Identities-in-action

Exploring the fragility of discourse and identity in learning mathematics

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The notion of identity is often used in mathematics education research in an attempt to link individual and social understandings of mathematical learning. In this paper we review existing research making use of the notion of identity, and we point to some of the strengths and weaknesses in the ways the notion of identity is being constructed. We propose a conceptualization of the notion which points to the fragility and instability of identification processes as embedded into discourse. We contend that a notion of identity formulated from a poststructuralist perspective and emphasising the dialectic relationship between identification and discourse offers interesting possibilities for interpretations of mathematical learning as a fragile process characterised more by discontinuities and disruptions than by continuity and stability. We further argue that a poststructuralist notion of *fragile identities in action* allows us to bring attention to what is normally considered as "noise" or "impossibilities" in our understandings of mathematics education and classroom interaction.

In recent years the notion of identity has gained an increasingly visible position in educational research in general and in mathematics education research in particular. While the notion of identity has had a long history in other disciplines in the social sciences such as psychology and sociology [1], in mathematics education research its appearance seems to be connected with the adoption of socio-cultural theories to explore mathematical learning, in particular the idea of learning as a process of becoming a legitimate participant in communities of mathematics learning/teaching practice (see for example Lave & Wenger, 1991; Rogoff, 1991; Wenger, 1998). The notion has also been associated with the adoption

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of poststructuralist approaches emphasising processes of subjectification as embedded into the institutionalised practices and discourses of school mathematics (Black, Mendick & Solomon, 2009). Independent of the theoretical framework to which it is attached, the notion of identity represents a way to move beyond the existing debate on whether mathematics learning is in essence individual or social. It can be seen as a notion which may assist researchers providing the missing link for grasping the dialectic relationship between the individual and the social dimensions of learning (Sfard & Prusak, 2005 p. 15); and therefore it has been taken as a fruitful concept for providing more sophisticated interpretations of processes of mathematics education practices.

Many theoretical formulations on the notion of identity have relied on the idea that identity is the sense of self that a person has. The "self" is an important and stable attribute of human beings, that can vary from person to person, but that is immanent to the condition of the individual. So identity has been taken to be an essentially individual and static representation of what constitutes a person, his core or who she is (Benwell & Stokoe, 2006). When using this notion in research, identification is often conflated with the ascription of particular characteristics and traits to individuals based on categories of culture, social status, gender, race, occupation, ethnicity, language and ability. This identity or category ascription in turn serves to inform both the person in question and society around him. In the social sciences this attribution of characteristics to any individual or any group has greatly facilitated the emphasis on and use of fixed categorisations for identification when "representing reality" through research. This is particularly evident in the focus on quantitative research methods where examinations of specific characteristics of individuals form the basis for analysing statistics. From a political perspective these identities expressed through categorisations are often utilised to provide an overview of society and pinpoint areas in need of regulation or change, for example the need to regulate educational provisions for children of immigrants or children with a poor socio-economic background. Lange (2008) highlights the use of political discourses based on categorisations of for example minority students and their apparent lacking in learning mathematics. He demonstrates how a student comes to constitute her story as a mathematics learner around these discourses and how this makes it difficult to recognise the actual resources available to assist her in her mathematics homework

In research identities are constructed to serve a purpose of generalising student populations according to for example culture, gender, class, age and ethnicity and subsequently used in the argumentation for design of educational programs and teaching materials (Appelbaum,

2002; Halsey, Lauder, Brown & Wells, 1997; Moore, 2004). More concerning, some research appears to ascribe particular identities to students, which are used to forecast their performance in school and higher education and predict obstacles on the way. (Clarkson, 2007; Elbers & de Haan, 2005; Hofstede, 1986; Lareau, 1997; Zirkel, 2008). Studies of this nature are centred on defining characteristics of a student as coloured, indigenous or female, constructing such a strong categorisation that it becomes almost impossible to think about these students outside of or beyond these categories. Although these studies may shed light on serious matters, for example, how and why girls may be excluded from mathematics education (assuming they are excluded because of their gender), many of the studies risk falling into attributionist explanations of students' learning and performance (Boaler, 1998), and may consequently ignore the complexities of the social interactions behind the construction of these very same positionings in educational practices (Valero, 2007). Defining identity in terms of an individual as belonging to, for example, any of the predetermined categories mentioned above can only reveal one very specific side of the story of a person's engagement with life and with learning mathematics, e.g. the story pertaining to an him/her as black, female or indigenous and any interaction in the mathematics classroom will be interpreted according to this categorisation.

