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Research article

The Impact of Logotherapy in Education on Math Anxiety: A Case Study on a Meaning-Centered Approach to Learning

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Abstract

This study aims to define the concept of logopedagogy and emphasize the necessity of introducing logotherapy into the educational system. Drawing from the foundational works of Viktor E. Frankl, along with contributions by Elisabeth Lukas and Vladimira Velicki, the paper explores potential applications of logotherapy in education and proposes a new approach to managing math anxiety. Specifically, it investigates math anxiety as a psychological phenomenon and suggests logotherapy as an intervention to reduce it. The study presents strategies for applying logotherapeutic principles to foster a sense of meaning and purpose in mathematics learning. Such an approach can help students understand the relevance of mathematics in their lives, discover their own capacity for problem-solving, and develop resilience in facing mathematical challenges. A case study is included, illustrating how a student overcame fear of mathematics with the support of a logotherapy-trained counselor-in-training.

Keywords:
math anxiety, logopedagogy, logotherapy, mathematics learning

1. Introduction

Math anxiety is a complex, multifactorial phenomenon with both psychological and pedagogical implications. While various cognitive and behavioral strategies have been explored in the literature**,** the role of existential approaches, such as logotherapy, remains largely understudied**.** This research seeks to address this gap by applying an explanatory case study to understand how logotherapeutic principles may alleviate math anxiety. The study focuses on how meaning-making, self-transcendence, and attitudinal change may influence a student's experience with math anxiety. The research question guiding this inquiry is: ,,How can logotherapy contribute to the reduction of math anxiety in students by helping them find meaning in their learning experience?''.

2. Theoretical foundation

2.1. "Logopedagogy": conceptual and etymological clarifications

The term *"logopedagogy"* (Logopädagogik) originates from the German-speaking world and implies that it can be practiced by educators in a broader sense, not only by those formally trained in pedagogy. This includes preschool educators, primary and secondary school teachers, as well as university faculty, essentially, all those actively involved in the educational system. The fundamental prerequisite for this practice is, of course, training in logotherapy and existential analysis. In Croatian, the term has been adopted as such, using *"logopedagogy"* (Velički, 2018). In Colombia, the term *"logopedagogía"* is also used (Rueda, 2005). However, in Romania, the term *"logopedagogie"* refers to speech and language disorder therapy (Stănculescu, 2007). To avoid misinterpretations of the term *"logopedagogy"*, following a detailed linguistic analysis of these terms and phrases across several languages, we have drawn several conclusions regarding their correct usage in Romanian. Thus, we prefer the expression *"logotherapy in education."* According to the conclusions from the terminological clarification section, the term *"logopedagogy"* will henceforth be used in quotation marks throughout this work.

2.2. Anxiety caused by mathematics

In the context of school-related anxiety, Brown and colleagues (2018) identify schools as a primary setting that can trigger anxiety in students. Anxiety disorders among children are common, affecting around 10% of school-aged children (Costello, Egger & Angold, 2005). Children tend to be less equipped to handle stress compared to its intensity, often displaying various physical, psychological, and emotional symptoms, such as school phobia, headaches, and stomachaches, when facing acute stress (Van Lier et al., 2012). Students may experience

anxiety related to different subjects. It is commonly believed that mathematics generates stronger emotional responses, particularly anxiety, than other academic subjects, although this belief calls for further research (Punaro & Reeve, 2012).

Regarding math anxiety, it should be noted from the outset that this phenomenon has not been theorized from the perspective of a single framework. Generally, research on this topic has applied general anxiety theories and theories related to test anxiety. A classic definition of math anxiety describes it as "a feeling of tension and anxiety that interferes with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations" (Richardson & Suinn, 1972).

According to Louise Lafortune and her collaborators (2002), math anxiety emerges as "an affective state of worry, discomfort, and fear that can hinder the study of mathematics." In terms of the content of math anxiety, researchers Wigfield and Meece (1988) theorized two components:

a) The affective component: refers to feelings of nervousness, fear, tension, and unpleasant physiological reactions in test situations;

b**)** The cognitive component: consists of worries related to negative thoughts that arise in a math learning context.

