

EXPLORING IDENTITIES OF MATHEMATICAL DISTANCING THROUGH STORYTELLING ON SOCIAL NETWORKS

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This paper investigates the gap between mathematics and society through storytelling shared by adults on social networks. Using qualitative thematic analysis, we identify five dimensions that constitute these identities: the affective domain, exclusionary pedagogical practices, performance-based labeling, curricular transitions, and gender bias. This study places particular emphasis on one finding: the trauma at the board as a tool for public humiliation and exposure. The findings suggest that mathematical alienation is not a cognitive deficit but an identity produced by traumatic and unsupported educational environments. We argue that humanizing the classroom requires transforming these spaces of exposure and isolation into supportive dialogic environments.

INTRODUCTION

This research is centered on the Chilean educational landscape, a context marked by persistent challenges in international evaluations and significant achievement disparities linked to gender and socioeconomic status (Agencia de Calidad de la Educación, 2023; Wang & Degol, 2017). Within this setting, Critical Mathematics Education (CME) provides a vital framework for scrutinizing the sociopolitical forces that foster alienation, aiming to promote more equitable and just pedagogical practices (Skovsmose, 2023). Central to this inquiry is the well-documented and enduring divergence between the public and the mathematical world, a contradiction often described as a learning paradox (Skovsmose & Valero, 2008). Despite years of mandatory schooling, a large segment of the population fails to develop a meaningful connection or deep interest in the subject. This disconnect is frequently rooted in emotional trauma, where the traditional classroom is remembered as a site of "torturous" experiences (Watson, 2021) or even intellectual harassment akin to cognitive bullying (Soto-Andrade, 2018; Valdés et al., 2023).

To investigate these phenomena, we adopt a narrative conceptualization of identity, defining it as the ensemble of stories that individuals construct about themselves (Sfard & Prusak, 2005). These mathographies, personal accounts of separation from the discipline, offer a profound data source for understanding how mathematical alienation is formed. While the field of Mathematics Science Communication (MathCom) strives to reconcile this divide (Anderson et al., 2015), it faces a significant barrier: pre-existing mathematical identities. Individuals who have internalized the belief that they are not a math person often proactively self-exclude from outreach efforts, thereby

reinforcing their distance from the subject (Dudo & Besley, 2016). Consequently, this study examines adult testimonies shared via social media to address the following research question:

What specific dimensions emerge within these digital narratives to constitute an identity of mathematical distancing?

THEORETICAL FRAMEWORK

Mathematics science communication

Science communication (SciCom) is an expanding field of practice and research that has moved beyond simple transmission models toward defining communication as a social conversation around science (Bucchi and Trench, 2021). It is understood as the practice of producing and negotiating meanings under specific social and cultural conditions (Burns et al., 2003). To establish Mathematical Science Communication (MathCom) as a rigorous discipline, a dialogue is necessary at the intersection of mathematics, didactics, and communication science, fostering an exchange between practice and research (Hartkopf and Henning, 2023). While related to concepts like Public Understanding of Science (PUS) and Scientific Literacy (SL), SciCom, particularly through a dialogue model, provides the framework for this study, which aims to engage with public narratives to better understand the gap between mathematics and society.

The sociopolitical in mathematics education

The sociopolitical turn in mathematics education marks a shift from individualistic-psychological views to a holistic understanding of the discipline's relationship with society. It critiques the notion of a universal, context-devoid learner (Valero, 2005) and challenges the neutrality of mathematics, revealing its role as a gatekeeper and a source of political power that structures social dynamics (Skovsmose, 1998; Aguilar & Zavaleta, 2012). This perspective sees the mathematics classroom as a space for sociocultural dissemination where access to mathematical knowledge can mean either democratic participation or political exclusion. Informed by traditions like socio-epistemology (Cantoral et al., 2014), this approach problematizes who learns math, what is taught, and why, framing mathematics education as a Network of Social Practices (Valero, 2012) where its meaning and value are socially contested.

