An analysis of pre-service teachers' dispositions to teach mathematics in economically diverse settings: a Bourdieusian perspective

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This study aims to surface dispositions of primary student teachers in relation to mathematics teaching and learning in economically diverse settings. Bourdieu's concepts of field and habitus are mobilized to explore participants' dispositions. Ernest's typological analysis of aims for mathematics education is employed to analyze the data collected. Findings revealed that majority of the participants can be located in the group of technological pragmatists who aim for learners to gain basic mathematical skills. A small number of participants, on the other hand, seem to be located in the category of progressive educators who aim for learners to gain confidence through learning mathematics. This paper argues that a theoretical analysis of student teachers' dispositions can provide a useful tool to understand how their prospective mathematics teaching dispositions can be shaped.

Keywords: mathematics teacher education; critical pedagogy; educational inequality; social reproduction.

Literature review

This paper will explore a theoretical approach to surfacing mathematics teaching dispositions of prospective primary teachers. This exploration aims to provide new insights into initial teacher education to better support student teachers to structure 'positive' dispositions for those growing up in low socio-economic status (SES) households and/or in poverty. Young people from low SES families have historically been marginalised, discriminated against and experienced prejudice and systematic exclusion (Smyth, Wringly, & McInerney, 2018). The mistreatment that these individuals experience in social life is often translated into school life (Weisglass, 2001). According to Gorski (2012), a considerable number of teachers have certain stereotypical views about the concept of poverty, which can negatively affect their classroom practice. People with stereotypical perspectives on poverty often regard poverty as a situation caused by individual deficits, such as being lazy, devaluing education, being intellectually inferior and so on, rather than considering the systemic inequalities (ibid). This can be linked with the concept of *misrecognition*.

For Bourdieu (2000), misrecognition refers to two things: (i) Individuals' practices are not recognised in a *field* for what they are as they are first not 'cognised' and they are attributed to what an individual is already familiar with, for instance their own beliefs, values and perspectives, and (ii) social, economic and political conditions which generate a field are not fully recognised (ibid.). Misrecognition occurs when "underlying processes and generating structures of fields are not consciously acknowledged in terms of the social differentiation they perpetuate" (Grenfell, & James, 1998, p. 23). Referring to individual deficits to conceptualise why people might experience poverty, for instance, can be a good example of the second principle

of *misrecognition* as the systemic and structural factors that potentially cause poverty are not 'recognised' in this conceptualisation.

In terms of the problem of poverty, an important issue relevant to misrecognition is symbolic violence that presents itself as a form of victim blaming attitude and beliefs (Schubert, 2008). Parents of poverty victims are often blamed as being irresponsible in relation to their children's education and neglecting their needs (Thompson, McNicholl, & Menter, 2016). Ladson-Billings (2006) also states that student teachers tend to overlook complex problems related to child poverty, such as the two-way relationship between school and families, educational policies, job market exclusions, and many more, and attribute the root causes of poverty to race, ethnicity and family culture. In some cases, such stereotyped beliefs can be due to teachers' unfamiliarity with the situation of poverty in terms of how inequalities are perpetuated by the systems of structure (economic, social and political), regardless of individual effort and hard work (this can refer to the first principle of misrecognition). According to Gorski (2012), "when people find themselves in contexts with which they are not familiar, their decision-making cognition defaults to intuition and stereotyped beliefs" (p. 303). This way of understanding can be translated into the classroom as a socially reproductive practice where dominant social classes are 'recognised' as more 'able' and nondominant, mostly disadvantaged, social classes are 'misrecognised' for being less 'able'. To address the problem of misrecognition in teaching mathematics in (socio)economically disadvantaged settings, firstly, the field of mathematics education should be clearly defined with a consideration of socio-political events. This is important because, as stated above, a poor grasp of the field can lead to misrecognition.

