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Mathematics Education as a Matter of Identity

Anna Chronaki
University of Thessaly, Volos, Thessaly, Greece
Malmö University, Malmö, Sweden

Synonyms

Agency; Discourse; Identity; Identity-work; Positioning; Selfhood; Subject; Subjectivity

Introduction

"Mathematics education as a matter of identity" is an emergent field where selfhood and the mathematical subject are being theorized as the effect of lived experiences in institutions such as family, school, media, or church. Identity and its associated term subjectivity are embryonic in varied theoretical and activist arenas ranging from sociocultural psychology, psychoanalysis, cultural studies, poststructuralism, postcolonialism, new materialisms, or arts-based research. Emphasis on the "question of the subject" facilitates the problematizing of a "knowing self" as the effect of politics of difference, diversity, language, discourse, body, power, authority, agency, justice, and emancipation or as the product of affective politics connected to consumption habits and entertainment desires.

Up until today, "identity" persists the status of a ubiquitous concept in social sciences, resists clear-cut definitions, and subjects itself to critique. Despite being unsettled as a robust concept, mathematics education researchers embrace identity and/or subjectivity for analyzing, discussing, or interrogating how selfhood becomes inscribed through mathematical practices; how certain subject positions are constructed as normative, deficient, or marginal; and how a reconfiguration of mathematical subjectivity is potentially possible as part of cultural, discursive, material, corporeal, or affective renewals. Moreover, "mathematics education as a matter of identity" is key toward understanding the reciprocal relation among a bourgeoning free-market economy, neoliberal governing, increased socioeconomic crisis, vulnerable environmental sustainability, loss of security and safety, forced migration, etc. and the risky process of fabricating (by means of mathematics) the rational, reasonable, and yet fragile, fragmented, or indebted subject.

Lines of Identity Research in Mathematics Education Practices

An explosive interest in discussing *mathematics education as a matter of identity* has been recently realized among researchers, educators, curriculum designers, and policymakers. The turn to *identity* signifies primarily a concern for the quality of life experienced by learners or teachers through a

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complex availability of discursive and material mathematical practices. It also expresses an intent to capture, perform, or alter imageries of "who" is the mathematical subject. As such, identity research is geared toward the social, cultural, discursive, affective, ethical, and political underpinnings of mathematics education by being alert on how self and subject enact mathematical institutions (Martin 2006; Solomon 2009; Walshaw 2010; Chronaki 2009, 2013).

Most identity research marks a dissatisfaction with restrictive representations of the mathematical subject as the myth of the active, rational, autonomous, white, able, male, middle-class learner. It pursues to explore how marginalized or excluded subject positions are being constructed through racial, socioeconomic, ethnic, cultural, linguistic, or disability/ability discourses. It seeks not only to interpret or deconstruct normative mathematical subjectivities but also to reconfigure alternatives. At the same time, a focus on mathematical identity and subjectivity exemplifies (and sometimes disrupts) how imperialism, modernist thought, and neoliberal governing are being built on predominant ideologies of a certain, objective, predictable, measurable, and calculable selfhood. Equally, the turn to identity signals a discontent with conceptions of learner participation, access, and engagement as simply a matter of individual beliefs, attitudes, views, values, or of an enculturated, socialized, or self-regulated behavior. Instead, it gestures attentiveness to a more rigorous theorizing coupled with a deliberation toward problematizing equity, social justice, and emancipatory politics.

How is then identity being discussed and used in relation to mathematics education? Two distinct lines of thought, in contemporary social sciences, approach "identity theory" and "theories of the subject" from almost incongruent standpoints. On the one hand, "identity theory" with antecedents in structural perspectives of cultural or social psychology, sociocultural theory, and sociology strive toward a coherent language of "identity" clarifying relational mechanisms among social structures and subject positions. In this line, researchers in mathematics education exploit mostly sociocultural theory and search for operational tools that discuss identity as a precursor to learning (Sfard and Prusak 2005), to design participatory learning activity (Cobb 2004), or to create sustainable communities of practice (Lerman 2012). On the other hand, "theories of the subject" bring together scholars from the broader field of cultural studies including critical psychology, psychoanalysis, gender and queer studies, discourse theory, poststructuralism, new materialisms, or postcolonial theories. They discuss identity politics in relation to subjectivity in the realm of contemporary changing times as a complicated matrix of fluid relations, bodies, and spaces forming loci of immense dynamism, resistance, and creation. By and large, researchers in mathematics education who identify with a "theory of the subject" line of inquiry focus on how mathematical subjectivities are being produced discursively or materially and explore disruptions or reconfigurations of normative identity.