Regarding the scales used to measure math anxiety, the following are noted:

- the MARS scale (Richardson & Suinn, 1972) and its variants,
- the AMAS scale (Hopko, 2003) and its variants,
- the Betz Math Anxiety Scale (Dew et al., 1984),
- the Fennema-Sherman scales (Mulhern & Rae, 1998),
- the questionnaire developed by Thomas and Dowker (2000),
- the scale developed by Jameson (2013),
- the scale proposed by Vukovic and colleagues (2013).

There are also physiological tools for measuring math anxiety. These refer to heart rate, skin conductance (Dew et al., 1984), cortisol secretion (Mattarella-Micke, 2011), EEG-based imaging measures (Suárez-Pellicioni, 2015), and functional MRI (Pletzer et al., 2015). The literature identifies several factors influencing math anxiety: social influences, gender, age, nationality, cognitive influences and genetics. Personal factors include motivation, self-efficacy, perceived competence, age, gender, and nationality.

Also, the causes of this phenomenon include: timed tests (Ashcraft & Moore, 2009), teaching methods (Jackson & Leffingwell, 1999), teachers' attitudes (Tobias, 1990), students' attitudes (Hembree, 1990) and educational tools (Jackson & Leffingwell, 1999). Teachers and parents who are afraid of mathematics can also pass this fear on to children, modeling behaviors that reflect their own discomfort with the subject.

In addition, research conducted by Oberlin (1982) and Furner (1996) found that certain mathematics teaching techniques cause anxiety:

a) Having all students perform the same task;

b) Assigning repetitive tasks;

c) Giving written assignments every day;

d) Insisting on only one correct way to solve a problem;

e) Using math problems as punishment for inappropriate behavior.

Possible treatments for math anxiety include: psychological anxiety-reduction techniques (Swanson, 2013), students' attitudes (Stuart, 2000), teachers' attitudes (Jackson & Leffingwell, 1999), teaching methods (Hembree, 1990) and bibliotherapy (Furner & Duffy, 2002).

The phenomenon of math anxiety has also been observed in online education, but it is less significant than in face-to-face education. In online learning, the way teachers perceived students' math anxiety highlighted two different processes: students' engagement in online learning and students' digital competencies (Grecu, 2020).

2.3. Logotherapy in education

The greatest source of stress for school-aged children is academic stress (So & Chung, 2003). Since stress negatively impacts the formation of self-identity, improving stress-coping abilities is essential (Kim & Koh, 2016). For older school-aged children, a crucial developmental task is the search for meaning and purpose in life, within the context of forming their self-identity (Kang, 2017). When a child fails to recognize their own uniqueness and individuality, and cannot find meaning and purpose in life, they enter a

state of confusion, loss, and identity moratorium, which inevitably leads to a maladaptive life instead of one built on planning for the future (Erikson, 1994).

Logotherapy**,** developed by Viktor Frankl (1988), is based on the idea that the primary motivating force of the human being is the will to find meaning in life. This form of psychotherapy helps individuals discover the "logos", the meaning of existence, even in difficult or stressful situations (Frankl, 2006). According to Frankl, "noogenic neuroses do not result from conflicts between drives and instincts, but from existential problems. Among these, the frustration of the will to meaning plays an important role."

To prevent such developments and to help children become motivated through awareness of their mission in the world, it is essential to explore values and meaning with them from an early age, guiding them to understand that they are co-creators of the world and of social reality. Emphasizing content and methods that stimulate sensitivity to existential questions, values, and meaning in life becomes a necessity for all those involved in children's education.

Developing the capacity of conscience as the "organ of meaning" and to recognize, in certain moments and places, the challenge of values and their need for fulfillment, as well as to respond to the questions that life asks us should be part of every educational act. If we understand education as the art of respect, then we must ground it in sensitivity to the uniqueness and unrepeatability of each person, educating the young with respect and cultivating in them respect for others. On this foundation, responsibility and awareness grow, the understanding that each individual has a unique mission, a present-moment challenge of values.