Studies on Bourdieu's concept of field in educational research embrace various approaches to define *field*. Noyes (2008) refers to field as 'habitat' where teachers are located to perform their teaching practice. Grenfell (2009) refers the concept of field as an epistemologically and theoretically constructed concept in which agents compete to gain position and power. Specifically, in the mathematics education community, Jorgensen, Gates, & Roper (2014) argue for a concept of a field of mathematics education within the larger field of education, stating that practices in mathematics education *field* represent unique values and dispositions to teaching the subject. However, what is less clear is the nature of the field of mathematics education. Since various actors adhere to distinct dispositions, i.e. values, beliefs and ideologies within the larger field of mathematics education, it can be argued that there are smaller fields or social positions.

The dispositions here refer to what actors know, believe and value about mathematics education. For example, this can be their beliefs about the nature of mathematical knowledge and how mathematics should be taught. This can include different teaching approaches in school mathematics, such as the constructivist approach, behaviouralism, sociocultural perspectives and so on (Schwarz, 2020). Social positions, on the other hand, refer to an *imaginary* location where different actors in the field of mathematics education with similar dispositions are clustered. To better describe the field of mathematics education, I draw on Ernest's (1991) analysis on the socio-political and historical development of the mathematics education field in relation to the diversity in epistemological and ethical understandings around the subject.

Ernest (1991) provides an analysis of the interlink between individuals and public belief systems and ideologies that shape mathematics education, while considering the historical, social and political development of education. He

categorises five social locations which, I propose, can be referred to as *field.* These locations are the industrial trainers, technological pragmatists, old humanists, progressive educators, and public educators. It is important to note that this typological analysis provides a useful tool to understand individuals' way of viewing mathematics education regarding their ethical and epistemological views and ideologies on mathematics education. However, they should be considered as fluid categories rather than being fixed and discrete. This being the case, ideologies of individuals located in each field can provide an initial model to link Bourdieu's concept of field and mathematics education.

Methodology

The fieldwork in this study encompassed questionnaires, workshop activities and post-workshop focus group interviews with 20 primary school student teachers. Only one participant was a fourth year MA Education student (a four-year undergraduate teacher education programme), and the other 19 of them were Professional Graduate Diploma in Education (PGDE) students (a one-year graduate teacher education degree). The participants attended the workshop (designed by the researcher) voluntarily and were provided with a questionnaire before the workshop. The questionnaire involved open-ended questions, ranking scales as well as statements with a five-point Likert scale. The data presented in this paper is from two sections of the pre-workshop questionnaire: the Likert scale and the open ending questions.

The Likert scale included six statements about socially reproductive practices in school mathematics. For example, questionnaire-Statement 1, "*Students living in poverty are more likely to be assigned to low ability groups if there is ability grouping in the school*", is to examine student teachers' expectations for the academic 'ability' of students in poverty. Research shows that lowered expectations for students from low-SES backgrounds can seriously affect the quality of instruction that is provided by the teachers (Atweh, Bleicher and Cooper, 1998; Hoadley, 2007; Sraehler-Pohl, Fernandez, Gellert and Figuerias, 2014). Low quality instruction can perpetuate the attainment gap between students with low-SES and their better off peers (Gustafsson, Nilsen and Halsen, 2018), while contributing to social reproduction. The participants were also provided with a text box to explain their agreement/disagreement with the provided statements to explore why they think what they think and to avoid misunderstandings.

In terms of the exploration of student teachers' dispositions in the field of mathematics education in high poverty contexts, the following open ended questions were asked: "what is the key aim of primary mathematics education for you?" and "how would you define poverty?"

Two codebooks were created to analyse the data collected. A codebook can be defined as a list of themes which consist of a number of high and low level codes to support the researcher in the data analysis process (Reavis, 2019). The codebook to analyse aim(s) of mathematics education is created by mobilising Ernest (1991)'s table of aims of mathematics education (see Ernest 1991;2000), and the boundaries between the categories are considered as fluid.

Findings and discussion

In this short paper, findings from only two participants from each social position are presented due to the limitation of space. However, the actual number of participants in each social location are provided in brackets.

