Researching Identity in Mathematics Education: The Lay of the Land

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In this symposium, we argue that a deeper understanding of what impacts on teaching and learning in mathematics education can be gained by foregrounding the concept of identity and exploring its explanatory potential. In this paper we provide on overview of identity and introduce a scenario from mathematics preservice teacher education that is then interpreted from three theoretical perspectives in the papers that follow.

Identity is a concept that is important to consider in mathematics education research because it draws together a range of elements that are integral to our understanding of mathematics contexts and learning spaces. In a broad sense, identity can be thought of as how individuals know and name themselves (I am: a teacher, a student, good at maths…), and how an individual is recognised and looked upon by others (that person is: white, tall, smart, an introvert…). We see identity as a unifying concept that can bring together multiple and interrelated elements that all stakeholders (including teachers and students) bring to a learning environment. These elements include beliefs, attitudes, emotions, cognitive capacity and life histories. Although these respective elements have individually provided a central focus of numerous studies in mathematics education, the concept of identity potentially connects these elements. As such, identity can be thought of as a connective construct for examining the interplay between these elements and the effect such a nexus might have on mathematics teaching and learning.

Because the term identity has been used by researchers from a range of different paradigms, and thus been conceptualised from multiple perspectives, we begin this paper by briefly outlining some of these perspectives. We then critique these views and in the process posit the argument that identity is not a single "entity" that can be understood from any one perspective alone. With this in mind we comment on some of the existing research on identity in mathematics education. Finally, we outline a scenario that the ensuing papers in this symposium will explore using particular theoretical frameworks that consider identity as a central focus.

Perspectives on Identity

The term identity has been named and conceptualised by researchers and theorists from a range of traditions and disciplines. Three views of identity appear to be particularly influential: (1) the psychological/developmental; (2) the socio-cultural; and (3) the poststructural. While we will briefly discuss these views independently, we acknowledge that the divisions are somewhat arbitrary, and certainly a number of theorists and researchers work across these divisions.

The most significant feature of the psychological/developmental perspective is the focus on the individual. Often, scholars within this tradition will try to compartmentalise and categorise aspects of identity in order to better understand and describe it. Alternatively, other researchers in this tradition attempt to create models that place the individual within a context that considers specific elements (often variables) that impact on a person's self-concept (Marsh, Graven & Debus, 1991). In both instances identity

formation is seen largely as self-determined as the individual adapts or develops to fit with the events and situations of life.

Those who align with a socio-cultural perspective focus more specifically on the interactions between the individual, culture and society. In this sense, identity is located both within, and external to, the individual, and it is developed through social and cultural practices. Identity formation is seen as being "steered" by society with the individual attempting to "navigate predetermined passages" (Côte & Levine, 2002). To this end, identity can be seen as "the ordered sum of all these: relationship skills, emotions, physical abilities, and so forth" (Zembylas, 2003, p. 220).

A poststructural perspective challenges the idea of identity formation as being either an individual or a social phenomenon (Foucault, 1984). Moreover, the whole notion of having a fixed-self is problematic and the process of identity formation is viewed as dynamic and somewhat unstable. To this end, poststructuralists often describe identity formation as a continuing process of becoming. Clearly, the notion of identity brings with it connected and multiple discourses. Table 1 outlines some of the representative discourses used by scholars from the respective ideologies when referring to the concept of identity and identity formation.

Table 1
Identity Discourses across Three Theoretical Perspectives

	Psychological	Socio-cultural	Poststructuralist
Locus of identity	- individual - the "inner world", - self, self-concept, self-efficacy - intrapsychic cognitive structures - emotion - agency, autonomy	- relational self, the "outer world", - connected to otherness - embodied - habitus, fields, cultural capital - belonging	- non-agentic, - a political posture, - no unified self, - all is relative - subjectivity rather than identity - positionings - becoming
Identity formation	- internalised, behavioural repertoires, - executive functions of the self (monitoring, choice-making), - searching for internal integrity, autonomy and competence - individual responsibility for who one is,	- constructed and situated -communal consciousness and identification - sociocultural reproduction and framing	- interior self is populated by others, - a constant becoming - a function of difference - constituted by political and institutional processes
Theoretical alignments	Bandura, Erikson, Piaget,	Wenger, Vygotsky, Bakhtin, Bourdieu, Bernstein	Foucault, Derrida,

Critique: A Potential Nexus between the Theories

As positioned above, the concept of identity has been variously portrayed in scholarly communities using psychological, sociocultural, and postmodern lenses. The choice of which lens to adopt seems to depend on one's persuasions in the debate about where identity is located—that is, whether its origins are essentially individual (inner) or social (outer). Côte and Levine (2002, p. 54) describe this as "the structure-agency debate" about how much individuals exercise control that is independent of social structure versus how much social structure determines individual behaviour. Holland, Lachicotte, Skinner and Cain (1998) make sense of this debate by arguing that a sense of identity combines the individual, personal world with the collective space of cultural and social relations. From their cultural studies perspective, identity is framed as a self-in-practice:

This self-in-practice occupies the interface between intimate discourses, inner speaking, and bodily practices formed in the past and the discourses and practices to which people are exposed, willingly or not, in the present… (Holland, et al., 1998 p. 32)

If identity is always connected to activity or practice (Holland et al. 1998), and if we think of mathematics education as a practice, then the notion of self-in-practice could become a useful construct for understanding the formation of mathematical teaching and learning identities.

Facets of identity have emerged in a number of recent studies in mathematics education. For example, aspects related to identity can be found in the shaping of school students' mathematical identity or learning identity (Boaler & Greeno, 2000; Forster, 2000); the development of a teaching identity from preservice (Klein, 2002; Smith, 2002; Walshaw, 2004), inservice (Cooney & Shealy, 1997; Goldsmith & Schifter, 1997) and teacher educator (Schuck, 2002) perspectives; and the transformative potential of research for forming a research identity (Mason, 1998). There is considerable variation in the extent to which these studies explicitly foreground identity. Nevertheless, they all share a common thread—the notion that within the practice of mathematics teaching and learning, the people within the practice, and the social conditions they experience, play a major role. We conclude by presenting a scenario that is embedded within a mathematics education context. The next three papers within this symposium then offer identity as an explanatory framework from three different theoretical perspectives.

A Scenario in Mathematics Education

Casey is in her final year of a Bachelor of Education program. The well-defined, personal beliefs about mathematics that accompanied Casey to university have been influenced by thirteen years of experience and observation as a learner in mathematics classrooms. During her years at university, Casey's established beliefs about teaching mathematics have been considerably challenged. Throughout her professional school-based experiences (practicums), new ideas about the pedagogy of mathematics put forward by university teachers have been put into practice with varying degrees of success. Casey has been confronted with many contradictions during her experiences learning to teach mathematics that include: a misalignment between university and school-based ideals and practices; contradictory beliefs, and a lack of support, from teachers in schools; and established classroom norms that produced barriers when she attempted to implement innovative ideas and practices. Casey is currently experiencing a great deal of doubt about

the sustainability of her beliefs and her ability to teach the way she would like to when she gets into a "real" classroom next year.

This scenario typifies the current literature related to the process of becoming a teacher of mathematics and sets the scene for the remaining papers in this symposium to analyse the scenario using different theoretical lenses and related discourses framed around identity and identity formation.

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