In particular, psychoanalytic perspectives based on Freud and Lacan capture the subject as "split" or as "polymorphous perversity" denoting that gender, race, and ability are already instilled in us as part of our corporeal encounters with biological species. Foucault-based poststructuralism develops a view of the subject as the workplace of power, struggle, will, and resistance where the self becomes governed through education to identify with society as organized in fixed categories around rationalized discourses of truth and knowledge. Laclau and Mouffe advance a discursive post-Marxist position based on the Althusserian notion of the interpellated subject via ideological state apparatuses (such as family, school, media, religion, law) and Lacan's theory of the split subject as fundamentally fragmented and constantly struggling toward becoming whole. This struggle to "whole," although always imperfect and incomplete, is crucial for identity-work where individuals strive to articulate meaning via chains of equivalence/difference, myths, social imaginaries, and bodily action functioning as "surfaces of inscription." Butler's queer theory further problematizes the discursive limits between subject, body, and identity tied into materializations that produce ideal constructs of

selfhood and discusses the politics of "troubling" hegemonic identity. Deleuze and Guattari's new materialism, allying with a Foucauldian analysis of the subject's relation to discourses of power and truth but departing from a psychoanalytic view of an esoteric subject, conceives subjectivity as a continuous "being" and "becoming." The subject is constituted in an extrovert process of affective encounters with the surfaces and rhizomes of a socio-material assemblage seeking mostly connections rather than predetermined identities as patterned structures of eternal or generalizable truths.

Reviewing the literature on identity research in mathematics education, Lisa Darragh (2016) points to a growing body of research with an increased peak in the last 5 years. A distinction is often made among two ways of conceiving identity, on the one hand, as "representing," "acquiring," or "appropriating" drawing on theories that frame learner qualities in socialization, culture, or biology and, on the other hand, as "performing," "resisting," or "troubling" predominant self-categories. Yet, the terrain might be more complicated as, despite urges for shared definitions of identity, a proliferation of terms such as narrative, enacted, leading, fragile, fragmented, or hybrid identity marks how researchers strive to capture aspects of a complex process of identity-work in which individuals struggle to perform norms or resist stereotypes. At the same time, there is a notable realization on how the concept of identity is more and more grounded in diverse and often conflicting theoretical frames without discussing their epistemological and ontological underpinnings making it more and more difficult to consider potential synergies. Methods are mostly drawn in qualitative studies (e.g., ethnographies, interviews, teaching experiments, genealogies of knowledge) focusing on the discursive analysis of moment-to-moment classroom talk, classroom episodes, workshop or leisure activity, narratives of student and teacher learning trajectories, career choices, and future aspirations as mathematics learners or educators.

Despite the absence of clear-cut definitions, one might appreciate a cartography of empirical outcomes produced by a growing research body designating how identities mediate learner cultures, influence educators' pedagogic acts, and inform the choice and design of adequate materiality as spaces where mathematical subjectivities become performed or resisted. As such, "mathematics education as a matter of identity" can be discussed in relation to (a) learner identities including children and students in primary, secondary, and tertiary domains; (b) educator identities including preservice, novice, and teacher professional development; and (c) material identities including texts, textbooks, resources, technologies, media, and varied genres of pop culture. It is within these spaces where discourses of truth and power unfold around gender, race, ethnicity, social class, language, or body politics and fabricate (or not) the self as the subject of mathematics.