The limitations of a notion of identity linked to predetermined categorisations are taken up critically in the following two studies. Swanson (2005), in her study of discourse and political context in mathematics classrooms in South Africa, points to the ongoing constructions of student identities when re-contextualised elements of "outside" socio-political discourses were brought into the mathematics classroom. Swanson gives the example of black students being constructed as disadvantaged and as a result being offered different possibilities for learning mathematics than other students. Skovsmose (2005b) describes how categories of race and colour made South African educational researchers, teachers and politicians blind to the influence of other factors in students' learning. He argues that the appalling educational facilities of many "black" classrooms obviously make the environment for teaching and learning mathematics unattractive and serve as tangible learning obstacles for many students. Specifically, Skovsmose points out how students in a run-down school building with poor resources could obviously lack motives for engaging in mathematics education. The "hole in the roof" appeared more obstructive to learning than the colour of the students' skin or their ethnicity.

Researching mathematics education through traditional social, political and cultural categorisations have assisted in providing a detailed

understanding of how mathematics and mathematics education are perceived in society and how these perceptions are brought all the way into the context of the mathematics classroom. However, narrowing the lens and attributing a limited number of specifying and fixed characteristics to students and teachers as part of their identity presents the risk that other characteristics and processes made relevant through classroom discourse and determining for individuals' or groups' inclusion or exclusion in mathematics education are overlooked. This risk has also been noted by Cobb and Hodge as they point out that "a crucial limitation of these institutionalized categories in our view is they do not necessarily correspond to people's own sense of identity" (Cobb & Hodge, 2002 p. 258). The quote raises two important questions when engaging with the notion of identity in mathematics education research: Do the categories or identities used in research reflect identities visible in mathematics classroom interaction? And is it possible to take particular identities as for example an identity ascribed to students as learners of mathematics for granted?

If mathematics education research has a commitment to address the complexities of mathematics education practices, and if the notion of identity is to offer a powerful tool to explore these complexities, then there is a need for alternative approaches to defining categorisation and identification. This paper intends to contribute with a theoretical discussion in precisely this direction. We begin with a review of existing research in the field of mathematics education making use of the notion of identity, and we point to some of the strengths and weaknesses in the ways the notion of identity is being constructed. This leads us to propose a conceptualization of the notion which encompasses the fragility and instability of identification processes as embedded in discourse. We contend that a notion of identity formulated from this perspective and emphasising the dialectic relationship between identification and discourse offers interesting possibilities for interpretations of mathematical learning as a fragile process that is characterised more by discontinuities and disruptions than by continuity and stability; a process which cannot be taken for granted even when students and teachers are confined by the walls of the mathematics classroom. The poststructuralist notion of *fragile identities in action* allows us to bring attention to what is normally considered as "noise" or "impossibilities" (Biesta, 2005) in our understandings of mathematics education and classroom interaction.

Identity in mathematics education research

In his account of the "strong social turn" in mathematics education research, Lerman (2000, 2006) points to the potentials offered by

research in understanding learning as a transformation of identity. Investigations into the Interrelatedness of learning and identity has indeed become a new branch on the tree of mathematics education research, as over the past decade the notion of identity has gradually found its way into the field through explorations of a variety of theoretical perspectives and empirical sites[2]. In general terms, our review of existing literature[3] made evident that the majority of research has been carried out on students' identities as they engage with mathematics in classroom settings. However, research related to teachers' identity and what it means to "become" a mathematics teacher and to construct a mathematics teacher identity seems on the increase[4]. More often than not the term identity is not clearly defined. When defined, the approaches behind the researchers' view of identity are predominantly rooted in socio-cultural and discursive theories. In what follows we exemplify these trends.

The mathematics learner is a natural focus when addressing identity. Social practices in the mathematics classroom have been investigated as a realm for students in their constructions of mathematical knowledge and understandings and for their identification as mathematics learners. Boaler and Greeno (2000) and Boaler, William and Zevenbergen (2000) are examples of some of the first work where the notion of identity appeared to express how the perception of students' as being proficient (or not) mathematics learners was highly related to the culture of teaching and learning established by different pedagogical approaches. Agnes Macmillan focuses on the creation of an identity around mathematics and being a mathematics learner in young children, as she explores how they engage in and navigate through language in social practices as they integrate what is known and new knowledge in becoming "numerate" (Macmillan, 2004).

