

Premature children's negotiation of mathematic identity in the figured worlds of home and the mathematics classroom

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Background and Introduction

Studies involving premature children and mathematics have shown that up to 50% of extremely premature children (<28 weeks gestational age) show serious impairments in mathematics (Johnson et al., 2009). These studies, however, involve large-scale analysis of quantitative data that groups all extremely premature children together, rather than examining them as individuals. In contrast, identity research in mathematics education has increasingly been used to examine individuals' math learning and experiences with mathematics in a more holistic, agential, and less deficit-based, approach.

The concept of identity has been linked to learning through the adoption of socio-cultural theories, with the understanding that learning happens through social participation and the process of identity development (Esmonde, 2009). Mathematical identity is a construct that allows for self-authoring and agency, incorporates positioning and the impact of significant others, can provide insights about learning without using discourses of cognitive deficit, achievement, or performance, and can be used as a lens to examine participant experiences in relation to their social contexts. This paper will discuss the mathematical identity negotiation of Joe, Mekhai, David, and William, four secondary school students who were born extremely premature, and seeks to answer the research question "how do children born extremely prematurely negotiate their mathematical identities, and what insights may this identity negotiation provide about their mathematical learning and doing?"

Research Objectives

There are four interrelated objectives to this study. Objective 1 is to explore how secondary school students who were born extremely premature negotiate their mathematics identities. Objective 2 aims to describe the contexts of home and the mathematics classroom in which these students engage in identity work. Objective 3 is to explore how positioning by others within the worlds of home and school influences/mediates mathematical identity work. Finally, objective 4 is to examine how participants' mathematical identity negotiation and learning are related.

Theoretical Framing

Figured worlds are "socially and culturally constructed realm(s) of interpretation in which particular characteristics and actors are recognized, significance is assigned to certain acts, and particular outcomes are valued over others" (Holland et al, 1998, p. 52). In this research, figured worlds is used as a socio-cultural framework to examine how secondary school students who were born premature negotiate their mathematical identities in the contexts of home and the mathematics classroom. How students are positioned by significant others like parents or teachers in different figured worlds can also impact on their identity negotiation (Carlone et al., 2014). In this study, identity is recognized as something an individual does socially - "identity work" - not something that they "have" or "are" and as a discursive construct, where individuals' narratives about experiences with mathematics are seen as resources for identity negotiation in specific contexts

(Radovic et al, 2017). A discursive understanding of identity and the socio-cultural theory of figured worlds are used together to examine how premature students negotiate identities and are positioned by others, and how identity negotiation can be linked to their mathematical learning.

Methodology and Methods

This study uses a collective case study methodology with four participants, ranging from 12 to 17 years old who were born extremely premature and who are currently in different secondary schools in the Montreal area. The four participants, their parents, and two of their teachers have engaged in one set of semi-structured interviews over Zoom lasting between 30 and 60 minutes and will be interviewed two more times. Report cards and psychoeducational assessments were also used as artifacts. Interview transcripts were coded for excerpts that help explain and describe the figured world of home and the mathematics classroom and indicate how parents and teachers position students as learners and doers of mathematics. Narratives excerpts where students author themselves as learners and doers of mathematics were identified. Emergent themes explored links between students' authoring of identity and how they are positioned in different figured worlds, and their identity negotiation relating to their mathematical learning.

Findings

Findings suggests that even though the participants have experienced varying challenges in school mathematics, they show resilience and narrate generally positive mathematics identities that are often closely aligned with how they are positioned by their parents but not always how they are positioned in the mathematics classroom. Interviews show a strong achievement-motivation master-narratives in both the figured worlds of home and school in that there is a link between positioning and identifying as mathematically competent and work habits. For example, certain participants, David and Mekhai, show some difficulty in negotiating an identity that is aligned with the figured world of their secondary mathematics classroom.

Conclusions and Significance

In conclusion, there are factors beyond just mathematical ability that contribute to student learning and achievement, including family and classroom contexts and mathematical identity work. While the results from this study should not be used to overgeneralize to all premature children, they highlight the complexity of identity work, learning and academic success, complexity that is not captured in the current research literature about premature children and mathematics.

References

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