to provide appropriate conditions. The quotation regarding the view of the teacher stating that providing appropriate conditions is necessary is as follows; T2: "As teachers, we should keep our motivation high and support ourselves both in physical and emotional manners. This would also enable us to have healthier communication." It is seen that only one teacher stated a view regarding solutions to problems in classes that have a negative classroom climate. Moreover, it is seen that the teacher with the stated view mentioned that attracting the attention of students who are indifferent to the course would be the solution while explaining the reasons for the student behaviors in the negative-climate classrooms. The quotation regarding the teacher's view is as follows; T2: "Not paying attention leads students not to get along with their teachers and friends, and not to obey rules. While the size of the classroom is one of the factors causing this problem, elimination of the negativities that students create would also reduce their stress in this important year in which they prepare for the university exam."

Having looked at C6, it is seen that teachers adopt both competitive and individualistic classroom climates. It was found that teachers stated different views on the following approach types to have a positive classroom climate. One of the teachers adopts an individualistic and competitive approach while the other teacher adopts an individualistic approach. Having reviewed the solutions to problems in a negative classroom climate, it is seen that one of the teachers suggested cooperation while the other teacher suggested attracting the attention of students who are indifferent to the course. In this study, the factors considered to affect the classroom climate studied under different dimensions by various sources are taken as a safe environment for the target, student motivation, qualitative relations, and a democratic environment. A target-oriented safe environment requires the preparation of classroom organizational structure in a way that adapts to the environment [27]. In such an environment, the rules related to the classroom must be clear and duties should be distributed. Motivation studies should be done for students by learning individual differences.

It is also possible by indicating the importance of the course content, creating a plan, arousing curiosity towards the course, and meeting the needs of students, and this will facilitate the student encouragement as well as motivating them and keeping their focus [28]. It is known that the classroom climate plays an important role in preparing appropriate ambiance in classroom management, rendering students more eager to come to classes and preventing undesirable behaviors [29]. Carrying an effective education in a classroom where the targeted behaviors of education are achieved depends on the endearing academic and social learning that will be provided in the classroom environment. It is also important to remember that the classroom is a place where students can make face-to-face contact and communicate [30]. That's why the use of body language and communication language and demonstrating a positive attitude must be meticulous when teachers communicate. Additionally, effective classroom communication and interaction contribute to a positive classroom climate, providing opportunities for student success. Therefore, to maximize student learning efficiency and effectiveness, it is important to increase student achievement and create a classroom environment that enhances student learning.

Table 1. Teacher views

Theme	Codes
Adopted classroom climate approach	C1 T1: Individualistic classroom climate T2: Both competitive and collaborative classroom climate according to the context
	C2 T1: Collaborative classroom climate T2: Collaborative classroom climate
	C3 T1: Collaborative classroom climate T2: Collaborative classroom climate
	C4 T1: Competitive, individualistic, and collaborative classroom climate T2: Competitive and individualistic classroom climate
	C5 T1: Individualistic classroom climate T2: Collaborative and individualistic classroom climate
	C6 T1: Competitive classroom climate T2: Individualistic classroom climate
Classroom characteristics with a positive classroom climate	C1 T1: Presence of a comfortable environment where students feel self-confident T2: Implementation of collaborative and individualistic classroom climate where students can be more active
	C2 T1: Elimination of negative behavior T2: Creation of a comfortable environment where students can express their opinions
	C3 T1: Creation of a comfortable environment where students can discuss their opinions about the asked questions T2: Creation of an environment where students can express their opinions
	C4 T1: Providing appropriate conditions T2: Creation of a comfortable environment where students can express their opinions
	C5 T1: Creation of a comfortable environment where students can express their opinions T2: Providing appropriate conditions
	C6 T1: An individualistic and competitive approach is necessary. T2: Attracting student's attention with an individualistic approach is necessary.
Classroom climate approach to be followed in eliminating negativity in a negative classroom environment	C1 T1: Solving detected problems together with students T2: Making plans and curricula that increase student's motivation
	C2 T1: Group work by cooperation T2: Attracting student's attention
	C3 T1: Providing a chance to answer to every student in group work created by a collaboration T2: Elimination of problems regarding appropriate classroom environment
	C4 T1: Along with increasing motivation, the approach of school management, teacher communication, and generation of solutions by planned teaching T2: Increase attention of irrelevant students
	C5 T1: Not answered T2: Attracting the attention of students who are indifferent to the course
	C6 T1: Collaborating with school counselors T2: Attracting the attention of students who are indifferent to the course

In line with the teacher responses obtained, the classroom climate approaches adopted and tried to be implemented in the schools where the teachers work were tried to be summarized in the figures. Figure 1 discusses the classroom climate approaches adopted by schools. Figure 1 illustrates that student self-confidence and individuality can be expressed freely if a conducive classroom environment is created by eliminating negative behavior. Figure 2 shows that all schools adopt different classroom climate approaches and some schools combine more than one classroom climate to support student achievement. In Figure 3, two types of classroom climate approaches that can be followed to eliminate the negativities in the event of a negative classroom environment in schools are mentioned.