The notion of identity and what constitutes the baggage an individual brings into the mathematics classroom has previously been related to issues of culture and language as constitutive elements in what it means to engage with mathematics activities in a particular school context. In these studies students are "identified" according to cultural or linguistic characteristics which then form the foundation for analysing their participation and interactions in the mathematics classroom (Adler, 2001; de Abreu, 2006; de Abreu, Bishop & Presmeg, 2002; Gorgorió & Planas, 2005; Gorgorió & Prat, in press; Lerman, 1994).

Theories of cultural models as first proposed by Holland and colleagues (1998) have been explored when interpreting students' narrating or storying identities and how these identities play a crucial role in the students' relationship with mathematics and mathematics education and its relevance to their life imaginaries (Williams et al., 2007).

Storytelling is also a main feature as learning is explored as the gap between designated identities and actual identities as they are collectively produced and narrated (Sfard & Prusak, 2005). Sfard and Prusak emphasise identity as a communicational practice where one's and others' reifying stories about one self constitute the basis for identification. This definition moves away from essentialism because identities cannot be entities formed outside of discourse.

Researching the transition phase from teacher education into teaching practice and experiences of teacher practices has invited some considerations of teacher identities and identity formation as important constitutive elements of teachers' work (Brown, Jones & Bibby, 2004). For example, based on Wenger's theories of communities of practice and identity (Wenger, 1998), van Zoest and Bohl (2005) have proposed a complex model of mathematics teacher identity as residing in the individual as he brings his identity into and out of communities of practice in mathematics education and in the process learns, consequently leading to an alteration of his teacher identity. Van Zoest and Bohl view identities as unique to the individual as they embody the knowledge, beliefs, commitment and intentions of that individual. They provide an example of US mathematics teachers' trajectory from students to reform oriented teachers. The multiplicity of teacher identity as it is realised in classroom settings is further explored as teachers' enactment of identities of personal narratives and procedural discourse is analysed through a discourse analysis perspective (de Freitas, 2008).

National tests have been addressed as intervening on teacher identity, as teachers are constructed as navigating between being "good" teachers producing positive test results and their understanding of best practices for teaching mathematics to the children (Walls, 2008). William, Bartholomew and Reay (2004) offer related concerns about identity, assessment and learning as they demonstrate how assessments play a role in shaping the learning experience and student identities in the mathematics classroom.

More recently poststructuralist thoughts on identity and mathematics education have been made explicit in mathematics education research shifting research focus from identity as a destination or final result of investigation – something teachers and students are – to viewing identity as process and action closely tied to actions of learning – to identity as intersecting with context and discourse. Based on a Lacanian perspective, Brown and McNamara (2005) explore the transitional phases through which teachers become teachers and how this journey of becoming is lined with intertwined and intersecting discourses of a personal,

institutional and political nature. From a similar perspective Hardy (2008) examines teachers' confidence and how research needs to take into consideration multiple subjectivities of participants and move away from essentialist categorisations.

This short exposition of works relating mathematics education practices to the notion of identity is far from exhaustive. We found it a challenge to make clear-cut categorisations of existing literature since the fact of using the term "identity" in itself does not necessarily imply adopting a thorough view of learning/teaching practices from the perspective of identity construction. In its broadest definition any use of theories locating the learning process of mathematics outside the mental, cognitive processes of the individual and into social practices, actions and interventions include some underlying dispositions to deal with issues of identity. However, identity seems to be linked to the subject (the learner or the teacher) and his/her participations in the classroom setting, as s/he engages with mathematics and in processes of becoming a mathematics learner. What appears even more interesting is the fact that rarely if ever do researchers raise the question of the relevance of the specific categorisations and identities chosen to represent the participants to the research. Consequently, particular identities are taken for granted and assumed to reflect the identities actually realised, felt, or believed by the participants. Taking specific identities for granted is problematic, as the notion is by many seen as somehow unstable, as they describe moves or shifts in identity or as the issues of what it means or requires to "achieve" a particular identity are addressed. Another common characteristic of research in mathematics education utilising the notion of identity is the apparent lack of engagement with any constituative element beyond those directly associated to mathematics and educational matters. This could misleadingly give the impression of mathematics and education as central and essential to any one individual Irrespective of the complexities of life and living faced by the individual and moving beyond any aspect of (mathematics) education.

In the following section we will address the notion of identity in a complex conjunction with issues of discourse. We do this as we discuss how the notion of identity can be seen as a fragile construction, which can never be assumed and taken for granted. These claims may have serious implications for perceptions of what it means to learn mathematics and the way we engage with and construe research on interaction in the mathematics classroom. We reflect on these implications in the final part of the paper.