Numerous works have been published on logotherapy in education. The idea of implementing logotherapy in education is not new. The Viktor Frankl Institute in Vienna notes that as early as 1953, Karl Dienelt systematized Frankl's thinking, drawing educators' attention to its significance, and continued to address this topic in his later works. Since the 1950s, an increasing number of researchers have explored the relationship between pedagogy and logotherapy, including through doctoral theses and international academic studies. In the case of math anxiety, logotherapy can be a valuable tool, as it helps reframe negative perceptions of failure and difficulty, offering students a broader perspective on the value of effort, learning, and personal growth. Studies show that academic stress is the main source of stress for school-aged children (So & Chung, 2003), and the inability to cope with stress can lead to significant physical and emotional symptoms (Van Lier et al., 2012). Stress, including that associated with difficulties in mathematics, can negatively impact the formation of self-identity (Kim & Koh, 2016).

Research has demonstrated that applying logotherapy among children contributes to the development of self-awareness and self-identity (Kang, 2017), which are crucial in overcoming school-related anxiety. Therefore, the application of logotherapy in the context of math anxiety can help students redefine their educational experiences through the lens of meaning and personal value, thereby reducing stress and fostering a positive attitude toward learning.

To reduce math anxiety, one solution could be the use of relaxation techniques, which include body awareness exercises and breathing exercises. Bellego (2009) explains the importance of reducing the fear of mathematics and preparing parents and teachers not to transmit negative emotions to students. Lafortune and Massé emphasize that teachers should pay attention to their words and gestures, value students' progress, and speak about their own difficulties in learning mathematics. According to Bellego (2009), it is important for the student to "visualize success," remain calm, trust in their own abilities, and use their resources effectively.

In summary, logotherapy as an approach to reducing math anxiety refers to:

- The relevance and purpose of mathematics: Students should be helped to discover how math can be meaningful in their lives. Teachers can introduce real-life applications.
- Self-transcendence and student responsibility: Logotherapy encourages students to view mathematical challenges not as obstacles, but as opportunities for growth.

Attitudinal values: Students can learn to adopt an attitude of courage and perseverance in the face of mathematical difficulties.

3. Methods

This article presents an explanatory case study exploring the relevance of logotherapy in addressing math anxiety among students. Given the limited research on the application of logotherapy in educational contexts, particularly in relation to mathematics-related anxiety, this study aims to offer

insight into how meaning-based interventions can contribute to emotional and academic resilience.

Ethical considerations were considered for this study: informed consent, confidentiality, and psychological safety. The intervention was conducted from both a pedagogical and psychological perspective, as the researcher has 20 years of experience as a mathematics teacher and is also a logotherapy-trained counselor-in-training.

A secondary school student presenting high levels of math anxiety and signs of existential questioning was selected for this study. To protect the student's identity, a fictional name, Paula, will be used. Paula is a middle school student. She is a diligent and conscientious student who performs well in most subjects, except for mathematics. Starting in the seventh grade, she began to develop a strong fear of the subject, manifested by: cognitive blocks during class or tests, panic episodes before assessments and self-deprecating thoughts ("I'm not good at math," "I'll never succeed"). Identified triggering factors include: constant comparisons with classmates ("it seems easy for others"), a rigid perception of mistakes as personal failure and pressure from parents to achieve academic success. Paula's story reflects her personal perspective, but the feeling that mathematics is taught as meaningless is shared by many (Nardi & Steward, 2003).

The first intervention is based on the example provided by Young-Sook Lim (2020): for Jackie, meaninglessness meant she couldn't understand something unless she knew its purpose. Like many adults, she didn't understand the point of "x" in mathematics: *"I remember seeing x's on the board and they meant nothing. They made no sense. I couldn't relate to an x at all, and I thought: no matter how you work with that x, it still doesn't matter, because I still don't know what x is..."*

During Paula's first counseling session, the researcher introduces her to the "hand model" of the brain, based on the work of Siegel (2010), with the goal of helping her reframe her belief that she was "bad" at math and empowering her to say "pause" whenever she felt overwhelmed.

This simplified visual model helps illustrate how different parts of the brain interact in the process of emotional regulation:

a) The wrist represents the brainstem, responsible for basic functions such as breathing and heart rate.

b) The thumb folded into the palm symbolizes the limbic system, especially the amygdala, which manages intense emotions and "fight or flight" responses.

c) The fingers folded over the thumb represent the cerebral cortex, involved in rational thinking, planning, and decision-making.

