MORAL EDUCATION IN THE TEACHING OF MATHEMATICS

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This paper investigates the question how the curricular teaching of mathematics can provide an opportunity for intentional and explicit moral education. The linking of moral education to the teaching of mathematics is motivated, and it will be suggested that human morality is imaginative in nature and moral education is to be about developing students’ moral understanding and moral imagination. Drawing on three approaches to humanized mathematics education, possibilities within those approaches are explored for providing students with the opportunities to develop their moral understanding and moral imagination and, thus, provide the opportunity for moral education in the curricular teaching of mathematics.

THE ISSUE

Classroom teaching has a moral dimension, whether it is recognized and intentionally addressed or not (Buzelli and Johnston 2002, Hansen 2001). Jackson et al. (1993, part 1), for instance, distinguish between eight different ways in which classroom teaching influences the moral life in classrooms, at least five of which are subject matter independent. In this sense, teaching of mathematics as other subject matter teaching is (intended or not) moral education. The question to which the answer is less clear, and which is at the centre of this paper, is whether the curricular aspects of teaching mathematics can provide a basis for intentional and explicit moral education. The challenge of systematically connecting the teaching of the curricular aspects of mathematics education and moral education is that mathematics education does not seem to allow for the consideration of moral content. Literature studies and social studies provide a fertile curricular ground for the inclusion of moral content and, hence, moral education, however, mathematics is often understood and experienced “as a depersonalized, uncontextualized, non-controversial and asocial form of knowledge” (Brown, 1996, p. 1289).

Underlying the suggestions made in this paper is the central assumption that moral education (at least in the way suggested here) is a worthwhile endeavor in schooling in general and in classroom teaching in particular, and that it, thus, should influence curricular subject area teaching. This assumption is sensible for at least the following two reasons. First, if general schooling in general and classroom teaching in particular have a moral dimension, implying that it has an impact on the moral development of students, then purposefully influencing that development through intentional moral education seems a sensible thing to do. That applies to schooling and teaching in general as well as to subject matter teaching. Second, saturated in intentionality, human action and experience is inevitably moral in character,
because “intentions include desires and motives that go beyond needs, to encompass notions of what it is good to be (in character) and do (in conduct)” (Martin & Sugarman 1999, p. 44). Education that has as at least one of its purposes to engage students in and prepare for the different aspects of life, then, needs to address this moral aspect of being human. Considering the dominance of subject matter teaching in students’ formal education, subject matter teaching should contribute to this purpose of education.

What is suggested here is an integration of the larger purpose of schooling (moral education) into subject matter teaching, which includes the teaching of mathematics. However, this does not imply neglecting or ignoring other, subject matter specific purposes of the teaching of mathematics like the development of mathematical literacy (see, for instance, NCTM, 2000).

In the following moral education is linked to the curricular teaching of mathematics in two steps. First, a view of morality is adopted according to which moral understanding and moral imagination are front and centre in human moral functioning, and according to which moral education is centrally about the imaginative exploration of one’s prototypical moral concepts and moral metaphors. In the second step, approaches within the tradition of humanized mathematics education are used to suggest opportunities for students in the curricular teaching of mathematics to engage in imaginative explorations of their moral concepts and metaphors.

MORAL EDUCATION: DEVELOPING MORAL UNDERSTANDING AND MORAL IMAGINATION

There are two dominant approaches to moral education in schooling in at least North America. One understands itself as being in the tradition of Ancient virtue theory (Aristotle, trans. 1976) and is generally referred to as character education (Lickona, 1991), while the other one is in the tradition of Piaget’s (1997) and Kohlberg’s (1971) cognitive approach to the development of moral judgment and reasoning (Edelstein et al., 2001). The first group of moral education approaches focuses on the development of particular ‘virtues’ like honesty, responsibility, fairness and ranges from a view of moral education as social control to the view of moral education as the development of virtue-based moral agency. The second group, on the other hand, focuses more or less exclusively on influencing the development of moral reasoning of students, assuming that a person’s moral reasoning capacity impact accordingly on the person’s conduct.

