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Introduction to the work of TWG10: Diversity and Mathematics Education: Social, Cultural and Political Challenges

Hauke Straehler-Pohl¹, Anette Bagger², Laura Black³, Anna Chronaki⁴ and David Kollosche⁵

¹Freie Universität Berlin, Germany; h.straehler-pohl@fu-berlin.de

²Örebro Universitet, Sweden; anette.bagger@oru.se

³University of Manchester, United Kingdom; laura.black@manchester.ac.uk

⁴University of Thessaly, Greece; chronaki@uth.gr

⁵Pädagogische Hochschule Vorarlberg, Austria; david.kollosche@ph-vorarlberg.ac.at

Scope and Focus

Thematic working group 10 is interested in discussing mathematics education within the realms of *culture, society and the political*. TWG10 builds on the premise that mathematics education is always more than the encounter between an individual and an object. Such encounters are embedded within wider contexts than just classroom settings. They are shaped by the social, cultural and political contexts in which they take place. Being social, cultural and political encounters themselves, they reflexively contribute to constituting the wider context in which they are embedded. Research in this group is characterized by an effort to reflect its own double-role in not only analysing but also shaping the possibilities of seeing and inventing mathematics education practices.

The call for papers invited participants to address how *diversity* affects possibilities in mathematics education. The group's work was based on a broad understanding of diversity, including: 1) Diversity as expressed in terms of attributes of people, such as gender, ethnicity, language, socio-economic status, social class, (dis)abilities, needs, achievement, life opportunities; 2) diversity as expressed in terms of ways of perceiving the world and giving structure to it, such as aspirations, worldviews, ideologies, school systems, and governance structures; 3) diversity in relation to the variety of sites where mathematics education takes place, such as schools, homes, workplaces, after-school organisations, communities; and finally, 4) diversity in relation to who is doing the research and who is being researched, posing methodological issues of an ethical nature. Diversity thus also refers to the wide variety of doing mathematics education research within the realms of culture, society and the political. As all these multiple diversities intersect, the group made an effort to develop reflexive approaches. The group invited to explore, deconstruct and even reinvent the concept of diversity.

Organisation of TWG 10's work

Understanding research as a practice that is situated within the realm of the cultural, the social, and the political has implications for practicing research *in situ*. We strived to organize the group to work in a way that 1) cultivates a change of perspectives and fosters reflexivity and 2) creates consciousness about the power relations underlying TWG10's work as a community of practice. The introduction in the first session gave a brief overview about the controversies that have unfolded within the TWG in previous CERMEs, highlighting that controversies do not only occur

between (groups of) scholars but also occur *within* individuals or within allegedly homogeneous “camps”. Fostering controversy was intended to counteract dichotomization and facilitate the deconstruction of binaries.

The development of reflexivity was sought by following the principle of *peer presentation*, namely that authors do not present their own paper, but give a short (5 minutes) presentation of a colleague’s paper. This peer presentation included a description of the main ideas from the perspectives adopted in the paper and the formulation of questions from the presenter’s own perspective that opened up subsequent whole-group discussion (15 minutes). In addition, two sessions each involved, firstly, a small group breakout discussion (30 minutes) and, secondly, a synthesis (30 minutes) to support participants in drawing connections between contributions. In an attempt to make poster contributions visible to the whole group, posters were also presented. However, since the poster presentations were not followed by discussions, this procedure did not only make visible the posters, but also visualized and potentially stabilized the hierarchical distinction between papers and posters.

