

Workshop 10

Challenging Ableist Perspectives on the Teaching of Mathematics: A CAPTeaM Workshop

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ABSTRACT This short paper outlines the main aims and objectives of the CAPTeaM project and the activities that took place during the CAPTeaM workshop at ICME14 on Wednesday 14 July 2021.

Keywords: CAPTeaM; MathTASK; Ableism; Disability; Inclusion; Mathematics.

1. The CAPTeaM Project

The MathTASK and CAPTeaM projects see engaging school and university teachers with challenges they are likely to face in class as an effective professional development approach. We design situation-specific tasks that emulate these challenges (such as: fostering mathematical reasoning; strengthening classroom management; enriching use of digital resources; and, improving the inclusion of often marginalised groups of learners) and we engage teachers with these tasks in reflective workshop settings. In this workshop, we focused on the last of the aforementioned challenges, inclusion. This is the focus of the CAPTeaM_project (Nardi et al., 2018), an international partnership and mobility project between institutions in the UK and Brazil and funded by the British Academy (2014–15, 2016–21).

The CAPTeaM project (Challenging Ableist Perspectives on the Teaching of Mathematics) sets out from the assumption that, rather than being the consequence of internal, individual factors, disabled students' oft-reported underperformance in mathematics can result from explicit or implicit exclusion from mathematics learning. The project challenges teaching practices that contribute to such exclusion and that may emanate from ableist⁷ perspectives on mathematics. The project's aims cohere

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⁷ Ableism: “a network of beliefs, processes and practices that produces a particular kind of self and body (the corporeal standard) that is projected as the perfect, species-typical and therefore essential and fully human. Disability then, is cast as a diminished state of being human.” (Campbell, 2001, p.44)

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with the articles of the United Nations *Convention on the Rights of People with Disabilities* (2006) that both the UK and Brazil have signed up to and the project aims to contribute to a hitherto under-researched, yet growing and highly topical, area of research (Healy and Powell, 2013). CAPTeaM endorses a Vygotskian historical-cultural perspective and elements of embodied cognition (Nardi et al., 2018) and its data consists of written responses and video recorded work on two types of tasks, Type I and Type II, by pre- and in-service teachers of mathematics.

In Type I tasks, participants engage with classroom episodes that evidence mathematical contributions which are made by students with a physical disability (e.g., are visually or hearing impaired), have the potential to shift classroom mathematical discourse towards creatively unexpected turns and may bring learning benefits to all in class. Said episodes are selected from the databases of the Brazil-based (Rumo à Educação Matemática Inclusiva) and UK-based (e.g., Stylianidou and Nardi, 2019) project partners. In Type II tasks, participants engage in small groups with solving a mathematical problem while at least one of them is temporarily and artificially deprived of access to a sensory field or familiar channel of communication. Work on both types of tasks concludes with sharing reflections on the experience and with a brief exposition on the project's hitherto data analysis, findings and plans for the future.

2. The CAPTeaM Workshop at ICME-14

Workshop participants engaged with two tasks, one of Type I and one of Type II. The session lasted 90 minutes and was structured as follows.

Nardi introduced CAPTeaM's aims, objectives, theoretical framework and research design. She outlined the two types of tasks that participants were invited to engage with during the workshop and introduced the first, *André and the pyramid*. In it, participants were asked to consider a mathematical contribution made by André, a blind student: André's description of a square-based pyramid, as an object that can be built from gradually diminishing squares, evokes Cavalieri's (Nardi et al., 2018) description but also diverges from the faces/edges/vertices definition proliferating in textbooks. Participants explored the mathematical affordances of André's proposition and considered the enriching role that such a proposition may play in lessons. They pondered on what constraints and support teachers have for orchestrating the inclusion of disabled learners in mathematics lessons and shared experiences from the very diverse educational contexts each was located in.

Brief findings from data analyses driven by the five themes of *Value and Attuning*, *Classroom Management and Benefit*, *Experience and Confidence*, *Institutional Possibilities and Constraints* and *Resignification* were shared with the participants, before proceeding with engaging with a Type II task. In normal circumstances, this type of task involves the use of several sensory channels, including touch (Nardi et al., 2018). Doing so however is not possible during an online workshop and participants were asked to engage with a COVID-19 pandemic secure adaptation of a Type II task.

This involved working in groups of three (A, B, C), where one participant was A (observer), B could not see, and C could not speak. We communicated a mathematical problem ($354 - 86 = ?$) to C in a private channel of the chat function on the conference platform. Nardi and Biza collated accounts from the chat and coordinated the discussion of the experience across the entire group. During this, participants shared their experiences of working with limited access to sensory channels. Their coping strategies were then compared with those produced by CAPTeaM participants and the workshop concluded with Nardi outlining project findings so far and mapping current and future CAPTeaM activities. The workshop concluded with participants asking questions and reflecting on — as well as evaluating — the experience of participating in the workshop.

Throughout the workshop, participants noted substantial differences on inclusion policy and implementation around the globe. Exchanges focussed on how deconstructing the notion of the normal mathematics student/classroom and attuning mathematics teaching strategies to student diversity takes different meanings in different institutional contexts. For example, Nardi and Biza shared the example of a doctoral study in the UK, led by team member Stylianidou, that focuses on exploring and engineering mutual benefits for the mathematical learning of sighted and visually impaired pupils in inclusive elementary mathematics classrooms in the UK, where inclusion is thoroughly legislated but its actualisation supportive mechanisms for teachers is in relative infancy. Other issues, such as mathematical and pedagogical support for specialist teaching assistance staff (e.g., Sign Language interpreters for hearing-impaired/deaf learners) were also raised.

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