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|A STUDY ON THE EMOTIONAL TRIGGERS OF TEACHERS IN TRAINING: MATHEMATICAL REDEMPTION

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ABSTRACT
This article presents an exploratory study on the affective experiences of future teachers. It examines a population of primary school students who recount past negative emotions related to mathematics and either continue to experience negative emotions about teaching mathematics (absence of mathematical redemption) or develop positive emotions about teaching mathematics (mathematical redemption). The research aimed to identify the triggering situations that influence the desire for mathematical redemption, either fostering or hindering it. In this study, future teachers' responses to the Teachers' Attitude Toward Mathematics and Its Teaching (TAMT) test were analyzed using the Theory of Cognitive Structure of Emotions (OCC Theory). The study first identified the presence or absence of mathematical redemption and then explored causal connections between triggering situations and the desire for mathematical redemption.

KEYWORDS: Emotions, Mathematical redemption, Teachers in training.

INTRODUCTION

This work is timely in the context of the teaching and learning process of mathematics, the teacher training cycle, and the importance of affective mastery in mathematics educators.

Mathematics has long been regarded as a challenging subject, often described with adjectives such as boring, difficult, and stressful. It is common to empathize with these perceptions as a student, but do these views change when one chooses the path of teaching? Are there future teachers who still hold these opinions?

The problem lies with some teachers in training who experience negative emotions at the thought of teaching mathematics. They express feelings of fear or anxiety (Ochoa & Rothstein-Fisch, 2021; Wilson, 2018) and shame (Bibby, 2002). Consequently, their teaching may become limited to technical instruction, neglecting the motivational impact on students.

Mathematics has been classified as a subject that exposes cognitive weaknesses due to the demand for exact answers, logical reasoning, and abstract concepts such as imaginary numbers. It involves finite processes within its resolution algorithms, requiring students to pay attention,

apply learned procedures, and interpret processes to identify missing information—factors that determine academic success or failure. "Anxiety about mathematics has been associated with the belief that success in mathematics is determined by ability and not effort" (Stigler & Hiebert, 1992 as cited in Wilson, 2018, p. 173).

Throughout this process, situations arise that hold different meanings for individuals. This study aims to identify and describe key triggering situations that influence teachers in training, either bringing them closer to or distancing them from the possibility of mathematical redemption.

These experiences leave lasting emotional imprints, predisposing future teachers to negative feelings about teaching mathematics. On both personal and professional levels, such emotions may limit opportunities for growth and development.

Studies conducted in Italy have identified a phenomenon among future teachers who report having had a strongly negative relationship with mathematics in the past. However, many express a desire to rebuild their relationship with the subject in preparation for their teaching careers process referred to as *mathematical redemption* (Coppola et al., 2012, 2013a, 2013b; Di Martino et al., 2013).

Some teachers have the desire to redeem themselves, while others do not consider or are unaware of this possibility. Teacher training requires "social justice in the sense that it can make a difference not only for themselves but also for their future students" (Wilson, 2018, p. 182). Highlighting this path to mathematical redemption can foster personal and professional growth among teachers.

LITERATURE REVIEW

The phenomenon of mathematical redemption allows for a renewed relationship with discipline, offering a vision of perseverance in educating others effectively while minimizing negative emotions and difficulties in the process.

Negative Affect in Teaching Mathematics

It is notable how much dislike many students express toward mathematics (Bibby, 2002; Coppola et al., 2013a; Coppola et al., 2013b; Frenzel et al., 2007; Wilson, 2018), from primary school through at least high school. The prevalence of *math phobia* and *math anxiety* are just two examples of the significant challenges associated with teaching and learning mathematics. These issues are further reflected in the low performance on standardized tests at both national and international levels.

