Topic Study Group 5.8: Philosophy of mathematics and mathematics education

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Overview

Paul Ernest, a past leader of this group has asserted that the philosophy of the particular domain is "about systemic analysis of its fundamental problems". Consequently we are interested in bringing attention of the community to persistent controversies, epistemological and ontological issues which are brewing under the surface of the Mathematics Education domain. We are inviting submissions of recent advances in Philosophy of Mathematics Education broadly following the discussions of this TSG during previous ICME meetings, and especially ICME-13 and ICME-14.

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Before engaging into the broader discussion of the goals and interests of TSG 5.8, it's important to ask what the role of philosophy of mathematics education for our discipline is. How can it help us in teaching, learning and research? First, it can enable us to go beyond the habitual routes we use in our everyday work and to question the status quo of thinking within the profession; it enables us to point to present controversies, to elucidate them and propose possible solutions. Second, it aims to provide secure philosophical foundations for research and practice, which can guide us in daily work of teaching and research.

Areas of interest

Since Philosophy of Mathematics Education is a sub-domain of Philosophy, Mathematics, and Mathematics Education, we can expect interesting problems exactly on the intersections between these domains, which can be approached in two directions, 'bottom up' and the 'top down'. The 'bottom up' process originates in the examination of fundamental problems in Mathematics Education which are present in our everyday teaching and research, and it may lead to new questions within Philosophy, and possibly Mathematics. On the other hand the 'top down' approach allows illumination of research, theories and practices in mathematics education by applying different branches of philosophy to explicate conceptual problems in mathematics education. We invite the reflections of the community in both directions related to the following areas and questions of interest:

Philosophy of Learning and Teaching of Mathematics

The theme has of course many questions, assumptions, presuppositions. Some of them are: is the presence of many different theories of learning a help or hindrance for the classroom teacher? For the researcher? For the teacher-researcher? What is the state of the relationship between research and practice? What is the relationship between learning and affect, and conation? How to solve the persistent controversy between constructivism and social constructivism? What is the relationship between socio-cultural, and in particular ethnomathematics practices on one hand and practices based on pure mathematics, on the other?

What is the impact and potential impact of emerging epistemological perspectives in mathematics education and mathematics education research. Recent developments in the philosophy and sociology of knowledge, including inferentialism (Brandom, 2009; Derry 2017) and critical and social realism (Moore, 2014; Thornton, 2022) have been the subject of discussion in the mathematics education research community and in the broader education community. These developments question the nature of knowledge, how knowledge is developed and the individual's experience of

knowledge-building. What connections are there between these emerging areas and more established approaches? Are they in conflict or can they shed new light on our existing epistemological and philosophical approaches to mathematics and learning? What are the implications for questions of equity and inclusion?

Philosophies of Mathematics and Mathematics Education

What is the relationship between Philosophy of Mathematics and Philosophy of Mathematics Education? How does this relationship impact learning and teaching of mathematics? What is the impact on, and the process of, introduction of new mathematical discoveries on student learning in mathematics classrooms? What are models of proof in current mathematical practice and mathematics education? What are concepts of infinity in current mathematics and mathematics education? Did digital technologies change the foundations of mathematics and mathematics education? What is the relationship between creativity of a mature mathematicians and the creativity of students in our classes? What is aesthetics in mathematics and what is the role of mathematical aesthetics in teaching and learning of mathematics? Is history of mathematics relevant for learning and teaching of mathematics? How is it relevant?

Naturally an extensive theme here is the relationship between mathematics and society, which leads to the relationship between mathematics education and society. What are the goals of doing mathematics? Of learning mathematics in classrooms? Can the individual goals of developing pure mathematical interests be successfully integrated with social, cultural and economic goals of the society?

Philosophy of Creativity in Mathematics and Mathematics Education

Philosophy of creativity is a relatively new domain of philosophical exploration to the degree that Paul and Kaufman (2013), the authors of a recent volume on the subject tell us “that philosophy of creativity is still a neologism in most quarters”. On the other hand within last two decades the subject of creativity in learning mathematics and problem solving became noticeably explored in both research and practice of Mathematics Education. What is the relationship between creativity of a mature mathematicians and the creativity of students in our classes? What is the role of creativity in learning? In teaching? What is the role of context for creativity in teaching? In learning? A significant boost in the exploration was the realization and that the nature of creativity of mature mathematicians and that of a student of mathematics solving problems in algebra and geometry is similar (Hadamard, 1945). The reflections upon creativity in Mathematics Education not only may illuminate our work, but also may contribute to Philosophy of Creativity in general.

From the last minute:

The publication of ChatGPT took place during the preparation of the TSG 5.8 Description Paper. The discussions within our profession on its implications are abounding and certainly warrant including the topic for the considerations of Philosophy of Mathematics Education. So, we also ask for submissions addressing the possible implications, role, and consequences of such AI creatures in our profession as the philosophical problem.

How to make a submission to this Topic Study Group

Submissions for Topic Study Group Papers and proposals for Posters open 28 April 2023 via the official ICME-15 website, icme15.org. The website also contains a timeline of dates for the activity of the Topic Study Groups in the lead up to the Congress.

For questions about this TSG, please contact the Co-Chairs using the email addresses provided.