When the fingers open, this symbolizes the moment when the prefrontal cortex "disconnects" due to stress or intense emotions, allowing the limbic system to take over. This phenomenon explains why, in moments of stress or anxiety, it becomes difficult to think clearly or make rational decisions. This exercise helped Paula reflect on the role she plays in her own learning and understand the impact of emotions on the learning process, making her feel more relaxed about her attitude toward learning.

The researcher's subsequent meetings with Paula focused on logotherapeutic interventions. The goal of the logotherapeutic intervention was to redefine Paula's relationship with mathematics by helping her discover a personal sense of meaning, reduce anxiety through specific logotherapy techniques, and increase intrinsic motivation by reconnecting with her own personal values.

We present the steps of the logotherapeutic counseling process:

a**)** Discussion about the meaning of learning mathematics through Socratic dialogue. Examples of interview questions: *"Paula, what would you like to do in the future? What motivates you to come to school, even when it's hard? What kind of person do you want to become? How can math help you with that? How might you use math in your life?"* Through Socratic dialogue, Paula reflected and realized that she would like a career in psychology, and that math is required for university admission.

b) Reframing failure using the Life Line technique: Paula draws a life line and marks key moments (positive or negative), then identifies: ,,*What did I learn from those moments?* and *What goals do I have for the future?"* Paula changes her attitude toward failure by learning that it does not mean she is worthless, it means she is growing: *"A mistake doesn't define who you are. It just means you've learned something new."*

c) Paradoxical Intention

Paula is gently encouraged to say to herself: *"I hope I make a big mistake today so I can learn*

something new!" Before a major test: *"Let's try to be the worst today. Let's see what happens…"* This technique relieved her tension, reduced her fear of making mistakes, and broke the fear cycle through humor and detachment.

d**)** Deflection

In moments of fear, Paula is guided to remind herself: *"Who am I doing this for?"* and *"What matters more: this fear or my dream?" "Don't focus on your fear—think about how you could help a classmate who feels the same way."* Over time, Paula's anxiety decreased, and her focus shifted from fear to motivation.

e) Self-Transcendence

Paula is helped to see beyond herself and her immediate struggle. Discussion with Paula on how math can be used in real life to build, help, or create: *"How could you use what you learn to help someone? How can you contribute to a greater idea?"*

f) The Triad of Meaning (creative, attitudinal, and experiential values)

Paula is encouraged to answer the following questions: *What can I create or contribute today?* (creative value), *What brings me joy today?* (experiential values), *What attitude do I choose in the face of a challenge?*(attitudinal value).

4. Results

Paula's case shows that logotherapy can be a valuable tool for reducing math anxiety, especially when it involves a loss of meaning and harsh self-criticism. By redirecting her focus toward personal values and adopting an active attitude toward the challenge she faced, Paula was able to rebuild her relationship with mathematics. As a result of the logotherapeutic counseling, Paula's academic performance in mathematics improved from low to average, as confirmed by her school grades. Additionally, her family observed a more constructive attitude toward learning. Paula's own words reflect this shift: "I'm not a student who can't learn math; I just need to persevere."

5. Conclusions

The qualitative data analysis conducted through the case study revealed several relevant directions regarding the impact of applying logotherapeutic principles in an educational context, with a particular focus on reducing math anxiety. The results can be grouped into the following categories: the reduction of math-related anxiety through meaningful learning, the redefinition of Paula's relationship with mathematics, and the development of a constructive attitude toward academic challenges. Together, these findings validate the innovative approach of logotherapeutic counseling within the educational setting. However, further research is needed to identify the most effective logotherapeutic approach within educational contexts. One possible limitation of the study could be the fact that the counselor was still in training, which may have influenced the depth of the intervention.

Authors note:

Alina-Elena Grecu, PhD, Assistant Professor at the Faculty of Psychology and Educational Sciences, University of Bucharest, Romania. The study reflects the author's independent research on the integration of logotherapy into education and its potential impact on reducing math anxiety. The paper builds on doctoral research and personal experience as a counselor-in-training, aiming to contribute to a meaning-centered approach to learning.

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