As human beings—and social beings—we have a fundamental need to connect with others. However, certain school practices, particularly in mathematics classes, can hinder this connection. Instead of fostering integration, these practices may create divisions between students who struggle with the subject and those who excel. Scheff (1994, as cited in Bibby, 2002, p. 707) suggests that shame arises from our need to feel an appropriate level of connection with others; when we feel either overly included or excluded, we experience this emotion. This dynamic may explain why certain mathematics teaching practices contribute to student segregation rather than inclusion.

Background: the teacher-student relationship

Students' negative relationships with mathematics are often shaped by the teachers they had in the past. The role of a teacher extends beyond the classroom, encompassing the learning environment they create, the implicit and explicit instructional expectations (didactic contracts), and the relationships they establish with other school stakeholders. Additionally, students'

experiences of success or failure, the emotional burden they associate with mathematics, and the skills they perceive and develop because of their classes all contribute to shaping their attitudes toward the subject.

Teachers' emotions significantly influence students' learning experiences and perceptions of mathematics. In this regard, Di Martino et al. (2013) presented key findings on the role of teachers' emotions in shaping their attitudes toward teaching mathematics.

Most teachers in training acknowledge that a specific teacher played a decisive role in shaping their relationship with mathematics (Coppola et al., 2013a; Coppola et al., 2013b; Di Martino et al., 2013; Ilany, 2022; Marbán, 2020; Zembylas, 2005). Consequently, their experiences as students have influenced their current perception of mathematics teachers.

For some, teaching mathematics presents a challenging opportunity to "redeem" themselves by surpassing the teachers they once had and avoiding the same mistakes. Even if they do not enjoy teaching mathematics, they may feel a sense of duty to provide instruction grounded in cognitive epistemology and subject knowledge.

From another perspective, it can also serve as motivation to rebuild their relationship with mathematics, overcome fears and difficulties, and become a positive force in shaping the mathematical learning of future generations.

According to Britzmen (2005), teaching knowledge is embedded in the lived experiences of teachers, the values, beliefs, and deep convictions expressed in practice, the social context that shapes these practices, and the social relationships that bring teaching and learning to life (Britzman as cited in Zembylas, 2005, p.467).

These values, beliefs, and emotions come into play when teachers make decisions, act, and reflect on the various purposes, methods, and meanings of teaching (Coppola et al., 2013b, p. 205).

Emotions such as shame directly impact self-identity, as they stem from anxiety about the adequacy of the narrative through which an individual maintains a coherent sense of self. These emotions are triggered by experiences of inadequacy or humiliation.

Shame is rooted in feelings of personal inadequacy and must be understood in relation to the integrity of the self. (Scheff, as cited in Bibby, 2002, p. 707). It establishes a form of segregation that extends beyond the classroom where the mistake was made, and the shame was experienced.

Initial teacher training should facilitate continuous growth in relation to mathematics (Kaasila et al., 2012; Mandt, 2021; Marbán, 2020; Ochoa & Rothstein-Fisch, 2021; Pair & Dinh, 2022). Fear of mathematics can generate negative emotions that hinder effective teaching, even among educators who strive to improve their instructional practices.

The Phenomenon of the Desire for Mathematical Redemption

Teachers in training who define their relationship with mathematics as negative generally fall into one of two categories: those who feel insecure and view teaching mathematics as a responsibility fraught with obstacles, or those who experience mathematical redemption—a process in which they free themselves from negative emotions by "facing the challenge of teaching mathematics, based on a personal reconstruction of their relationship with the discipline" (Di Martino et al., 2013, p. 227).

Given the broad scope of studies on the affect of teachers in training, Coppola shows that some future teachers, even before reaching higher education, have had negative emotional experiences with mathematics. These experiences influence their perceptions of the practice of their future profession. Consequently, a percentage of these future teachers are inclined toward mathematical redemption (Di Martino et al., 2013; Mandt, 2021; Kaasila et al., 2012; Hodgen & Askew, 2007; Pérez-Torres & García, 2024), while others do not consider it at all. Therefore, it is important to understand the factors that influence this decision.

