AGENCY IN MATHEMATICS EDUCATION

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In this paper we elaborate on the notion of agency. We relate agency to Skovsmose’s and Biesta’s frameworks respectively. Both Skovsmose and Biesta are concerned with citizenship education, mathematics education and the purpose of education from a critical position. We explore if and how Skovsmose’s and Biesta’s frameworks respectively relate to agency.

Key words: agency, citizenship, empowerment, mathematics education

INTRODUCTION

The purpose of this paper is twofold, to widen our understanding of different approaches to the notion of agency in relation to mathematics education, and to explore the compability of Skovsmose’s and Biesta’s frameworks respectively in relation to agency and to each other (Wedege, 2010). As a starting point we understand agency in a dialectic relationship to structure (Roth, 2007) and as a dynamic competence of human beings to act independently and to make choices. Sometimes the choices are conscious; however at some times we act as agents not being aware of our options (Cohen, 1994). Agency is not just individual; it is exercised within social practises. As Holland, Lachicotte, Skinner, & Cain (2003) put it: “Agency lies in the improvisations that people create in response to particular situations” (p. 279).

In this paper firstly we investigate the notion of agency in relation to earlier research addressing agency in mathematics education. We thereafter relate agency to Skovsmose’s theories of critical mathematics education (1994, 2005). The third part of the paper discusses Biesta’s (2009) and Biesta and Tedder’s (2006) theoretical framework for understanding agency in mathematics education. In the last section of the paper we discuss how the different frameworks and agency may add to our understanding of mathematics education practices.

As we both authors use the notion of agency in our research respectively (Norén, 2010, Andersson & Valero, 2009; Andersson, 2010 forthcoming), and both Skovsmose and Biesta theoretically have inspired our different research projects we find it fruitful to explore and elaborate on the notion of agency cooperatively in this paper. One argument is that understandings of agency in Skovsmose’s philosophy of critical mathematics education and in Biesta and Tedder’s (2006) may enable a way to use the theories and hence a way forward in analyzing agency in discursive practices in mathematics classrooms.

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1 Not to be seen as something situated in a person from birth
AGENCY IN MATHEMATICS EDUCATION RESEARCH

During the last years there have been increasing attentions in mathematics education research addressing the notion agency. For example Boaler (2002), Wagner (2007) and Grootenboer and Jorgensen (2010) all refer to Pickering’s (1995, p. 21) metaphor the dance of agency. Pickering has elaborated on scientific practices and looked at science as practice and culture. To him the ‘dance of agency’ takes the form of a ”dialectic of resistance and accommodation” (p. 22):

Within an expanded conception of scientific culture, however – one that goes beyond science-as-knowledge, to include the material, social, and temporal dimensions of science – it becomes possible to imagine that science is not just about representation. /.../ /.../. But there is quite another way of thinking about science. One can start from the idea that the world is filled not, in the first instance, with facts and observations, but with agency. The world, I want to say, is constantly doing things, things that bear upon us not as observation statements upon disembodied intellects but as forces upon material beings (p. 5f).

As people we respond to material agency such as in winds, heating or winter. Pickering goes on describing how humans as agents seem to be different from non human agency like: “the weather, television sets, or particular accelerators” (p. 15). Humans are active and intentional beings. Pickering links Foucault’s elaboration on temporal emergence and the displacement of the human subject (Foucault, 1977) via the notion of agency. According to Pickering (1995) human agency has an intentional and a social structure. The ‘dance of agency’ manifests itself at the human end in the intertwining of free and forced moves in practice.

Boaler (2003) uses the ‘dance of agency’ metaphor when illustrating the importance for mathematics learners to have an empowering identity in relation to school mathematics. To know when to draw on mathematical ideas and to be able to solve mathematical problems is a critical part of the dance of agency according to Boaler. Grootenboer and Zevenbergen (2007) note that mathematics teachers have to engage in a ‘dance of agency’ when to decide to encourage students’ own agency as mathematicians or rearrange to the requirements of standard procedures or forms of representation. Wagner (2007) investigated students’ voice in utterances, he wanted to discuss with the students who had agency in the discourse and who had control in the classroom communication. Grootenboer and Jorgensen (2010) combine the work of Boaler (2003) and the work of Burton (2001) to illustrate how teachers work together to solve mathematical problems. Teachers’ sense of agency allowed them to expand their sense of learning and achievement through the solving of mathematical tasks, relying on the members of the group, their individuals’ knowing, and the collective knowing of the group.