Learner Identities

The bulk of identity research in mathematics education concentrates on how young children and students in primary, secondary, or tertiary domains experience mathematics as part of continuous changing social, cultural, and linguistic contexts. In particular, researchers tend to focus on how learners fabricate themselves as mathematical subjects while they relate to genres of formal or informal mathematical activity; become involved in transitions from primary, to secondary, and to tertiary education; make choices for studying mathematics or opting out STEM careers, or, even, migrate across geographical territories due to socioeconomic or environmental crisis, war, and religious and political conflicts. Of major concern is how students adopt, appropriate, conform, reproduce, or resist normative mathematical subjectivities and how categories of race, gender, class, religion, or ethnicity influence learning, knowledge access, and engagement with mathematics. Identity is often seen as the "missing link" for exploring learning as the distance between actual and designated identities (Sfard and Prusak 2005). It becomes a lens to explore how normative mathematical identities become construed or constrained via learning design, curricula reforms, and innovation (Cobb

2004). It is as well the hybrid space for opening up entries to "dialogicality" between West and subaltern positions of the mathematical subject (Chronaki 2009).

Learner identities tend to become affective spaces that govern a complex political work where traditional disciplinary dichotomies are entangled with curricular reform, innovative pedagogy, or educational policy. However, a number of issues need to be confronted. *First*, identity as a static, core self, or individual trait that contributes toward the construction of the "real" or "universal" mathematical learner has been problematized, and a figuration of the child as changing, growing, and always in flux is becoming endorsed. *Second*, there is an increased awareness of youth mathematical identity as constituted at the intersections of race, gender, social, linguistic, cultural, religious, and ethnic subject positions. And *third*, a configuration of learner identities in relation to youth and childhood spaces, mathematical agency, learning, and design for learning is progressively considered in the realm of sociomaterial, semiotic, and discursive practices of mathematical activity.

Educator Identities

Identity has equally been a construct for discussing how educators live through the changing sociopolitical dimensions of institutional teaching cultures as part of their initial education courses or in-service training, their encounter of pressing requirements to implement and mediate curricular reforms, and their responses to increased transcultural contexts of schooling. While some resort on how mathematics education practices work toward producing and reproducing certain teacher identities in the realm of regulatory strategies, cultural habitus, and reform demands, others emphasize how teachers resist, negotiate, transform, and, eventually, change identities as part of official policy requirements to implement curricular reforms or as the effect of market forces for innovative products or creative skills and capacities. They are based on the assumption that "traditional" and "reform" pedagogies are distinct worlds. "Traditional" is often implied as restrictive or primitive, while "reform" mathematics as always developing new professional identity by encountering innovative tools, novel ways of constructing mathematics, or new governing strategies for designing, organizing, representing, testing, assessing, evaluating, and marketing.

Educator identity research focuses primarily on the interplay among "traditional" versus "reform" or "innovative," "progressive," and "creative" practices that circulate through varied regulatory strategies in which educators position themselves as they struggle to articulate meanings among hegemonic and marginal discourses. Teacher identity-work does not reveal a preexisting fixed mathematical subjectivity but a complex discursive construction of self and subject at the thresholds of macro and micro educational levels. As Brown and McNamara (2005) argue that the potential reconfiguring of mathematical subjectivity of either novice student–teachers, who start anxious when they lack a solid background in mathematics, or expert teachers, who resist reform curricula implementation, lays primarily in making accessible creative experiences or sharing innovative mathematical activity with children and less within official regulatory frameworks for teacher training. Still, the recurring theme of mathematics teacher as autonomous subject, flexibly moving across territories of expertise, constantly changing and adapting, or always being the locus of thought, action, and ideology, needs further discussion. Some research interrogates how the neoliberal politics of a free-market economy exploits "educator identity" as the alibi for promoting particular products, skills, and competences that will turn into governing technologies of the self. Current demands for effective media or technology use and for responsive postures to social justice and cultural, religious, racial, gendered, and linguistic diversities in mathematics classrooms exemplify how identity becomes a crucial space toward governing teachers as agents for change. At the same time, teachers and educators fall into being identified as the "indebted" subject, unceasingly responsible for change, innovation, and creativity and,

instantaneously, guilty of not being able to, finally, meet these goals.