The fragility of identity in discourse

We see that poststructuralism can offer us tools to rethink identity and its significance in an understanding of mathematics learning and teaching, and a way of going beyond the shortcomings of some of the existing uses of identity in mathematics education research. First of all, for the purpose of this paper we adhere to a view of poststructuralism as an analytical move that intends to formulate what existing research discourses have made impossible to think about the social world. It is a move that brings voice to what other particular research languages may name as "noises" or the disruptions that defocus a predetermined research gaze (Biesta, 2005). Making the noises visible and legitimate parts of a research gaze allows opening for possibilities of talking about what has been ignored or simply taken for granted. This entails that poststructuralism further offers a scope for questioning the salience and relevance of the particular identities so often ascribed to students and teachers in their engagement with the teaching and learning of mathematics.

In mathematics education in particular, our move can be seen as an attempt to make visible what existing mathematics education research has not paid attention to or has simply constructed discursively as given entities (Valero, 2004). Nolan and de Freitas proposes poststructuralism as an alternative to re-read mathematics education as it "seeks out aporias, the silenced voices, the inconsistencies in texts, the moments of surplus meaning, the asymmetries within power relations, the inherent alterity of the speaking subject – all of which establish the very conditions of discourse." (Nolan & de Freitas, 2008 p. 2) In what follows we will propose how a poststructural perspective allows us to think of identity in terms of fragile identification processes embedded in discourse and, therefore, tightly related to peoples' actions and participation in on-going discursive practices.

A poststructuralist perspective on the notion of identity strongly opposes a view on identity as a static and constant entity. Baumann (2004) links identity and belonging to peoples' actions, and proposes to see identity as both as fragile and dynamic:

> One becomes aware that 'belonging' and 'identity' are not cut in rock, that they are not secured by a lifelong guarantee, that they are eminently negotiable and revocable; and that one's own decisions, the steps one takes, the way one acts – and the determination to stick by all that – are crucial factors of both. (Bauman, 2004 p. 11)

This idea is also present in Dallmayr (1997), who analyses non-identity to signal how identity can no longer be trusted as a provider of accountable

and sustainable information about an individual. Analysing the writings of Foucault, Dallmayr states that:

> [...] his writings tend to give room to multiplicity over unity, contestation over consensus, rupture over teleology, and nonidentity (or the dispersal of identity) over any stable self-conception.
>
> (Dallmayr, 1997 p. 41)

Proposing identity as fragile renders the notion intangible, impossible to capture and difficult to predict. Viewing identity as fragile emphasises the vulnerability of identity to disturbances, as well as highlights the uncertainty inherent in its very construction. It also implies a move away from certainty, inherent in the word when conceived away from structure. However, at this point it seems relevant to raise the question of the potential for educational research of a notion that seems to be so fluid and liquid that it could be difficult to employ in the analysis of empirical situations found in educational practices. As an answer, we turn to the notion of discourse as the anchoring for the fragility of identity.

Discourse has seved as a productive notion in mathematics education research in the last decades, and many researchers have used it to specify the characteristics of mathematical communication in classrooms as well as an overarching perspective on learning (Sfard, 2008). It goes beyond the scope of this article to provide a review of the use of the notion in the field. We concentrate on the notion of discourse from a poststructuralist perspective. The notion of discourse – as the notion of identity – is a much used term with fuzzy boundaries. How narrowly or broadly the notion is defined has a great bearing on definitions of identities. Various approaches have linked discourse closely to interaction and language-in-use (Antaki & Widdicombe, 1998). However the notion of discourse can be extended to constituting not only the social interaction itself and its linguistic characteristics, but also the broader environment in which interaction occurs and in which processes of shaping and altering identities take place. Gee (2005), for example, distinguishes between discourse with and without capital D. Discourse with a capital D is defined as:

> Such socially accepted associations among ways of using language, of thinking, valuing, acting, and interacting, in the 'right' places and at the 'right' times with the 'right' objects (associations that can be used to identify oneself as a member of a socially meaningful group or 'social network'). (Gee, 2005 p. 26)

Laclau (2005) also adheres to this idea when he says that discourse cannot be seen as:

> [...] essentially restricted to the areas of speech and writing, but any complex of elements in which 'relations' play the constitutive role. This means that elements do not pre-exist the relational complex but are constituted through it. (Laclau, 2005 p. 68)

