INTRODUCTION TO THE PME PLENARY PANEL, ‘SCHOOL MATHEMATICS FOR HUMANITY EDUCATION’

Koen Gravemeijer
Utrecht University

The theme of the PME 31, ‘School Mathematics for Humanity Education’, will addressed by a panel of four panellists. In this introduction, the theme and the position papers that the four panellists wrote in preparation for the panel are introduced briefly.

INTRODUCTION

The plenary panel of this conference will address the theme of the PME 31, ‘School Mathematics for Humanity Education’. This theme may be interpreted in various ways. We may, for instance, think of what mathematics is, and discuss whether or not mathematics is a human construction. Or we might consider what we want mathematics to be for our students. Here we may take Freudenthal (1973) as an example, who stresses that for him mathematics is a human activity, and that that is what it should be for the students too in his opinion. Another perspective would be to look at how mathematics education is experienced by students emotionally. Then issues such as appreciation for, or dislike of, mathematics come up. This theme could be elaborated further in terms of task and ego motivation, cultivating mathematical interest, and the role of identity. Finally, we might look at the goals of mathematics education from the perspective of humanity education. Should the emphasis be on practical problem solving, or on more formal mathematics, cherishing mathematics as cultural heritage, trying to cultivate appreciation for the beauty of mathematics, or focus on mathematical thinking and reasoning?

In preparation of the panel, each of the panellists wrote a short position paper, in which they briefly elaborate their own take on this issue. We may, however, discern one common thread in a shared concern for the negative way mathematics is valued and experienced by many students. This they point out is in conflict with mathematics for humanity education. Their diagnoses and remedies, however, vary. Cristina Frade emphasizes the cultural aspect, Willi Doerfler promotes mathematics as an activity of acting with signs, Martin Simon elaborates the importance of realizing the human potential, and Matasaka Koyama advocates mathematics education as a means for developing the students’ personality and humanity.

By way of introduction, I will briefly sketch the four positions.

Cristina Frade starts by challenging the notion of a dichotomy between ‘theoretical’ and ‘practical’ in regard to mathematics. She argues that traditional theoretical-practical dichotomy may lead to a ‘pervasive hierarchy’ between school mathematics and mathematics that is developed out of school. This may be mirrored by
a similar hierarchy in the relation between teachers and students, within which teachers and students can be thought of as belonging to two different cultures—with one dominating culture, that of the teachers. She shows how Wenger’s notion of participation in a community of practice may offer an alternative.

Wilibald Doerfler takes the position that mathematics is a human activity through the core. He argues that mathematics is done and produced by human beings. His main point is that we should make mathematics more humane, and more mundane, by making students aware of the human origin and nature of mathematics. He elaborates this with the thesis that mathematics is an activity of designing and using signs, which, he argues, reveals its human origin, and highlights the aspect of mathematics as a social practice. He elaborates mathematics as a shared and social practice of sign use, as an alternative for mathematics as a purely individual mental activity with abstract objects.

Martin Simon approaches mathematics education from a different angle. He connects the notion of humanity education with the notion that humans have a potential for mathematical reasoning, knowledge, and communication. This should be realized through education. He contrasts this with the observation that students are often treated as if they have no ability and motivation to learn. Which brings him to the question of how to foster students’ flexible use of their full complement of intellectual resources. He connects this with his research that aims at developing understanding of mathematics learning in a way that enables one to scientifically support students’ abilities to learn—which he illustrates with recent work on understanding how students construct mathematical concepts through their own mathematical activity.

Masataka Koyama argues for the need for humanising mathematics education by taking his starting point in the Japanese cultural tradition of “GEI (Art)-esprit”. Within this perspective, mathematics education is characterized as part of the way to develop students’ personality. In line with those ideas, he depicts mathematics as a creative activity of the human mind, and promotes mathematics-as-an-activity as the way for students to develop their personality and humanity. He emphasizes the role of mathematics as a means for ‘educating students’ awareness’ as a typical human quality, but warns that this does not mean that we may reduce or lower standards for the mathematical content. Instead, we are to help children to collaboratively meet the challenges they may encounter in their process of learning mathematics.

References