A quite different approach to morality has been recently pursued by Mark Johnson (1993, 1996, 1998), who, based on work in cognitive science (Lakoff & Johnson, 1999), has proposed a theory of morality that puts moral understanding and moral imagination at its centre. Johnson (1993, p. 198) summarizes his approach as follows:
A theory of morality should be a theory of moral understanding. Moral understanding is in large measure imaginatively structured. The primary forms of moral imagination are concepts with prototype structure, semantic frames, conceptual metaphors, and narratives. To be morally insightful and sensitive thus requires of us two things: (1) We must have knowledge of the imaginative nature of human conceptual systems and reasoning. This means that we must know what those imaginative structures are, how they work, and what they entail about the nature of our moral understanding. (2) We must cultivate moral imagination by sharpening our powers of discrimination, exercising our capacity for envisioning new possibilities, and imaginatively tracing out the implications of our metaphors, prototypes, and narratives.

As theories of physics provide us with an understanding of gravity, force, etc. rather than tell us how to build bridges, theories of morality – Johnson (1993, p. 188) argues – should provide us with an understanding of human moral functioning rather than tell us how to live a virtuous life. It is the imaginative exploration of our prototypical moral concepts (like fairness) and our moral metaphors (‘an eye for an eye’) in specific moral situations that is the basis of our moral functioning as human beings. At the same time, it is these imaginative explorations that help us develop further our understanding of human moral functioning in general and our own idiosyncratic moral functioning in particular. Moral education – the intentional and purposeful influencing of moral development – within this framework focuses, then, on the development of moral understanding through the imaginative exploration of one’s prototypical moral concepts and one’s moral metaphors.

Adopting Johnson’s approach to morality and moral education, the question, then, is whether the curricular aspects of teaching mathematics can help develop students’ moral understanding and moral imagination by providing opportunities for the imaginative exploration of their prototypical moral concepts and their moral metaphors. The rest of the paper addresses this very question.

THE FRAMEWORK: HUMANIZED MATHEMATICS EDUCATION

As long as mathematics is understood, practiced and experienced “as a depersonalized, uncontextualized, non-controversial and asocial form of knowledge” (Brown 1996: 1289), it is hard to see how the curricular teaching of mathematics can provide an opportunity for developing moral understanding and moral imagination. Even if this is by far the most dominant view of mathematics underlying – often unarticulated – the teaching of mathematics, there are calls in the academic and professional mathematics education community to give consideration to the ‘human element’ in mathematics. This ‘humanizing of mathematics education’ has taken different forms with different foci. For instance, for some the focus is on the ‘human’ nature of mathematics (Hersh, 1997; Lakoff & Núñez, 2000), some suggest a focus on the social responsibility of mathematics and mathematics teaching (Skovsmose & Valero, 2001) and others, again, suggest different ways of ‘humanizing’ the curricular teaching of mathematics (Brown, 1996; Freudenthal, 1968; Katsap, 2002; Wheeler, 1975). But what all these approaches to mathematics education have in
common is the view that mathematics is (to at least one part) something humans do, a human activity and, thus, that mathematics has a social context.

Within this broader class of approaches to humanized mathematics education it is in particular these latter approaches to humanizing the curricular teaching of mathematics that promise the most in terms of providing opportunities in the teaching of mathematics for the development of moral understanding and moral imagination. The next section explicates some of those opportunities.

DEVELOPING MORAL UNDERSTANDING AND MORAL IMAGINATION IN THE TEACHING OF MATHEMATICS

In the following, I extract out of the class of the above given approaches three particular ones and explicate the possibilities within those approaches for students to imaginatively explore their prototypical moral concepts and their moral metaphors, and, thus, help developing their moral understanding and moral imagination within the curricular teaching of mathematics.

History of Mathematics

The first approach in the humanizing of the curricular teaching of mathematics suggests incorporating historical aspects of the development of mathematics with particular focus on the life and contributions of mathematicians into the teaching of mathematics (Wheeler 1975, Katsap, 2002). Here, the ‘human element in mathematics’ is the mathematicians as the doers of mathematics and contributors to the mathematical science. Wheeler (1975, p. 6) characterizes the purpose of this form of humanization as follows: “These questions [the questions dealt with in a history of mathematics approach to the humanization] are concerned with an enlargement of our experience and our understanding through vicariously sharing the experience and understanding of others.”