Material Identities

Researchers have devoted attention on how sociomaterial and semiotic practices including a variety of texts such as textbooks, literary books, curricula resources, media, technologies, or popular culture genres represent, signify, or mediate certain mathematical identities and provide a textural basis for crafting mathematical subject positions. Walkerdine (1989) analyzed how textbooks employed in the UK have served to limit female agency with regard to mathematical knowledge. This has proved a lasting and consistent pattern throughout primary-school while becoming more grievous in secondary-school textbooks across nations up until today. Specifically, women and girls are still represented in textbooks as mostly passive and inferior to men or boys, frequently in need of help, support, or guidance, and, often, in positions that do not accord with serious mathematically rooted professions. On the contrary, masculine images in texts are comparatively more in demand for power and action identifying the genius, quick, and clever problem solver.

Gendered, racial, and class dichotomies prevail along with discursive constructions of ethnic identity not merely in textual representations of mathematical content and historical accounts of mathematicians and mathematics but also in the ways specific written speech acts and visual images of word problems address the reader into mathematical activity. Recently, Hottinger (2016) discusses gender reconstruction of mathematical subjectivity in the US context by means of a popular series of mathematics textbooks authored by glamorous actress and mathematician Danica McKellar who addresses middle-class adolescent girls (e.g., *Girls Get Curves*, *Kiss My Math*). Although her storied problems attempt to shift the masculine discourse of mathematical ability and to align mathematics with femininity, gendered representation is conflated with heterosexual identity and femininity norm is fixed around specific notions of sexuality (Raubel 2016). Such material identifying of mathematical subjectivity can be problematic since the textual narratives of "real-life" problems unfold around fixed categories of gender, sex, and sexuality but also social class and neoliberal governing. Thus the process of mathematical activity ignores diversity across gender identity, sexual orientation, and ideology positioning.

Of significant importance is how learners, teachers, or spectators identify selfhood and configure mathematical subjectivity by conducting multiple narratives, storied problems, modeling, thematic contexts, and problem-based activity in textbooks or media. Findings indicate that mathematical content selection and representation is not only rarely in accordance to youth cultures but appears to limit motives for participation and intensities for successful participation. The tenacious presence of normative identities has also been documented in genres of stereotyping the presence of mathematics and mathematicians in popular culture texts such as movies, TV series, youth magazines, etc. Prevailing images of mathematics and mathematicians construct, by and large, negative or alienating relationships with audiences not appealing to the complexity of life (Moreau et al. 2010). In addition, normative mathematical subjectivity is configured not only as incompatible with femininity but also in close relation to constructions of West identity as superior. This is evident in how narratives of the mathematical hero in most representations, varying from textual historiographies to visual portraits in postage stamps, tell the story of mathematical knowledge growth as mainly a racial, gendered, and cultured achievement where the West as imperial power is revisited without being interrogated (Hottinger 2016). As such, the civic disposal of mathematical material identities in relation to mathematical activity is often trapped around particular norms that do not fit with contemporary struggles toward discursive shifts related to racialized, cultured, or gendered subjectivities and, thus, cannot identify with the public at large including educators and learners.

Concluding Remarks

"Mathematics education as a matter of identity" lures the question of "the subject" as crucially political. It serves to interrogate the relation between subjectivity and identity politics and to problematize normative assumptions around categories such as women, age, ability, masculinity, sexuality, patriarchy, social class, West, or indigenous as consistent across regions and historical periods. A number of studies in mathematics education agree that stereotyped categories of identity persist in the cultural spheres of education. At the same time, there is a noted absence of research that sheds light on alternative identity-work that pursues reconfigurations of mathematical subjectivity. It is apparent that more attention is required in relation not only on how mathematical identity mediates the construction of specific subject positions as success or failure. It is equally important to think about how material, textual, and corporeal mathematical subjectivities can queer, trouble, or disrupt essentialist identities and can contribute into creating alternate spatial and embodied constellations of both representing and performing subjecthood.

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