Powell (2004) uses the notion of agency and motivation to avoid deterministic theories and to resist deficiency explanations of African-American students’ failure in mathematics in the US. Powell’s research study among 24 sixth graders gave
“evidence of the mathematical achievement of students of colour as a byproduct of their engagement of their agency” (p.10). Powell found that the students initiated investigations, reasoned and progressed in building foundational understanding of certain mathematical ideas. He continues saying that understanding agency “is particularly important since both failure and success can be located within the same set of social, economic, and school conditions that usually are described as only producing failure” (p. 6).

The last example we present comes from a Danish context, where Lange (2010) in his study on 10-year old children concludes that children seem to be suspended between two conflicting experiences: from the practical and creative school subjects and the school subjects, like mathematics, not so creative but important for their future. In the practical and creative school subjects students experience they have more space for agency than in mathematics classrooms.

From this we infer that the research mentioned above seem to draw on differently theoretical standpoints such as socio cultural ones (research referring to Pickering’s ‘dance of agency’ and Lange) and critical theories (Powell).

SKOVSMOSE’S PHILOSOPHY OF CRITICAL MATHEMATICS EDUCATION

In this part of the paper we explore the notion of agency in relation to Skovsmose’s work on critical mathematics education.

Towards a philosophy of critical mathematics education, including agency

Skovsmose developed his philosophy of critical mathematics education based on the Frankfurter school. The influence of Habermas and the philosophy of Critical Theory can be traced in his work “Towards a philosophy of critical mathematics education” (1994).

Critical Theory has changed its emphases since its beginning with the Frankfurter school. Today it has included contributions from structuralism, feminism and lately postmodernism and post colonialism (Popkewitz, 1999). The different perspectives have various assumptions regarding definition of power and the self. One influence of post modernity is from Foucault and his conception of power as productive and positive, not repressive and negative. Power is then conceptualised as working in two directions and not as a one-way surveillance technique of power. The late Foucault (1980, 1982) saw discourse as a medium through which power relations produced speaking objects – in our view this relates to the concept of agency even though Foucault did not discuss agency, but related to human beings as agents.

Critical mathematics education emphasizes social justice issues and students empowerment through mathematics education. In Skovsmose’s work, (1994), a basic assumption is that implicit as well as explicit functions of mathematics education are

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2 Though we don’t perceive mathematics as non creative, Lange relates to what students told him
of importance for society and democracy (see also Skovsmose, 1998; Skovsmose & Valero, 2001). According to a thesis of mathematics as a formatting power Skovsmose finds mathematics as “an essential instrument when technological authority is exercised. Mathematics is part of technological empowerment” (1998, p. 201). When he spoke about the formatting power of mathematics Skovsmose says it was a way to try to address the relationship between mathematical knowledge and power (2005). Skovsmose also articulates that mathematics education serves as a gatekeeper, to who will get and who will not get access to the information and communication structures in society (1994, 1998, and 2005). He concludes saying that the learner is a member of society and mathematics can be a source for decision-making and action makes mathematics education a critical feature in society.

When conceptualising Critical Theory “as an interdisciplinary attempt to raise awareness of problematic socio-political states of affairs” (Skovsmose 2005, p. 130) Skovsmose relates to post-modernism. He also relates to Foucault and his description of technologies of the social, the connections between power and knowledge, and to discourse. To Skovsmose it seems obvious that knowledge can be expressed in ways of acting.

**Is agency part of Skovsmose’s writings?**

Certain forms of acting and communicating in the mathematics classroom may support the development of citizenship. According to Skovsmose (1998) citizenship is about to face the “output” from authorities, but also to provide an “input” to authority. Education for citizenship “also presupposes participation” (p. 199). Skovsmose states that “mathematics education could play an important role in developing critical citizenship” (2005, p. 132). To Skovsmose “empowerment” seems to refer to a person in an informal meaning; as to have the capacity to speak for oneself. We believe this reasoning of Skovsmose applies to the notion of agency in terms of students’ capacity to act independently and to make personal choices in a situation. Intentionality and action presupposes agency.

Skovsmose (1994) does not use the concept agency explicitly, in his writings it is an evasive concept that conceals behind expressions as empowerment, intentionality, action and choice. He writes:

> Actions cannot be described in mechanical or in biological terms; and if a person’s behaviour can in fact be described in such a way, then behaviour is not a part of his or her actions. It is not a personal action to breathe or to let one’s hair grow. This I see as the first essential condition for performing an act: indeterminism must exist, or, the acting person must be in a situation where choice is possible.

