

INSTRUMENTS AND THE BODY

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The central goal of this working group is to study the possibility of bringing the body and embodiment into instrumental approaches to the use of digital technology in mathematics education. After two short introductions into instrumental views and the issue of embodiment, the participants will analyse a small data set using aspects of these perspectives. Opportunities and constraints of combining approaches for the sake of relating instruments and the body in mathematics education will be discussed. As a possible next step, the option of writing a joint research paper will be explored.

THEORETICAL BACKGROUND, TOPIC AND GOAL

Digital technology is omnipresent nowadays. This deeply affects education, and the teaching and learning of mathematics in particular (Monaghan, Trouche, & Borwein 2016). To address the complex relationship between the use of digital tools and the learning of mathematics, so-called instrumental approaches to tool use were developed since the 1990s (Artigue 2002; Drijvers, Godino, Font, & Trouche 2013). These approaches stress the intertwinement and co-emergence of the techniques to use specific digital tools and the schemes corresponding to the mathematical topic at stake. These instrumental approaches were helpful in going beyond the simple “just press the button” view on using digital tools, and addressing the subtlety involved.

A more recent development concerns embodied cognition (Lakoff & Núñez 2000). It stresses that cognition, even in the domain of mathematics, is rooted in bodily experiences, that take place in interaction with the world. Since then, the relationship between mathematics as material activity and the body has been exploited, giving rise to new views on embodiment (e.g. de Freitas & Sinclair, 2014; Ferrara & Ferrari, 2016). Beyond the tools and schemes central in instrumental approaches, these perspectives also include gestures, physical objects and arrangements (Ferrara & Sinclair 2016). Mathematical activity, in this view, involves the students’ bodies and other materiality.

The central goal of this working group is to study possible entanglements of these theoretical views for the case of using digital technology in mathematics education. What can each of the two contribute? Are they complementary or perpendicular? What happens if we short-circuit these two approaches? Can we give the instrumental approach the body back? How does the body come to matter in instrumental approaches? What is the relationship between mathematical concepts, body and the material activity with instruments? How do the different visions convey different

assumptions on mathematical practice and mathematical concepts? These questions guide the proposed working group, which is a new initiative. As a concrete outcome, the participants will investigate the possibility of publishing an article on this matter in a joint writing process after the conference.

PARTICIPANT ENGAGEMENT AND WORKING GROUP LAYOUT

As a preparation, participants will be asked to do some initial reading of some key publications in the field of instrumental approaches and new perspectives on embodiment.

In the first working group session, two 15-minute lectures will set the scene for the working group, one taking a primarily instrumental perspective, and the other taking an embodiment point of view. Next, the submitting researchers will take 10 minutes to present a small data set in the form of video data of students interacting with digital technology in a mathematical activity. The remaining 50 minutes will be devoted to a first exchange on this by participants divided into small groups.

During the first 30 minutes of the second working group session, participants will further analyze the data set in small groups. Each group will consider the data according to the questions above and will explore the opportunities and constraints that each of the perspectives offers. In the next 30 minutes, these experiences will be shared in the whole group. The final 30 minutes will focus on a discussion of possible next steps, in particular the exploration of a research paper in the line of the work done so far.

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