Experiences and emotions are closely related to the extent to which the resilience of teachers in training is developed. The results that emerge from comparing the emotions evoked by mathematics and the idea of having to teach mathematics are telling. In this context, Di Martino et al. (2013) found that 11.1% of teachers in training have positive emotions about teaching mathematics, despite expressing negative emotions toward mathematics itself. This contrasts with 66.7% of teachers in training who present negative emotions about teaching mathematics and have also expressed negative feelings toward the subject itself.

To promote the idea of professional practice and, in the future, the outcomes of teaching work, it is essential to understand the status of the phenomenon of mathematical redemption among normal school students. This understanding will help analyze the triggering situations that affect students' emotions before higher education, influencing whether they are drawn toward or away from the transformation process.

With this information, it becomes clear which areas are worth exploring to define the factors and characteristics that bring us closer to or further away from mathematical redemption.

The concept of redemption, commonly associated with overcoming academic difficulties in mathematics, can also apply to broader social contexts. Behar's (1990) research on the life story of a Mexican woman dedicated to marketing demonstrates that emotionally painful experiences can serve as a springboard to improvement and well-being.

Triggering Situations

In their work *Theory of the Cognitive Structure of Emotions* (OCC Theory), Ortony, Clore, and Collins (1988) define emotions as being present in language that refers to triggering situations.

Expressions are formulated through different words, even when individuals may not fully understand their meaning or distinctions, instead relating them to their contextual knowledge. For this reason, this theory allows us to describe emotions based on the situations that trigger them, to identify the causes and reactions that define the corresponding emotions.

People may be exposed to the same event, agent, or object, but each person will assess it differently, and therefore its impact will vary according to their beliefs and norms. Their interpretation is expressed through language.

The OCC Theory (Ortony et al., 1988) provides a framework for analyzing the triggering of emotions through what people express. It is explored from the perspective of the participants, considering each story as unique and different, referring to the narratives in which individuals explain their relationship with mathematics and its teaching.

MATERIALS AND METHODS

Research Design

Working with emotions in this research focuses on a situation where the researcher must concentrate on understanding the phenomenon of mathematical redemption, with no option

other than to explore it from the participants' perspectives, considering each story as unique and different.

Cohen, Manion, and Morrison (2007) consider exploratory research to be a crucial preliminary stage within the research process. This approach is used to gain an initial understanding of under-examined phenomena, identify important variables, and develop hypotheses that guide more structured studies. Its main purpose is to establish a foundation for future research that is deeper and more specific.

Therefore, exploratory research is especially useful when there is insufficient information available on the subject under investigation. It helps the researcher understand the context and the elements involved, which contributes to identifying relevant variables and formulating clear research questions. This type of study is particularly important in contexts where knowledge is still limited or existing theories are scarce.

The study aims to become familiar with the phenomenon of mathematical redemption. This phenomenon is explored to generate in-depth knowledge that can serve as a foundation for future research and lead to an empirical formulation of the problem. Flexibility is a crucial characteristic in the study, as it aids in the formulation and reformulation of research questions. Precision is achieved according to the information gathered and the direction chosen, so that, in the end, an "empirical hypothesis" can be formulated (Bunge as cited in Ansolabehere, 2018, p. 16).

Sample and Data Collection

For this study, primary school teachers were selected—specifically, teachers of children between the ages of 6 and 12. The criterion of universality in educational level is a key factor in the impact of this contribution. Another important criterion is that the primary school teacher is responsible for teaching all subjects to their class.

In institutions known in Mexico as "Normal Schools," professionals are trained to teach, among other levels, primary school. The main characteristic of this type of education is that a teacher instructs all subjects for the level they are assigned. The study was conducted with 30 teachers-in-training in the city of Puebla, Mexico.

To identify the phenomenon of mathematical redemption among these teachers, the Teachers' Attitudes towards Mathematics and its Teaching (TAMT) questionnaire was used (Coppola et al., 2012).