Math identity and mathographies

The concept of mathematical identity is founded on the central role of affectivity (emotions, attitudes, and beliefs) in a person's relationship with mathematics (McLeod, 1992). The field has largely adopted a sociocultural perspective, viewing identity as a dynamic and multiple construction rather than a stable trait. Research in this area is diverse, with Radovic et al. (2018) identifying five main strands, including the increasingly prominent conceptualization of identity through narrative. This narrative strand, rejecting essentialist views, defines identity as a collection of significant stories

a person tells about themselves (Sfard & Prusak, 2005). This study adopts this approach, using mathographies—personal mathematical biographies—as a methodological tool to understand how these identities are formed. These biographies are not isolated accounts but are embedded in cultural contexts, achieving coherence through discursive strategies shaped by social norms (Kassila, 2007), ultimately allowing for a definition of a mathematical distancing identity as a narrative of disaffiliation constructed through and restricted by social and institutional practices. Within these frameworks: *a mathematical distancing identity is understood as a personal narrative of disaffiliation, charged with negative affect, which results from being positioned and restricted by institutional practices and social discourses.*

METHODOLOGY

This study employed a qualitative thematic analysis methodology (Braun & Clarke, 2006) to explore the narratives of mathematical distancing. This approach is more flexible than quantitative methods, enabling a deep and reflexive engagement with the data (Canales, 2006). Thematic analysis allows for the identification and detailed examination of recurring themes within the data, providing a rich description of the phenomenon under study (Rice & Ezzy, 1999; Escudero, 2020).

Data collection and sample

The study's participants were social media users who self-identified as feeling far from mathematics and voluntarily agreed to share their stories of distancing, without necessarily being enrolled in any formal center of study. Recruitment was conducted primarily through the Instagram account of a female mathematician engaged in science communication, with minor engagement from connected Twitter and Facebook accounts. The data consists of 51 stories collected from individuals aged 18 to 54, who were predominantly women (82.35%), in response to the posted question: When did you give up on mathematics? Why?

Data recollection was managed either directly through the social network platforms or via a Google Form, and explicit permission was obtained from all participants to use their stories for research. A key methodological element was the subsequent posting of some of the collected stories back onto the social networks. This action created a dynamic feedback loop, prompting more individuals to share their own narratives and fostering a community response of empathetic comments and shared reflections, which in turn enriched the data.

Analysis process

The analysis process followed the six cyclical phases proposed by Braun & Clarke (2006) for a deep thematic analysis. 1) Repeated reading of the narratives to identify patterns and establish initial codes. 2) Documenting and labeling recurring patterns to create the first analytical categories. 3) Combining codes into themes that faithfully represent the narratives, while discussing and testing their definitions. 4) Verifying how the themes fit the narratives and the theoretical framework, cross-checking them.

5) Precisely defining each theme, ensuring they capture aspects of the data and correspond with the narratives. 6) Final verification by the team of the themes, their theoretical coherence, and their relationship with the narratives. In 3, 4 and 5 phases we use Atlas.Ti 8.0 programme for the processing, organization and coding data.

RESULTS

The thematic analysis revealed five core dimensions that constitute an identity of mathematical distancing. These dimensions are deeply interconnected and work together to shape an individual's narrative of alienation from mathematics, then we deeply describe one specific subdimension that shows this interconnection.

Gaps in understanding is the dimension involving cognitive and conceptual ruptures that weaken a student's connection to mathematical content. It manifests through either a gradual loss of understanding or abrupt "brick wall" moments triggered by complex topics like algebra. These gaps make the subject stop making sense, as seen when one participant noted: "With fractions, I got lost and never found my way back."

Affectivity is the domain that encompasses visceral emotions and negative beliefs that shape a student's mathematical identity. Intense feelings of frustration and terror often crystallize into a permanent self-diagnosis of being "bad at math." This emotional burden leads to a complete withdrawal from the subject, recalled by one individual as: "The terror of being sent to the blackboard... that's when I gave up."