The papers discussed

In order to encourage and also facilitate drawing connections between papers, they were grouped in thematic pairs before the conference. As any classification does, this grouping highlighted some connections while displacing others. In the 1st session the contributions of *Wright* and *Black et al.* critically sounded out possibilities of practicing progressive pedagogy in favour of underprivileged students. In the thematic pair on democratic experiences, *Daher* sought for ways of assessing democratic practices using a quantitative analysis of questionnaires, and *Sachdeva* took a closer look on how students experience learner autonomy in mathematics classes. In the first half of the 2nd session, *Maheux et al.* invited us to consider school mathematics as a possible reference for mathematics itself, hence disrupting traditional understandings of mathematics, where professional mathematics is often seen as the reference for school mathematics. *Salazar* reported on how students of colour developed a practice of mathematics in problem solving activities similar to the practice of professional mathematicians, thereby disrupting institutional racism in traditional school mathematics. In the second half of the session, *Cabral et al.* proposed Solidarity Assimilation Methodology not only as a way of disrupting traditional pedagogy, but also as a way of subverting the recurrent mode of capital accumulation embodied in assessment practices. *Bagger et al.* analysed how a neoliberal regime of assessment has expanded into the domain of preschool-class education in the Swedish context. The first half of the 3rd session was devoted to the connections between mathematics and life. *Aizikovitsh-Udi* reported on a teaching unit that aimed at explicitly teaching critical thinking skills. *Yolçu* problematized the forms of responsabilisation, reason and rationality in a course on “mathematical applications” in Turkey. In the second half, the contributions of *Kollosche* and of *Lüssenhop et al.* focused on language diversity, the former proposing guidelines for analysing and developing teaching materials, the latter exploring the practices of teachers in international preparatory classes for refugees. In the 4th session, *Makramalla et al.* explored the gaps between the “mathematical ideologies” of the Egyptian curriculum, of the teachers and of the teachers’ practices, yielding the potential for change within the contextual power dynamics operating in Egypt. *Foyt* confronted an emerging public discourse in Norway on disadvantaging boys with data from a longitudinal study, highlighting the need to nuance the debate

and not lose track of the discourses that still disadvantage girls. Critically reflecting the power relations between the researcher and her/his informants, *Lembrer* raised methodological questions concerning the use of photo-elicitation for data-collection in the context of early years mathematics education. *Kara et al.* presented their research on the relation between students' social backgrounds and their problem-solving competencies. *Nordkild et al.* reported on a culturally sensitive teaching unit in Finland. The unit was developed by students with a Sami background to teach geometry to peers from their own culture. The first half of the 5th session was devoted to mathematics teacher education. *Povey* reflected on the potential of her own teaching practice as an embodied case of a "living education theory" to serve the aims of social justice. *Dexel et al.* showed how a course on inclusive mathematics teaching for pre-service teachers fostered a potential-related perspective on diversity within teacher-students. This potential-related perspective on diversity was further developed in the second half by *Padilla et al.* who proposed the conjunction of interdisciplinarity, culturally sustaining pedagogies and pandisability cultures as a point of departure for co-creating diverse mathematics learning contexts. The need for such co-creation was empirically consolidated by *Nieminen* who reconstructed discourses of otherness in self-reports of university students with special needs. The 6th session zoomed in on the mathematics student. Both the contributions of *Röj-Lindberg et al.* and *Doğan* reconstructed students' perspectives. The former did so through a longitudinal study that provided insight into why some students develop negative identifications with mathematics despite the reform-related efforts of their teachers. The latter turned the focus on a popular Turkish social medium, where almost a thousand users reported on their moments of farewell to mathematics and constructed it as an individual and subject-related fate. The last thematic pair focused on students' identities. Taking an intersectional approach, *Sabbah et al.* investigated how categories of gender, ethnicity and religion play out in the formation of agency and identity in female Arab students entering university mathematics in Israel. *Gebremichael* explored in an Ethiopian context how students perceive the relevance of mathematics and how this is closely linked to the development of identity. His analysis also sheds light on how little Ethiopian mathematics education is attuned to Ethiopian society's needs and the possible historical reasons for this.