Table 1: Structure of the questionnaire
Breakdown of the Proposed Instrument in the Teachers' Attitudes Toward Mathematics and Its Teaching Model (TAMT-Model)

	Math	Teaching Mathematics
Relationship	4. List three emotions you associate with the word *mathematics*. 5. How was your relationship with mathematics as a student? (Positive, negative, indifferent) Explain why you think your relationship with mathematics was like that.	10. What emotions do you feel knowing that you will have to teach mathematics?

Vision	1. List three adjectives you associate with the word *mathematics*. 2. What do you think is a positive characteristic of mathematics? Why do you think that? 3. What do you think is a negative characteristic of mathematics? Why do you think that? 6. State three qualities that you consider necessary to be successful in mathematics. 8. For what reasons, in your opinion, do students perform poorly in mathematics? 9. In your opinion, why is it important to teach mathematics in school?	12. What characteristics do you think a good math teacher should have?
Competence	7. To what extent do you think you have the qualities mentioned in the previous question?	11. Describe some difficulties you expect to encounter in teaching mathematics.

TAMT "is aimed at capturing the relationships and dynamics that develop in individuals over time. In particular, we were interested in capturing links between past experiences as students and their perspectives toward future teaching" (Di Martino, 2013, p. 228).

The responses to the questionnaire, particularly in the relationship section, are the primary means of identifying teachers in training who demonstrate negative relationships with mathematics and emotions when teaching mathematics. The responses obtained from the vision and competence sections are useful for preparing the semi-structured interview, which will address the life story to favor the detailed analysis of each narrative.

The OCC theory is intended to complement the analysis and describe the data collected through TAMT.

Similar to a study by García and Martínez (2018), the students' discourse was analyzed, focusing on two elements of the OCC theory: the triggering situation and the emotional word, to interpret the emotion expressed and the situation that triggered it. It is believed that this analysis can generate a semi-structured interview that delves into identifying aspects that bring individuals closer to mathematical redemption, as well as those that distance them from it.

To work with affect, conducting interviews is considered essential to understand and reconstruct what has been expressed, said, and felt in the teachers' histories regarding mathematical redemption. Similarly, for the development of the interview, Pals' (2006) work is considered. Friends suggests the use of causal connections in the narration of the present, the formation of the self, and the meaning of past experiences with their relevance to the present. This methodological tool examines patterns of self-creation within the narration of the life story, and causal connections provide effective units of analysis to work with the abundant narrative that emerges from the interview.

To identify past experiences that created a negative relationship with mathematics and, similarly, to identify experiences that allowed for mathematical redemption, semi-structured interviews were designed based on the responses described in TAMT. In this way, the framework of the Life History Theory, through Causal Connections of Pals (2006), was investigated.

RESULTS

Once the data were collected, the following possible combinations of answers between questions 5 and 10 were obtained. These questions refer to the past relationship with mathematics and the emotions that arise when faced with the idea of teaching mathematics.

Table 2: Answers to questions 5 and 10 of the TAMT
*(*Only questions that reveal the presence or absence of mathematical redemption are considered.)

Cases	Past relationship with mathematics	Emotions regarding the idea of teaching mathematics
14	Positive	Positives
1	Positive	Negatives
4	Indifferent	Positives
3	Indifferent	Negatives
2	Negative	Positives
8	Negative	Negatives

The cases that present a negative relationship with mathematics in the past but a positive one in the present are two (C1 and C2). These will henceforth be referred to as redemption cases. On the other hand, the participants who had a negative relationship with mathematics in the past and currently experience negative emotions toward the idea of teaching mathematics are eight (C3, C4, C5, C6, C7, C8, C9, and C10). These will be referred to as cases with no mathematical redemption.

In line with the results obtained by Di Martino et al. (2013), it was found that a higher percentage of teachers reported having had a negative relationship with mathematics in the past and, furthermore, currently harbor negative emotions about teaching mathematics. In other words, there are more participants who are distant from mathematical redemption.