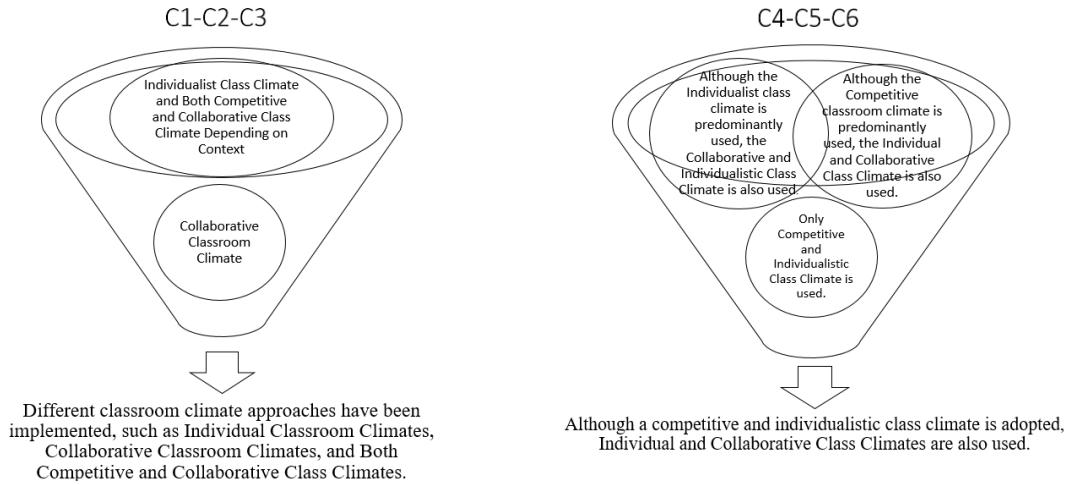


Figure 1. Adopted classroom climate approach

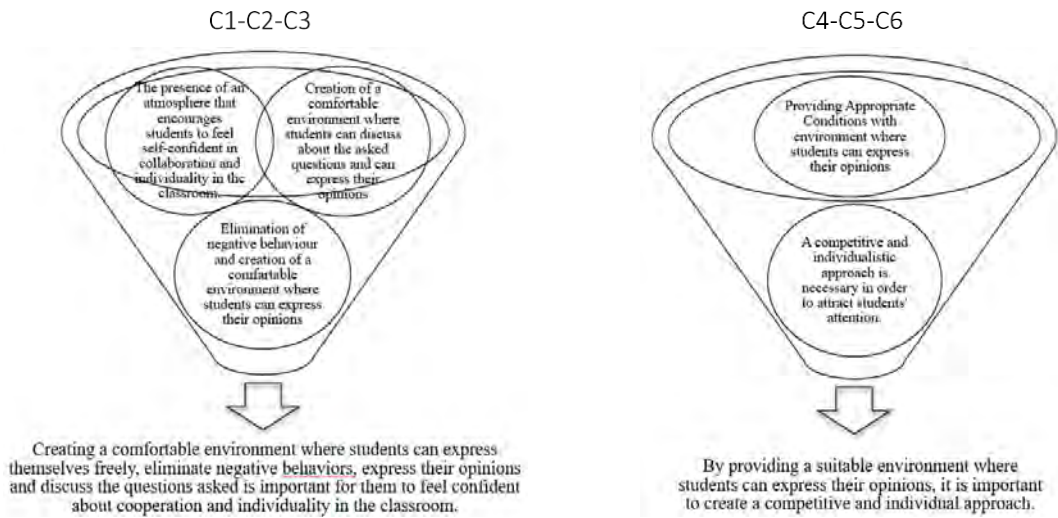


Figure 2. Classroom characteristics with a positive classroom climate

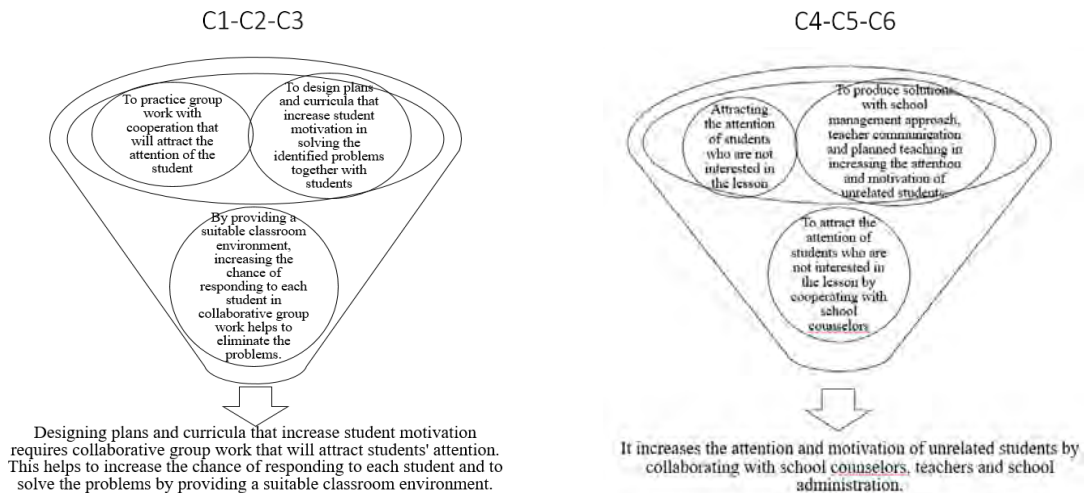


Figure 3. The classroom climate approach to eliminate negativity

A competitive and individual classroom climate approach is encouraged in Figure 1, particularly in densely populated areas, but it is emphasized that a comfortable environment must be created during implementation so students can express their ideas. However, it has been observed that students' individual needs and competencies, which are important in providing a comfortable environment where students can express their ideas and creating a democratic classroom environment where educational goals are realized, are not taken into consideration [31]. When we look at the approaches put forward in this context, it can be seen that a democratic classroom environment has not been created in any school.

Figure 2 also shows that teachers try to create a collaborative and competitive classroom environment where students can discuss their ideas in a positive classroom environment. It should not be forgotten that the most important factor in the education system in terms of raising individuals is teachers. Similarly, Puspitasari and Budiningsih [32] point out in their study that teachers are responsible for ensuring effective learning by directing students toward rapid growth at all times of life. They indicate that teachers have some basic skills and that these skills must be applied in their classrooms to achieve effective learning. In this context, the multi-factor classroom climate was examined by correlating students' motivation and willingness to learn in both teacher-supported and task-oriented lessons and teacher-controlled or competition-oriented lessons. As a result of the study, it is mentioned that providing an active and harmonious class climate is significant as a necessity of successful teaching. In their study, Vidic [33] also state that schools with a positive classroom climate have a positive school climate and that this positively affects student success both directly and indirectly.

Among the approaches indicated in Figure 3 to increase student motivation, encourage classroom participation, and increase the chances of responding individually to students is to provide a suitable classroom environment and implement collaborative group studies. It was stated that another approach is to work with the school's psychological counselor, teacher, or administration to motivate disinterested students and ensure their participation. For instance, Flook *et al.* [34], according to the report of the stress reduction course applied to teachers, the data obtained from the comparison of control and experimental groups showed that there were improvements in classes where stress was reduced, and teachers needed training on this subject. On the other hand, Kelly *et al.* [35] investigated how teachers can manage students' social and emotional demands that affect their attention and interest and how they can assist with these needs. Schonert-Reichl [36] and Kelly *et al.* [35], who stated that perceived stress in a negative classroom climate affects both student success and teachers' relaxed behavior, supported that students are affected not only by the stress caused by the classroom climate but also socially and emotionally. In this context, it is believed that teachers should pay attention to prioritizing their attitudes and behaviors towards students. Similarly, in the study of Khany and Ghasemi [37] on analyzing the extent to which teachers teaching foreign language courses provide emotional support, it is stated that the negative classroom climate created by teachers makes students feel a lack of self-confidence and courage.