> The person acting must have some idea about goals and reasons for obtaining them (p. 176).

Skovsmose writes that it does not make sense to talk about human action when a person is forced to do something or when a person is doing something out of a habit
or as a reflex, like when combing your hair. To be called action a person’s intentions must be present in what is done. “Intentions are examples of intentionality directed towards action” (p. 177). But a person may not always be aware of her/his intentions. Intentions are grounded in a “landscape of pre-intentions or dispositions” (p. 178). Skovsmose divides dispositions in background and foreground. Background belongs to the history of a person, and foreground to the possibilities a certain social situation makes available for the person to perceive as her/his possibilities. The dispositions of a person reveals when a person comes to action. Skovsmose sees learning as caused by the intentions of the learner and learning has to be performed by the learner:

Students will enter school with ideas, hopes and expectations. Intentions are inherent within every human being. /…/. But the demands of the situation in school too often result in broken or ignored intentions. When students’ intentions are ignored, it seems impossible for students to perform actions, which could fulfil negotiated intentions (p. 187).

Skovsmose (2005) articulates that possible structures behind social events may be much more complex than those explanatory principles which are conceptualised within contemporary sociology. He writes:

Social practices, or collective actions, can appear to be so complex that no ‘acting subjects’ (a person, a group of persons, an institution, a government, an organisation) can be identified. The very existence of an acting subject may appear impossible. Such actions I will refer to as happenings. A happening is certainly not a natural phenomenon and it cannot be explained within a framework borrowed from the natural science. Happenings are social constructions and achievements, which pack together a density of contingencies. In a happening, the involved persons are doing something, but it seems out of control as of what this could imply (p. 135f).

As an example of a happening he addresses Woodstock, the music festival. Persons taking part in a happening may not be aware of their role in it, and they may not have any control. In a happening there is no defined acting subject and a happening cannot be explained as a sum of human actions. But, we inquire, if agency is looked upon as a result of social practices, can a happening then be explained in the terms of agency?

There is a possibility to see happenings and intentions as intersecting. When intersecting the notions converge close to the notion of agency; as the capacity of human beings to act independently and to make choices of their own, though they not always may be aware of it, and as a result of social practices, as stated in the beginning of this paper.

Another way of understanding Skovsmose and the notion of agency is when Skovsmose suggest students and teachers to work within an investigative landscape, in contrast to the exercise paradigm. Skovsmose writes that working within the investigative paradigm provides recourses for working with investigations as a learning milieu. He finishes his article with the following sentence:
My only hope is that finding a route among the different milieus of learning may offer new resources for making the students both acting and reflecting and in this way providing mathematics education with a critical dimension (2001, p. 131).

We conclude that Skovsmose within a critical paradigm concerns democratic aspects of mathematics education, part of that is the intentions of students and their role as acting and reflecting subjects in mathematics classrooms. To us the notion of agency seems to work well with Skovsmose’s critical mathematics education.

**BIESTA’S PHILOSOPHY OF (MATHEMATICS) EDUCATION**

In this part of the paper we explore the notion of agency in Biesta’s (2009) and Biesta’s & Tedder’s (2006) writings. Biesta’s (2006) philosophy of education is influenced by philosophers such as Dewey and Derrida.

Biesta (2009) discusses the purposes of education against a background of, what he understand as “the new language of learning” (p.6), that is e.g. the rise of theories emphasising teachers more facilitating role in relation to the active role students’ play in their construction of knowledge, the shift of responsibility for education turning education “from a right into a duty” (p.5). He concretizes his reasoning with examples from citizenship education and mathematics education and we find these examples interesting to emphasis in relation to Skovsmose’s writings and the concept of agency.

Biesta’s (2009) way of understanding the purpose of education as such he describes with the qualification, the socialisation and the subjectification functions. The qualification purpose provides students with skills and knowledge required for particular professions, further studies or more general as an introduction to modern culture. Biesta argues that the qualification function is obviously a major function of schooling. The socialisation function has to do with the purposes to “become members of and part of particular social, cultural and political ‘orders’” (ibid p.40).