Within the framework of OCC theory, the responses were analyzed, and the results are summarized in the following table:

Table 3: Analysis of responses using the OCC theory

Case	Emotions in the past	Characteristics of emotion classification	Emotions regarding the idea of teaching mathematics	Characteristics of emotion classification
C1	Mortification	Reaction to agents Emotions of self-reproach Disapproval of one's own blameworthy action Censorable self	Hope	Reaction to events Emotions of hope Unconfirmed: pleased by the prediction of a desirable event Emotion of vicissitudes of the self
C2	Reproach	Reactions to agents Emotions of reproach	Happiness	Reaction to events Emotions of being happy for

		Disapproval of another person's reprehensible action		Happy about an event that is supposed to be desirable for another Emotions of the vicissitudes of others
C3	Reproach	Reactions to agents Emotions of reproach Disapproval of another person's reprehensible action	Fear	Reactions to events Emotions of fear Discontent over the prediction of an undesirable event Emotions of vicissitudes of the self
C4	Reproach	Reactions to agents Emotions of reproach Disapproval of another person's reprehensible action	Fear	Reactions to events Emotions of fear Discontent over the prediction of an undesirable event Emotions of vicissitudes of the self
C5	Frustration Disgust	Reactions to events Emotions of disappointment Discontent over the refutation of the prediction of a desirable event Emotions of vicissitudes of the self Reactions to events Emotions of well-being Disgusted by an undesirable event Emotions of vicissitudes of the self	Anxiety	Reactions to events Emotions of fear Discontent over the prediction of an undesirable event Emotions of vicissitudes of the self
C6	Self-incrimination	Reactions to agents Emotions of self-reproach Disapproval of one's own blameworthy action	Fear	Reactions to events Emotions of fear Discontent over the prediction of an undesirable event Emotions of vicissitudes of the self
C7	Reproach	Reactions to agents Emotions of reproach Disapproval of another person's reprehensible action	Anxiety	Reactions to events Emotions of fear Discontent over the prediction of an undesirable event Emotions of vicissitudes of the self
C8	Reproach	Reactions to agents Emotions of reproach	Fear	Reactions to events Emotions of fear

		Disapproval of another person's reprehensible action		Discontent over the prediction of an undesirable event Emotions of vicissitudes of the self
C9	Reproach	Reactions to agents Emotions of reproach Disapproval of another person's reprehensible action	Fear	Reactions to events Emotions of fear Discontent over the prediction of an undesirable event Emotions of vicissitudes of the self
C10	Reproach	Reactions to agents Emotions of reproach Disapproval of another person's reprehensible action	Anxiety	Emotions of fear Discontent over the prediction of an undesirable event Reactions to events

DISCUSSION

The following answers were given in the questionnaire:

"Most of the time, it was a complicated relationship, but a high school teacher changed the way we view mathematics: in a more positive and meaningful way for our lives" (Participant 1, personal communication, June 2024).

"Mathematics has been difficult for me because they explain things poorly" (Participant 2, personal communication, June 2024).

"I never had a good teaching…" (Participant 3, personal communication, June 2024).

"Teachers pointed out students who were doing poorly and applauded only the brainiacs" (Participant 4, personal communication, June 2024).

"I had a bad relationship because I always had teachers with little patience; they taught in a traditional way and had little experience in the area" (Participant 7, personal communication, June 2024).

The above statements indicate that teachers were often seen as taking on a leading role, which aligns with several studies (Di Martino et al., 2013; Mandt, 2021; Kaasila et al., 2012; Hodgen & Askew, 2007).

In 70% of the cases in this study, the findings support the determining role of the teacher in the relationship their students have with mathematics (Coppola et al., 2013a; Coppola et al., 2013b; Di Martino et al., 2013; Ilany, 2022; Marbán, 2020; Zembylas, 2005).

Regarding the situations that triggered a negative relationship with mathematics in the past, nine of the ten emotions arose in response to agents, and only one was in response to events. However, for the emotions triggered by the idea of teaching mathematics, all were in response to events, with no emotions arising from objects.