These definitions of discourse include more than the use of language and more than actual immediate interaction; they rather signal to the complexity of relationships and the possibilities for the generation and production of the social world in and through it. This generation of discourse is embedded into discursive practices, within which there are social interactions and actions of the individual. Including more than language-in-use, discursive practices can be characterized as an environment created through interaction but comprised of several different components such as a historical, temporal and spatial dimension, – interacting at a particular time in a particular place – and the components of thinking and valuing. Discourse and practice are therefore influenced by participants' thinking and narrating of past experiences and identity trajectories, as well as their imaginaries about their future identities and perceived identity trajectories, or what Skovsmose (2005a) has presented as the interplay between background and foreground of individuals. Discursive practices thus become the scene where identities are continuously created, negotiated, accepted or rejected. Discursive practices are the scene for the continuous construction of the subject as individuals take up subject positions in the discursive practice (Hall, 1996). In this way cognition and discourse are no longer kept separate but can be viewed as intertwined and co-dependent components of internal as well as social processes. Examples of how discursive practices operate in relation to mathematics education practices are exemplified in the work of Mendick, Moreau and Epstein (2009) addressing successful students' choice of mathematics in the framework of a neoliberal era. Successful students construct an identity of being "special and rare" making profit of public discourses of specialness of those being able to do mathematics. However, this is not a choice but rather they are forced into adopting such type of identity, in the absence of other discourses that could associate effort or like to mathematics. Being good at mathematics and being a "rare, special" person does not fit with the discourses that are promoted in a neoliberal age for reasons to choose course of studies.

In his exposition of discourse Gee does not explicitly address the interrelatedness between discourse and identity – i.e., how particular identities are created, negotiated and rejected in and through discursive practices – nor how the process of identification simultaneously influence the discursive practices, as illustrated by Mendick et al. above. However Gee does clarify that his use of the term identity points to the social

situatedness of identity as people adopt multiple identities in different practices and contexts (Gee, 2005 p. 34). Gee sees the multitude of identities as residing in the individual and brought out in and through specific discursive practices. He proposes that whether a person is "in" or "out" of a particular discourse practice depends on the recognition of that person in relation to his actions, interaction, language, beliefs etc. by other participants (Gee, 2005).

Hall on the contrary closely links the construction of identities with discursive practices:

> [...] identities are never unified and, in late modern times, increasingly fragmented and fractured; never singular but multiply constructed across different, often intersecting and antagonistic, discourses, practices and positions. (Hall, 1996 p. 4)

Furthermore, Hall (1996 p. 6) presents the notion of identity as a meeting point between subject and discourse:

> Identities are thus points of temporary attachment to the subject positions which discursive practices construct for us.

Despite the obvious differences between Hall and Gee, they both operate within a paradigm of identities as fragmented non-stable modes expressed, constructed and utilised in and through interaction and discursive practices.

The notion of identity is blurry and can even within a poststructuralist framework be interpreted and utilised in various ways, some of which are closely connected to the notion of discourse. Viewing identities and therefore also discourse as something more than immediate interaction – though constructed, changed and abandoned in interaction – emphasises the heterogeneity of identities that people adopt in their participation in discursive practices.

We have brought attention to the fragility of identities and their constitution within discourse and discursive practices. This allows us to point to a view of identities as constructed in continuous action and participation in discursive practices. Therefore it appears appropriate to talk about *identification*, the action of engaging in constructing multiple identities, or rather *identities-in-action*, to bring out the continuously shifting possibilities for new constructions as arising with changes in discourse when individuals meet in a social realm. Any discursive move contains a potentiality for shifting one's identity, and any identity carries with it a framework in which an individual will act, think and learn. Therefore, we now offer some reflections on the consequences for our

views of learning in the mathematics classroom as they can be inferred from a notion of identity-in-action.

Identities-in-action and learning mathematics

So far we have proposed the notion of identities-in-action to signal the fragility of the process of identification when people participate in discursive practices. In this section we will connect the notion with mathematical learning and teaching by offering our reflections on how students' identities-in-action can be seen as shifting in the framework of the discursive practices of the mathematics classroom. We illustrate this with an example taken from an empirical study in the context of teacher education of primary and lower secondary mathematics teachers in Denmark [5].

The first question to be raised here is why it could be relevant to reflect on a notion of identities-in-action as relational to issues of learning mathematics? Returning to our contentions above, we argued how particular identities cannot be assumed to exist or be taken for granted at particular times, as their "presence" vary in conjunction with discursive practices. These contentions also encompass mathematics classroom interaction, and consequently, it is not possible to assume and take for granted discursive practices and identities in the mathematics classroom to be particularly concerned with issues of mathematics despite the physical location – being in a classroom – and the intellectual framing of an educational institution. This means that the mathematics classroom may be full of "noise" in the form of those discursive practices and identifications not necessarily relating to the teaching and learning of mathematics. An additional question to be raised therefore is, whether this "noise" is significant in classroom interaction and plays a significant role in relation to issues of learning mathematics.