Biesta elaborates this purpose further:

But even if socialisation is not the explicit aim of educational programs and practices, it will still function in this way as, for example, has been shown by research on the hidden curriculum. Through its socializing function education inserts individuals into existing ways of doing and being and, through this, plays an important role in the continuation of culture and tradition – both with regard to its desirable and its undesirable aspects. (ibid p. 40)

The last purpose of education Biesta refers to is the subjectification process. Biesta writes that education has an impact on the processes of becoming a subject. In education newcomers do not only get inserted into existing orders, they also get to know how to become independent of such orders. The subjectification process, understood as a process of becoming thus relates to a way of independence and being agentic. An example of the subjectification process is Biesta’s reasoning about a citizenship education taking political agency seriously:
Political knowledge and understanding (qualification) can be an important element for the development of political ways of being and doing (subjectification), just as a strong focus on socialisation into a particular citizenship order can actually lead to resistance which, in itself, can be taken as a sign of subjectification (p. 42).

We agree with Biesta when he concludes that whether all education actually contributes to subjectification of students is debatable. However, any education worthy of its name should contribute to processes of subjectification that allow those educated to become more autonomous and independent in their thinking and acting; thus becoming agentic in our understanding of agency. He continues discussing the subjectification function in mathematics education as raising possibilities for students becoming a person who “through the power or mathematical reasoning is able to gain a more autonomous or considered position towards tradition and common sense“ (p.43). To us the last quote seems to be an argument for agency as a notion relating to Biesta’s philosophy. Biesta exemplifies his arguments with e.g. exploring moral possibilities of mathematics, e.g. dealing with division in relation to sharing – suggestions we think connects very well with Skovsmose’s theory about critical mathematics education.

Agency in Biesta and Tedder’s writings

Biesta and Tedder (2006) put forward two key ideas for understanding agency, theoretically mainly building on the work by Emirbayer & Mische (1998). The first idea is that agency “should not be understood as a capacity, and particular not an individual’s capacity, but should always be understood in transactional terms, that is, as a quality of the engagement of actors with temporal-relational contexts of action” (p.18). They refer to an ecological understanding of agency, “i.e. an understanding that always encompasses actors-in-transaction-with-context, actors acting by-means-of-an-environment rather than simply in an environment” (ibid p. 18). The second key idea is that agency should not be understood as a possession of the individual, rather that something that is achieved” (ibid p. 18) in relation to the particular context. They continue: “the idea of achieving agency makes it possible to understand why individual can be agentic in one situation but not in another. It moves the explanation away, in other words from the individual and locates it firmly in the transaction (ibid p.19).

Concluding, Biesta suggests that we engage in a discussion about the purposes of education, where he sees the notions of qualification, subjectification and socialisation as important and interrelating components. His examples from citizenship education and mathematics education highlight possibilities for further discussion within these areas. As we understand agency in Biesta’s and Tedder’s words as achieved in relation to/transaction with time and context, narrow in the focus, from the larger purpose of education to the individual within education. We see it as one way to further elaborate on relations and intersections between the individual, society and mathematics education.
CONCLUSIONS

What we intended is to widen our understanding of different approaches to the notion of agency in relation to mathematics education, and to investigate the notion of agency in relation to Skovsmose’s and Biesta’s writings respectively. We find that Skovsmose, Biesta, and Biesta and Tedder have established cores grounded on basic democratic concerns, citizenship and empowerment. Though Skovsmose’s writings are explicitly addressing mathematics education Biesta and Tedder’s are not. In line with Skovsmose we believe that certain forms of communication in the mathematics classroom may support the development of citizenship. We think the “certain form of communication” may enhance students’ space for agency, and vice versa, students’ agency may support the “certain form of communication”.

Biesta and Tedder are implicitly concerned with agency when discussing subjectivity and the individual becoming agentic. We find Skovsmose’s and Biesta’s frameworks compatible to some extend (Wedege, 2010) but we need to explore this further. One reason for that is that the framework of Skovsmose is grounded in his many writings since a long time back, Biesta and Tedder’s work is not. The work we have taken into account for this paper is just two from two papers.

In mathematics education research, agency can be used both as a tool for locating certain forms of communication in the mathematics classroom and for locating students’ activity and intentions in the communication. An example is when students’ agency change directions of teachers’ already planned lessons. Also the empowerment of learners as individuals and as citizens in today’s society can be discussed when relating to agency. The notion of agency can add to our understanding of mathematics education practices.

As learners’ intentions and their role as acting and reflecting subjects in mathematics classrooms can be discussed when relating to agency some questions arise. The questions are concerned with whether agency is something a learner can attain or achieve? Is agency already there? Can mathematics education enhance agency?

REFERENCES