Therefore, in these cases, it is necessary to complement the assertion that the dislike students have for the subject of mathematics (Bibby, 2002; Coppola et al., 2013a; Coppola et al., 2013b; Frenzel et al., 2007; Wilson, 2018) is related to both the agents and the events. For past relationships, 70% of the negative emotions were directed toward another person, the subject teacher, while the remaining 30% of the participants expressed emotions focused on the self, as in case 6:

"It was a negative relationship because I couldn't understand them" (Participant 6, personal communication, June 2024).

While 90% of the emotions regarding the idea of teaching mathematics are attributed to personal factors, both in cases of redemption and those where redemption does not occur, this coincides with Scheff's (1994) characterization of shame as a feeling of personal inadequacy linked to the integrity of the self (cited in Bibby, 2002).
The structuring of the life story, favored by the interviews, specifically in the two cases of mathematical redemption, revealed a narrative in which the participant experienced a positive change following an adverse situation.

I remember when I was in fourth grade, I had a hard time with math, especially multiplication. It was difficult for me to memorize the multiplication tables. I didn't have a good memory, or so I thought, and at that time, it was hard to learn the tables, as well as division. But little by little, I started to practice and improve. However, my learning pace was different from the others; it was a little harder for me… I deduced this because when I did the operations, I didn't get the correct results, which frustrated me. I would do it two or three times and still make mistakes… I started to memorize the tables very well until I got to high school. In my second year, I learned them because before that, I didn't even know the 8s, 9s, 10s, 11s, or 12s. I learned them in my second year of high school. In my first year of high school, I was without a teacher for a while, so during that time, there really wasn't anyone to guide us, or who knew how to teach us. They didn't explain things in depth, and at that moment, I thought, I'm not learning anything. I didn't take school seriously, but when I got to second grade, I started to take it seriously because the new teacher taught us the importance of learning. She also taught me to believe in myself and to improve. From that point on, I started to try harder, and with the teacher's strategies, I improved—not just in math, but in all subjects. She made a radical change. I attended a telesecundaria…, and she stopped us, gave us more discipline, and even spoke to our parents so they would be more aware that we were making mistakes and needed to change… I came to value the education teachers gave us a lot more. (Participant 1, personal communication, August 2024).

Almost finishing high school, I had the goal of managing to pass the subjects well to be able to get my high school certificate in time to be able to enroll in university. But I realized that this was going to be much more difficult than I had planned, I had the same teacher who had already taught me in first year and it was too difficult for me… in all the classes she would give us a questionnaire, and many times I didn't understand the subject so I would always fail them and they were worth a lot of points, I didn't understand the subject and when I did understand it, well, it was the last day we had to learn it and even if I did well on that questionnaire I had already failed the others so I didn't manage to pass… I had to do my ordinary, I went to counseling but the counseling teacher told me that I wasn't learning, that I had to go take external courses, which was when I was sad, but oh well, I continued. So, I was already passed to extraordinary, and I saw that I was doing badly. It happened that they put me with another advisor, a person from outside the school, she also did not know the topics, she told me to wait a little while and they began to look in their notes or on the internet, they finished writing the exercise and I erased it because I said that I had already made a mistake... it confused me more. I mean, I said, well, they cannot even do the exercises that the teacher is giving us to answer, how am I going to pass my exam? So, to pass the exam, she asked me to copy many exercises from the subject, I was very tired those days.

For the exam I wondered how it was going to be that I was not going to finish high school, I had to have tutoring with the teacher who was teaching me from the beginning and I got to the

point where I thought I was not going to be able to handle her anymore, so I went to another teacher, she was much kinder, I didn't feel judged like with the other teacher who did make you feel bad if you asked her something or if you didn't know something, with her I didn't feel judged for telling her, I just don't know, I understood the subjects better, much better and I already knew where to look or what specific subjects I had to retake.

The truth is that I suffered a lot in high school. (Participant 2, personal communication, August 2024).