Sfard and Prusak present a notion of identity emphasising a move away from extra-discursive entities objectifying expressions of individual identity. Instead they propose identities to be stories about persons which are reifying, endorsable and significant. Identities are activity incessantly connected to discourse. The notions of designated and actual identities refer to identities as imagined or expected in the future, and as the identity of the present. Learning, it is suggested, is the act of closing the gap between these two forms of identities (Sfard & Prusak, 2005). Relating learning and identity Sfard and Prusak (p. 19) assert that:

> Learning is our primary means for making reality in the image of fantasies. The object of learning may be the craft of cooking, the

art of appearing in media, or the skill of solving mathematical problems, depending on what counts as critical to one's identity. Whatever the case, learning is often the only hope for those who wish to close a critical gap between their actual and designated identities.

The action of learning can thus be seen as strongly informed by both actual or present identities as well as designated identities, or what Skovsmose (2005a) has described as the foreground of the individual comprised of imaginaries and dispositions to the future. Sfard and Prusak present learning as a means to close the gap between the two units of identification as the individual work his way towards his designated identity. The emphasis is placed on learning as an activity – learning-in-action – leading to changes in identities. Learning is thus informed by present discursive practices and identities-in-action but also constitutes an influencing factor and is containing a constant potentiality for changes exactly to identities and discursive practices. Similarly, identities-in-action and discursive practices as they come into being in for example the mathematics classroom contain potentialities towards very specific kinds of learning, which can not be assumed to relate to issues of mathematics. This contention raises additional issues of nature and constructions of discontinuities, disruptions and "noises" which are often omitted from research on identities and education.

Figure 1 below can be seen as the landscape in which learning is situated and highlights the multitude of intersecting components informing processes of learning as the individual engages with the social. Each

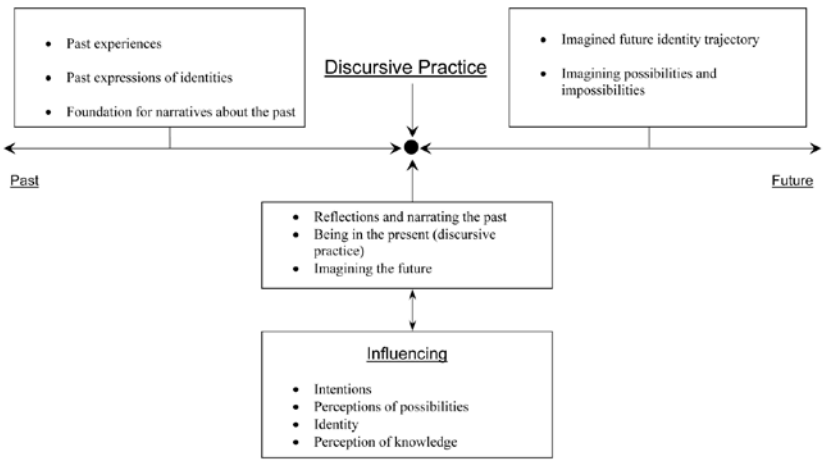

Figure 1. *Identities-in-action*

of the components of the figure – past experiences, present discursive practice and imaginaries about the future are in themselves dynamic shaped in and from each other and influencing the individual in her engagements with the social and in the shaping of identities in discursive practices. It naturally follows that learning as a process is dynamic and in constant motion as new experiences are acquired and as new scenarios for future trajectories emerge. Learning is a natural outcome of participation in various discursive practices and will inevitably vary in tune with varying discourses. In mathematics education the aim is therefore not only qualified dissemination of mathematical content which will determine whether individuals will learn. It is also the engagement of the individual with the social – in discursive practices – in ways bringing past experiences and future imaginaries into practices of mathematics learning and an identity of learner of mathematics which gives meaning and scope; where learning mathematics is the glue that positions the subject in discourse.

Re-entering the mathematics classroom we can think of a scenario where identities are continuously emerging and shaped in and by the interaction of participants and where the role of the teacher is not just to teach mathematics to mathematics students but rather to teach mathematics to what he hopes discourse will "allow" to be a group of mathematics students. For example discursive practices in which an identity of keen mathematics learner emerges will offer possibilities for the student to learn mathematics. However, the fragility of identities may also pose as obstacles to particular kinds of learning, if this particular kind of learning is not part of the learning potentialities embedded into an identity or discursive practice. In the mathematics classroom this could mean that identities usually considered as "noise" in the classroom could be instrumental in shifting the focus of learning away from mathematics and onto for example learning biology, the newest football tactics or the craft of knitting.