Common conclusions

All contributions and discussions were characterized by a strong openness to perspectives and methods that are not yet established within the field of mathematics education, but belong to the state of the art in the corresponding disciplines of reference. This interdisciplinary character was consistently appreciated. It also led participants to collectively question the "nature" of mathematics: How do we define it? What are legitimate sources of reference? Who decides what is legitimate? The group agreed that these questions must remain undecided. Another issue that found unrestricted approval was the necessity of bringing theory and practice together, not only rejecting theory for theory's sake but in a similar manner rejecting excessively inductive empirical research. This commitment to (social) theory is related to the critical spirit that participants saw as common ground, binding the group together. Work in this group is largely concerned with a critique of the *status quo*. This critique may concern educational institutions or the societies we live in more broadly. Group members were united in the desire to change systems, whilst at the same time being aware that they are part of these systems themselves. This insight resulted in a self-critical attitude when it comes to assessing the ethical ramifications and also the generalisability of research. The

self-critical attitude expressed itself in the fact that participants consensually cherished TWG work as an opportunity of “decentring oneself”, an opportunity to experience their own perspective as one among legitimate alternatives, thereby allowing a reflection about each perspective’s social, cultural, and political foundations. It was also expressed in a deep concern for the power relations that pervade instances of mathematics learning and teaching as well as research practice and the dynamics within the working group itself.

Open questions / controversy

While the participants all agreed on conceptualizing power as simultaneously having both restricting “negative” as well as empowering “positive” effects, the group remained undecided about the normative ramifications related to identifying power relations. For example, the group addressed the question of whether there is a boundary between acceptable and unacceptable values. What would a strictly horizontal organisation of values imply? If we do not privilege some values over others, how can we, then, talk back to and fight against socially accepted forms of oppression and violence? Related to the question of equality of values is the question about the role and function that we assign to schools: Is it their task to adapt to students’ backgrounds? Or is it exactly their task to treat students irrespective of their background, or at least help them to transcend their backgrounds? Reflecting the political and moral underpinnings of each of the participants’ stance certainly created tensions within the group. Some participants may identify with dissolving tensions to one side or the other, a third part of participants may identify with the contradiction inherent in the tension itself. While the group agrees that it is a collective task to deal with these contradictions and tensions, there may be different normative stances on how this *should* be done: Once power relations within the group surface, should the use of power be regulated? Can the group benefit in the future from explicit rules so that “privileged” participants develop techniques to govern themselves, re-distributing power to the “non-privileged”? Or would this suffocate the attempt to embrace controversy, finally leading to synchronization of perspectives and thereby jeopardizing the cherished opportunity of decentring oneself? Another controversial issue was the role of utopia in our research: Is utopia the generator of change that allows us to think of something in rupture with what exists? Or is utopia actually preventing change to materialize by outsourcing change into some displaced “alternative reality”? Finally, identifying all these controversies led to commonly posing the question: How much diversity can a thematic working group on “diversity” productively handle?

Future tasks

The group identified a need to ensure the productivity of diversity and saw the danger of losing depth in the discussion. Depth, here, applies both to the scientific quality as well as to the social quality of mutual intellectual engagement. Two ideas that found approval were 1) the reformulation and specification of the group’s theme and 2) a stronger focusing and specification of the group’s call for papers. Concerning the theme, the group agreed that even though *diversity* adequately described the spirit of the group, it factually did not serve anymore as the thematic pivot. It is a designated task for the future TWG-leaders to maintain this spirit of diversity. However, the contributions rarely addressed diversity explicitly. The group suggested to exclude diversity *from the title*, nevertheless making sure that the call maintains the thematic inclusion of diversity *as a theme* (among others). Further, the call should more explicitly demand authors to interrelate “the

micro” and “the macro” which also implies a stronger attentiveness to social, cultural and political theory. If the next group-leaders should, however, decide to keep diversity in the title, there is a need to sharpen the call for papers in that direction. In order to develop in any of these directions, the group requires a clearer and more concise focus in order to maintain its scientific and intellectual productivity.