In both cases, there is a transformation from negative to positive, which Pals (2006) defines as the "trampoline effect". This arises in participants through the identification of the impact a difficult situation had and how the recognition of this situation motivated them to resolve it, transforming themselves positively. The individual does not find the meaning of the problem; rather, they construct a positive meaning for the problem to confront it and grow personally.
In analyzing the causal connections of experiences that distance future teachers from mathematical redemption, it is found that teachers in training are afraid and anxious because they have not yet experienced the confrontation situation they imagined. They have observed this event as spectators and know that at some point, they will face it. However, they choose to evade such an event through various decisions, such as mastering methodological tools to promote learning, resulting in work limited to technical tasks.

Coinciding with the contributions of Marbán et al. (2020), whose research results aim to identify mathematical anxiety, we also add fear as the main barrier to overcome in order to generate a change in the affective domain of teachers in training.

It was the same issue with teachers. I grew up in a rural area where teachers didn't even have the pressure for students to study because less than 10% of the students who graduate go to university. As a result, teachers weren't interested in students passing the subject… I don't think I had any (bad experiences) because the teacher I had during those three years didn't even touch the subject of mathematics, so I didn't have any stumbling blocks to say, I feel bad because I don't want to touch mathematics or things like that. It was very demotivating... Right now, children think that the teacher knows everything, and I feel that the time will come when this child might ask, Teacher, teach me how to answer these equations, and you'll be left like a child, saying, I don't know either. So, I still hope to take it up again at some point because, as a teacher, you always must be prepared and stay on top of the knowledge the child wants to acquire, especially if it's by their own initiative. I think it's more important to be part of this support… My role as a teacher would be to find the right methodology or motivation for the child, not to make them feel that math is bad. For me, it would be like a fear that the child is afraid of math because they're not comfortable with the methodology. (Participant 3, personal communication, August 2024).

For me, math is not my strong point because I had a teacher in third and fourth grade who would only explain the subject once. If I understood it, great; if not, it affected my grade. I remember that the teacher would explain the subject, give us an exercise, and we had to solve it, and those exercises counted as grades… One time, I tried to cheer myself up, even though the teacher had a difficult character and no patience. I approached her and told her I hadn't understood, asking if she could explain it again, and all she did was get up, yell in front of everyone that I couldn't understand, that it was because I wasn't paying attention, and that I was stupid. Not in those

exact words, but that's how it felt. After that, I was too embarrassed to ask anything or approach any teacher. From there, I hated math. Even now, if I must teach or cover a math topic, I must study it a thousand times because I don't understand it the first time. Despite that, during class, I end up forgetting the content. (Participant 7, personal communication, August 2024).

I had a teacher who, when no one answered his questions, would start yelling… I was afraid of math class because I knew I would see the yelling math teacher. My relationship with math was bad because I didn't understand it, and instead of helping me understand it or love math, the teacher made me fear it. There were repercussions. The fear was that he would expose me if I didn't understand, and instead of supporting me, he would expose me. He never actually exposed me, but I was still afraid because when he gave us homework or something, sometimes I didn't understand it, and I would go to my dad, who would teach me in a very harsh way and raise his voice. I mean, the teacher and my dad. Well, no, never. I was never forced to love math. Right now, it doesn't worry me because I'm in second grade, but I was afraid. I say I'm going to teach them, but I don't know. I don't know 2-digit division, and sometimes I have doubts. How am I going to teach someone if I have that same doubt? That's why I'm afraid… When explaining it in very broad terms, I'm afraid of confusing the children. I'm afraid they'll tell me, the teacher said it's like this, and they'll go to their parents and see that it's not like that, or even a different teacher will say something different. Sometimes I fail, and I'm afraid I'll teach the students wrong. (Participant 5, personal communication, August 2024).

It's important to note that the desire to become a mathematics teacher is tied to helping students avoid the problems that teachers in training experienced before. Teachers in training want to understand them and offer good treatment and patience in teaching. The vision of "teaching for the love of mathematics" (Ilany, 2022, p. 10) is excluded in these situations, and they focus on "altruistic reasons, which include wanting to help others and make changes" (Ilany, 2022, p. 11).