This can be further illustrated through an example from a study of identities and discursive practices in the mathematics classroom, as it revealed a multitude of identities made visible in and through classroom interaction. The study further revealed that minor shifts in classroom discourse, or rather fragmented discourses all located in the classroom and some simultaneously in action, further led to quick shifts in how individuals identified themselves and others and thus positioned themselves and others as subjects to particular discursive practices and potentials for learning. In the example below it is seen how the late arrival of one student leads to an abrupt change in discourse and disrupted students' and teacher's engagement with mathematics.

T: It is a small thing to be aware of. Now I know, I can't remember how you write b, but if you do it in mathematics, then write the b like this so it is open or in some other way that cannot be misunderstood. Hi S6.

S6: Sorry I am late.

T: As long as you come.

S6: The trains were going wrong.

T: Did you see anyone else on the train?

S6: I don't know. But it was ehh there was a train jam in V station.

T: Aha. ... Train jam.

S6: Yes, it was something about too many trains ending in V. So I did not get on the right train.

T: That's a wonderful word. Have you heard this word before – a train jam?

S7: Yeah.

T: Have you heard this before?

S7: Yeah, in my language.

S6: Have you heard it? ... (inaudible).

T: Bosnian.

S7: Yes. S8 says it exists.

T: S8 says it exists?

S7: Yes.

As seen in this example the arrival of S6 in the classroom marks a clear shift in both discourse and identification as it moves from mathematics learners to that of someone engaging in a conversation about the construction and existence of a particular word. In this example the discursive move and the corresponding identities appear to abandon issues of mathematics as other potentialities for learning are exposed and brought into the interaction. These potentialities pertain exactly to the construction of a word and its possible existence in different languages. The question is, whether it would be accurate to ascribe identities of mathematics learners and a mathematics teacher to the persons engaging in this situation of interaction, even though it occurs in the mathematics classroom. We suggest this would not be the case.

Identities are fragile and in constant action, and with the inevitable intersection of identity and learning, learning is in action too both as an act of acquiring new experiences and as an act of negotiating which new experiences will be meaningful in a particular discursive practice. Consequently possibilities for meaningful mathematics education are not exclusively relying on stable factors such as available teaching resources or design of curriculum. As illustrated in the example above possibilities rely as much on students' active involvement in a discourse where

identities include a positive attitude towards learning mathematics: Learning-in-action.

Fragile identities-in-action and learning-in-action implies something in need of protection. In the mathematics classroom "the breakable" can be an identity, a focus of learning and discursive practice engaging with learning mathematics. Such an identity must be nursed and protected which requires the teacher to actively engage with the framework of the discursive practice and the students as they are shaping their identities in and through discourse. This adds a new dimension to what it means to create rich teaching and learning environments. Naturally, there must be a focus on teaching materials as well as the ability of the teacher to communicate the mathematics content to the students. Added to this could be the constant awareness of classroom discourse and learning-in-action and its effect on students' involvement in mathematics. Given the fragility of discourse and identity maintaining an identity in the classroom inclusive of all students and embracing the teaching and learning of mathematics is bordering to utopia. This idea is in sharp contrast to the portraits that research tends to present of mathematics classrooms, where participants are active cognitive agents all engaged with learning mathematics. In this way viewing identities and learning as being intertwined and in-action leaves both hope and frustration: hope because it allows the teacher or the researcher to make immediate changes to classroom strategies and discursive practices, which may just mean that students often absent-minded will find learning mathematics meaningful. Frustration because this view on the mathematics classroom means there will never be an end to the challenge, and no matter the effort, whether mathematics appears meaningful and relevant is only to some extend in the hands of the teacher. Other factors – past experiences, imaginaries about the future and present discursive practice may stand in the way of exactly learning mathematics.

Working from a poststructuralist framing of identities-in-action comes with some implications relating to research methodology and methods. Most research in mathematics education deploying a notion of identity make use of this notion in order to categorise or organise research participants according to specific characteristics and then relate these characteristics to various aspects found in settings of mathematics education. Researching a poststructuralist notion of identities-in-action requires a different perspective, as particular characteristics cannot be taken for granted as a focal point neither in the collection of empirical material nor in the subsequent analysis. Similarly, mathematics content cannot be made into a focus point, as there are no guarantees for its' emergence and relevance when doing research about interaction in the mathematics

classroom. Instead researching identities-in-action opens up to exploring the noise and disruptions to learning mathematics in the form of fragile and fluctuating identities and discursive practices, all what is omitted from research. This approach poses challenges to existing research methods as focus is shifted from research strategies of reduction towards research strategies embracing complexity.