Contextual conditions are external and institutional factors, such as academic transitions to more demanding schools, often act as catalysts for distancing. These conditions frequently dictate long-term life decisions, leading individuals to choose career paths specifically to avoid any future contact with the discipline. One participant shared: "I chose a humanities path to escape it forever... to never have to face it again."

Social and discursive impositions as social prejudices and powerful discourses, including gender-based labeling, significantly influence how students perceive their own mathematical potential. Public comparisons and negative labels from teachers are often internalized, creating a narrative of exclusion that discourages effort. A clear example of this is the testimony: "A teacher told me that 'girls' heads are not made for mathematics."

Exclusionary teaching practices: As the most prominent dimension, this focuses on how authoritarianism and public humiliation in the classroom foster a deep hatred for mathematics. Traumatic pedagogical dynamics, such as being ridiculed at the blackboard or lacking teacher support, create an environment of exclusion. This is reflected in the memory: "My teacher threw my notebook on the floor... He yelled at me that I was useless."

The blackboard as a site of public exposure and trauma

The results of the thematic analysis identify the blackboard as a primary site of mathematical trauma, functioning not as a tool for learning but as an arena for public

exposure and humiliation. Participants frequently described being called to the board as a moment of extreme vulnerability, where the fear of making a mistake was compounded by the presence of an audience. One participant recounted the visceral anxiety of these moments, stating: *"I remember with terror when I was made to go to the board... it was like being naked in front of everyone, waiting for the moment I would fail."* This suggests that the physical space of the classroom, specifically the front-facing board, serves to institutionalize a power dynamic that prioritizes performance over understanding.

The role of the teacher is central to this traumatic experience, often acting as the catalyst for mathematical distancing through sarcasm or public shaming. The mathographies reveal that the negative impact of these interactions often stems from the teacher's reaction to a student's struggle. For instance, a respondent shared a memory of a teacher who, while they stood frozen at the board, remarked: *"If you don't know this basic step, you don't know anything; you're just wasting our time."* Such experiences are described as "moments of rupture" where the student's sense of self-efficacy is shattered, leading to an immediate emotional withdrawal from the discipline.

Ultimately, these narratives indicate that the trauma at the board is a foundational element in the construction of an identity of distancing. The shame associated with public failure becomes a defining characteristic of the person's relationship with mathematics, persisting well into adulthood. As one narrative concludes: *"After that day at the board, I decided that math was a wall I would never climb; I simply stopped trying because the pain of being ridiculed was greater than the desire to learn."* These findings underscore that mathematical alienation is often rooted in these specific, localized pedagogical events that transform a common educational practice into a lasting psychological barrier.

DISCUSSION AND CONCLUSIONS

The narratives collected in this study provide compelling evidence that the origins of mathematical distancing are predominantly social, affective, and pedagogical, not cognitive. The classroom emerges as the primary site where negative identities are forged, particularly through trauma at the blackboard, where public exposure is used as a tool for ridicule rather than learning. Viewed through the lens of identity as narrative (Sfard & Prusak, 2005), these stories are the very fabric of identity, where individuals construct a self defined by its opposition to mathematics.

The five dimensions identified form an interconnected network of practices (Valero, 2012). For example, the lack of teacher support and accompaniment triggers intense negative affectivity, which is then interpreted through gendered social scripts of who can succeed (Mendick, 2005; Archer et al., 2012). When a student receives no empathy during a struggle, they internalize the failure as a permanent trait. This demonstrates

how the sociopolitical reality of the classroom—its power dynamics and definitions of success—directly shapes individual identity and belonging.

These shared stories serve as a powerful testimony to the lasting harm caused by exclusionary and uncaring pedagogical practices. The challenge is not just to make mathematics more accessible, but to create learning environments that are psychologically safe, socially just, and humanizing. Eliminating the trauma of public exposure and fostering genuine accompaniment are critical steps. Listening to these narratives of distancing allows us to begin reimagining a mathematics education that fosters belonging instead of alienation.

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