CONCLUSION

The objective of this study was to identify and describe some triggering situations for teachers in training that can either bring future teachers closer to or further away from a decision regarding mathematical redemption. We believe that, through the analysis and discussion of the results, this objective was achieved, as it was found that the phenomenon of mathematical redemption exists within the Mexican context, though it occurs less frequently compared to cases where redemption is absent.

Past relationships with mathematics that were identified as negative contain emotions such as mortification, reproach, frustration, disgust, and self-blame, which were triggered by classroom teachers. Negative emotions regarding the idea of teaching mathematics include fear and anxiety.

The questions in this study were aimed at describing the triggering situations that either bring future teachers closer to or push them further away from the phenomenon of mathematical redemption. These questions were answered by establishing causal connections.

In the analysis of the responses, it was found that future teachers approached mathematical redemption in situations where negative emotions were intense, and they felt cornered with no other option. In such cases, a teacher helped them focus on overcoming the difficulty with patience, mastery of mathematical content, and without inducing shame.

For teachers who are far from mathematical redemption, situations were described in which the confrontation with the fear of being embarrassed was avoided. Future teachers have built up this fear.

The methodological progression was beneficial in complementarily describing the triggering situations and the causal connections in situations that bring future teachers closer to or further away from mathematical redemption. While the OCC theory was used to understand each emotion exposed, the causal connections described the ways in which mathematical redemption was achieved in a deeper manner.

In terms of analysis, we find it revealing that there is a continuous repetition of emotions triggered by the agents who, in this case, identify as the mathematics teachers they had in the past. These emotions generated a negative relationship with mathematics when they were students, from primary education to high school. There is also a continuous repetition of the negative emotions that future teachers experience at the idea of teaching mathematics, which are triggered by events.

In other words, a negative relationship with mathematics is built because of an agent, but the motivation for mathematical redemption arises from anticipated events.

Working in the affective domain with mathematics teachers has limitations related to individual variability and cultural influences. The sample for this study is small, which may limit the results. Therefore, it is valuable for future research to replicate and validate the information generated from this study, in order to describe in detail, the processes of mathematical redemption.

Working with emotions in mathematics education means advancing in a somewhat unexplored field, but one with important implications for the teaching and learning process of mathematics. It is necessary for teachers in training to prepare themselves in both cognitive and equally important, emotional areas.

RECOMMENDATIONS

The topic of affect is less explored compared to other components in the teaching and learning of mathematics. This research is a step forward in exploring emotions in mathematics; however, there is still a lack of proposals and processes that promote reconciliation with mathematics from a teaching perspective. Therefore, moving forward involves exploring interventions and practices that address the difficulties that may arise due to the lack of mathematical redemption.

The methodology is suitable for the study of emotions, so it is recommended to continue analyzing triggering experiences and structuring life story narratives through causal connections.

For this reason, further research into the phenomenon of mathematical redemption is warranted.

LIMITATIONS

The topic of emotion, particularly in the context of feelings, is a field of subjectivity since the feelings and thoughts of everyone are influenced by multiple factors and vary in intensity. However, the methods used facilitate a categorization that contributes to the body of knowledge on the affective domain in mathematics education.

The social and cultural context has historically given little importance to emotions in mathematics. Feeling good or bad is described only when there is a lexicon to express each emotion. The lack of knowledge and correct expression of emotions led to complications that were addressed in the interviews and through life story narratives.

The location where the study was conducted has characteristics that may differ from other settings. It would be important to replicate the study in different contexts to obtain results that reflect a more diverse population.

AUTHORSHIP CONTRIBUTION STATEMENT

Solis-Jimenez & Juárez-López & Kantún-Montiel: Conceptualization, design, analysis, writing.

Juárez-López & Díaz-Espinoza: Editing/reviewing, supervision.

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