Concluding remarks

Discourse and identities-in-action are powerful components found in any mathematics classroom. They are critical in giving meaning to learning mathematics and simultaneously they can serve as obstacles withdrawing meaning from the discipline. What is perceived as relevant and meaningful learning by individuals is informed by her identities at any given time and space. Simultaneously, learning can be seen as action moving the individual towards changes in discourse and identities: Learning is in action. Actually coming to grips with mathematical concepts may to some extend reside in the mind of students. However, the road to even contemplating such concepts is lined with discursive and identity-related obstacles, challenges, possibilities and limitations.

Granting power to discourse and granting action to identities in the mathematics classroom renews the emphasis on mathematics education and participants in mathematics classrooms as shaped and operating in a wider context not purely centred round the learning of mathematics. This contextualisation and the constant insistence on treating identities as fragile and in action also comes to serve as a marker of the fragility of teaching and learning environments, and it opens up possibilities for thinking about students' engagements with mathematics not just in the light of books, curricula and teaching methods, but also in the light of culture, society, politics or any other aspect as it is brought into play with the learning of mathematics and as it is articulated through identities made salient in and through discursive practices in the classroom.

Viewing identities, discursive practices and learning as intersecting and in-action presents some wider implications for researching mathematics education. It begs for acceptance of uncertainties in processes of learning mathematics and for research to surrender applications of extra-discursive categorisations, and instead engage with analysis of discourse and identity as they are shaped and made visible in classroom interaction. In return analysis may just reveal new insights into how and why students become learners of mathematics and how obstacles of learning emerge and disappear in discursive practices of the mathematics classroom.

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Notes

1 For example a brief overview of the emergence of perspectives of identity can be found in *Discourse and identity* (Benwell & Stokoe, 2006). Bauman (1996) explores the shifting notion of identity moving from modernity into the era of the postmodern. (Turner et al., 1987) provide a historical overview of social psychological perspectives on individuals and groups in interaction.

2 A search on the word "identity" in the online version of Educational Studies in Mathematics on 21 April 2008 revealed 140 publications in which the word identity occurred. A large proportion of these articles are written within explicit mathematical disciplines and do not investigate identity as a social phenomenon. In conclusion identity as a concept is still only emerging in mathematics education research and is far from explored in full.

3 The literature review conducted in this study covered major international journal papers, books, book chapters and on-line conference papers written in English, during the period 2000 to 2008. The papers were read and analysed looking at their definitions of identity, the subjects of study and the educational setting. Here we present the overall characteristics of the material revised.

4 As an example of this in the Nordic countries see Bjuland, Cestari and Borgersen (2008); Braathe (2008).

5 The empirical study on which we draw forms part of the first author's Ph.D research. It was carried out as part of a research project "Learning from diversity" (Alrø, Skovsmose & Valero, 2003; Skovsmose, Alrø & Valero, 2005). The study focused on the interaction in a mathematics classroom at a Danish teacher training college. Audio recordings of classroom interaction were made and subsequently analysed with the objective to investigate if and how narratives of identity in discursive practices are changing over the course of mathematics lessons. The findings of the study are due to be reported in other publications. In this paper we illustrate some of our theoretical points through an example found in the empirical material from the study. The examples are therefore not intended as constituting empirical evidence for our theoretical reflections.

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Sammendrag

I forskningen om matematiklæring bliver et begreb om identitet ofte anvendt i forsøget på at forbinde individuelle og sociale forståelser af matematiklæring. I denne artikel gennemgår vi eksisterende forskning der anvender identitetsbegrebet, og vi peger på styrker og svagheder i konstrueringen af dette begreb. Vi foreslår en konceptualisering af identitetsbegrebet, der peger mod det skrøbelige og ustabile i identifikationsprocessen som den er indlejret i den diskursive praksis. Vi argumenterer for, at et identitetsbegreb formuleret fra en poststrukturalistisk synsvinkel og som fremhæver det dialektiske forhold mellem identitet og diskurs kan bidrage til interessante fortolkninger af matematiklæring som en skrøbelig proces karakteriseret mere ved diskontinuitet og forstyrrelse end ved sammenhæng og stabilitet. Vi fremhæver endvidere hvordan en poststrukturalistisk konstruktion af *skrøbelige identiteter i bevægelse* åbner op mod muligheder for at rette blikket mod det der sædvanligvis betragtes som 'larm' og udelades i vores forståelse af matematiklæring og interaktion i klasseværelset.