Moreover, considering that students have positive communication with their teachers and need to feel safe against their teachers, it is noted that teachers should pay attention to their attitudes and behaviors toward students. As Kanbur and Kirikkaleli [38] note, a teacher's attitude affects her interaction with her students as well as the climate in the classroom. Accordingly, it is thought that teachers' unresponsive attitudes towards student behaviors, punishment, or anger behaviors may both lead to the demonstration of negative attitudes and behaviors by students and reinforcement of the formed negative classroom climate. In summary, the results obtained from the research draw attention to the importance of teachers creating a positive classroom climate to increase student success. Therefore, it can be said that teachers should primarily provide emotional and social support to students, create a democratic classroom environment, and allow the use of more than one classroom climate approach appropriate to the environment.

4. CONCLUSION

As a result of analyses obtained from the research data, it is determined that a specific classroom climate approach is not a matter of discussion created, especially regarding math lessons. It is seen that the teacher is in a rush to teach and they mostly adopt collaborative and individualistic classroom climates. According to the obtained data, the participant teachers who adopt both individualistic and collaborative approaches to create a positive classroom climate generally pay attention to creating a comfortable climate where students can express their thoughts and views. Therefore, it is seen that statements regarding providing a safe environment, motivation of students, qualitative relationships, and a democratic environment are not matters of discussion in teacher views. Having looked at the negativities in classrooms that have a negative classroom climate, it is seen that one of the participant teachers from C1, who adopts an individualistic classroom climate approach, aims to eliminate the negative classroom climate by determining the problems inside the classroom with students, and it is also seen that another participant teacher from C5 did not state any views regarding this issue.

On the other hand, it was observed that the C6 participant who adopts the same classroom climate approach expressed the view that the negativity can be eliminated by attracting the attention of the students

who are indifferent to the course. Considering how both C2 and C3 participants adopted collaborative classroom climate approaches, it appears that C2 participants emphasized the importance of attracting students' attention and improving collaboration, while C3 participants emphasized collaboration and a positive classroom climate to eliminate classroom problems. As a result of analyzing the views on the characteristics necessary to create a positive classroom climate, it has been observed that teachers emphasized creating a comfortable and safe environment where students can express their opinions and eliminate negative behaviors. However, it is noted that none of the mathematics teachers stated the reason why a classroom climate approach or the most appropriate approach among the existing climate types required to be planned according to the mathematics course teaching output was preferred. Thus, this reveals that teachers do not possess adequate classroom climate approach skills, and no special effort is exerted regarding this issue.

In terms of the classroom climate approach regarding eliminating inappropriate behaviors in the classroom with a negative classroom climate, it is seen that some teachers intend to pull students who are indifferent in the classroom towards the course while other teachers try to increase motivation in the classroom. Concerning the elimination of negative behaviors, the student's stress due to their preparation for university exams and their inability to pay attention to the course may be one of the factors that will encourage them to fail the mathematics course. In light of the conducted study, it is recommended that teachers create a targeted, safe, and democratic classroom environment to create a positive learning environment. A teacher should pay attention to motivating students, be sensitive to the relationships within the classroom, arrange a competitive atmosphere, and ensure that math skills are upskilled according to individual differences. In addition, students can be supported to communicate with their peers in the mathematics course, which is expected to make them capable of problem-solving. This can be done by providing collaborative group studies and a variety of sitting styles where they can exchange ideas with their peers away from mediocrity. Furthermore, it is possible to reduce prejudice and anxiety about mathematics by providing more frequent practices to the students under the supervision of the teacher. The study was limited to 6 schools accepting students who had to take a particular exam and a total of 12 teachers, two teachers from each school. Therefore, increasing the number of teachers and making observations for future studies is recommended.




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BIOGRAPHIES OF AUTHORS



Nurdan Ozreberoglu Kirikkaleli    graduated from Near East University in 2012 from the Department of Mathematics. She did her MA in Mathematics Teaching at the same university. In 2015 she got the Best Researcher award (Kemal Yücel) from the Cyprus Educational Research Association. She did her Ph.D. at the European University of Lefke in Education Administration and Supervision in 2019. She started to work at the European University of Lefke in 2022. She is Chairperson of the Departments of Primary School Mathematics Teaching. She can be contacted at email: nozreberoglu@eul.edu.tr.



Neşe Serol    was born in 1980, Nicosia. After completing her primary, secondary, and high school education, she started her undergraduate education at Atatürk Teachers College in 1997. She has worked in different schools since she graduated in 2001. She works as the principal of Alsancak Kindergarten. In 2012, at the Department of Human Resources Management at Near East University; In 2023, she completed her master's degree at the Department of Educational Management and Supervision at Cyprus Health and Social Sciences University. She can be contacted at email: serlnese@gmail.com.