The majority of the participants (ten participants in the actual study) thought the key aim of teaching mathematics is for students to gain basic numeracy skills to use in everyday life. The following responses illustrate this point:

> ST8: To provide children with the basic foundations of numeracy knowledge and skills, for survival in society and to support them as they move on to secondary school

> ST17: […] children have the skills needed in the future to use life skills well, e.g. banking, control of finances, budgeting. Also, that they can learn further to use numeracy in further study and career options.

These student teachers can be located on Ernest's (1991) table on the social location of *technological pragmatists* who set the aim for mathematics education as "provid[ing] a training in basic skills and numeracy for all" (p. 151). There are, on the other hand, a small number of participants who stated that the key aim of mathematics education is for students to gain confidence through learning mathematics:

> ST12: Developing an understanding of number, exploration and estimation. Building confidence in abilities.

> ST10: To enable children feel confident in their ability to use mathematics both in education and in their day to day lives.

These two participants (four participants in the actual study) appeared to fit into the category of *progressive educators* as they aim for confidence through mathematics education for the learners of mathematics (Ernest, 1991). The educators located in this category often "regard children as having full rights as individuals, and needing nurturing, protection and enriching experiences to allow them to develop their full potential" (Ernest, 1991, p. 182).

The data above suggests distinct dispositions – habitus towards mathematics education in two different social locations – fields. This distinction was also clear in their views on the socially reproductive practices (via Likert Scale statements). Participant responses to the statement "*Students living in poverty might be excluded from the mathematical discourse because of their lack of ability in academic communication*" indicate this distinction:

Social Location – Technological Pragmatists

> ST8: I can imagine this happens as the students struggle to communicate and participate fully in maths. They might not know how to explain their thoughts/working.

> ST17: If they do not understand the vocabulary used in mathematical discourse, then they cannot be able to engage as much.

Social Location – Progressive Educators

> ST12: I do not agree that it should happen, but it is possible that it could! I think it could be very easy for a teacher to exclude them from challenges if the student does not understand the way it has been presented.

> ST10: I agree that it is more likely that students in poverty might not be as comfortable using/ familiar with academic communication due to their living circumstances. However, it is equally possible that a child living in poverty might have no issues in this area. Therefore, should not be assumed that students living in poverty automatically have a 'lack of ability' in academic communication (as surely this is something anyone can learn).

Student teachers' dispositions and the field in which they are clustered are distinctive in terms of their aims for mathematics education and how they view socially reproductive practices in school mathematics. The disposition of student teachers located in the technological pragmatists *field* shows an attitude tending towards victim blaming, indicating that students might be excluded from academic discourse due to their lack in ability to understand and respond. This can be seen as a form of symbolic violence as it includes "blaming the individuals involved for their poor performance" and it can contribute to the reproduction of inequalities (Schubert, 2008, p. 189).

Participants located in the progressive educators *field*, on the other hand, appeared to communicate a more child-centred approach. ST12 takes responsibility for children's educational outcomes as a teacher and suggests that the inability to communicate might be because the way the content is presented can be inaccessible to children. Similarly, ST10 recognises that children growing up in poverty can be excluded; however, this might not always happen, and such children might not have any problems with academic communication. Ernest (1991) describes progressive educators' theory of the child as follows: "As a growing flower a child is born with all it needs for full mental and physical growth and given the proper nurturing environment and experiences will autonomously develop to his or her full potential" (p. 182). Such a view is present in the responses of these two student teachers. In addition to these fourteen participants, six participants seemed to be situated between these two fields.

Conclusion

A theoretical tool was offered to operationalise an analysis of teachers' broad dispositions in the field of mathematics education. Despite its small scale, the analysis of teachers' dispositions undertaken here can be useful for educators in initial teacher education to better understand their students' ideologies, values and views with regards to teaching mathematics in low SES contexts. An analysis of teachers' dispositions can show how student teachers' dispositions in the field of mathematics education can also reflect on their views about the learners from low-SES background. This understanding is particularly important for initial teacher educators to make positive changes in student teachers' dispositions that might be translated to the classroom as a victim blaming attitude or more positive views about the learners. The findings might be expanded further, and a pedagogical model in initial teacher education can be developed to help student teachers enhance their dispositions for the learners growing up in low SES households in the field of mathematics education.

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