Suggestions to include historical aspects into the curricular teaching of mathematics are generally limited to linking those aspects to respective mathematical content (Eves, 1969; NCTM, 1969; Fauvel, 1991). For the purpose of providing students an opportunity to imaginatively explore their prototypical moral concepts and metaphors I suggest to expand in the following way on what Wheeler in the above quote has already hinted at. I suggest including the ‘human aspects’ that can be extracted from the historical accounts. For instance, the legend about the Pythagoreans killing one of their own because he proved that irrational numbers exist (Pappas 1997) provides an opportunity to engage in imaginative explorations of our understanding of human intentions, fears, and emotions, and our own prototypical understanding of moral concepts like motivation and justifications for killing, etc. The moral deliberation would include the imaginative exploration of how far we would go to protect an idea that is as important to us as the idea that all numbers are rational was to the Pythagoreans. Human emotions and their functioning are very central to our moral understanding (Johnson, 1993). Here, the teaching of the concept of irrational numbers as part of the mathematics high school curriculum through historical
references provides an opportunity for students to engage in moral deliberation through imaginative exploration of moral concepts and understanding of human moral functioning.

Mathematization of Life Experiences

The second approach in the humanizing of the curricular teaching of mathematics suggests moving away from understanding mathematics education as the transmission of mathematical procedural and factual knowledge and to understand mathematics education in the way that students are ‘doing mathematics’ with the goal of developing skills and habits of mind for students to ‘mathematize’ their life experiences (Wheeler, 1975, Freudenthal, 1968). Here, the ‘human element’ is the students’ intellectual capacity to use mathematics to make sense of their life experiences. Wheeler (1975, p. 6) explicates his specific idea of the ‘mathematizing’ capacity as follows: “In a crude attempt to make explicit the nature of mathematisation, I would include the following ingredients: the ability to perceive relationships, to idealise them into purely mental material, and to operate on them mentally to produce new relationships” (see also Gravemeijer & Terwel, 2000 on Freudenthal’s view of mathematization). Accordingly, the purpose of this kind of humanized mathematics education is the development of students’ mathematical competency in a way that allows them to use mathematical conceptualizations to understand at least part of their world, to see this part of their world through the eyes of mathematical relationships.

In this approach to the humanization of mathematics education, areas and issues from the world experiences of students are chosen to illustrate, develop with or practice the mathematization of their world around them. But rather than choosing areas or issues that are neutral with respect to human moral functioning, opportunities can be created for students to engage in an imaginative exploration of their prototypical moral concepts and moral metaphors within this teaching of the mathematization of life experiences. For instance, statistical concepts are used for the mathematization of relationships between quantifications of certain qualities that capture a certain area of our world experience. This provides an opportunity to engage in moral deliberation with students about fear as one of the human qualities relevant to our moral functioning by, for instance, considering how the documented subjective feeling of a more dangerous environment in our cities is in opposition to statistically documented declining crime in those very cities. Here students have an opportunity to explore their understanding of their own fear of being a victim of crime, how this fear is affected by the information and the understanding they have, and how this fear can be influenced and manipulated. Students have an opportunity to imaginatively explore their moral concepts and metaphors around ‘crime and fear’, even around ‘crime and punishment’.

Developing General Human (Meta-Cognitive) Capacities

The third approach in the humanizing of the curricular teaching of mathematics is guided by the more general goal of helping students develop general human
(cognitive) capacities and life-relevant skills. In this approach the ‘human element’ is those very capacities and life-relevant skills. For Wheeler (1975, p. 9) the teaching of mathematics can be utilized to educate children’s awareness, which he explicates as “the act of attention that preserves the significant parts of experience, that pegs and holds them in the self so that they are available for future use.” Güting (1980, p. 420) includes into the teaching of mathematics the teaching of skills like “how . . . to learn as effectively as possible”, “to make the best use of textbooks and other resources”, “to plan . . . time”, and “to check . . . results”. Katsap (2002, p. 14) suggests that teaching the history of mathematics can aid in “celebrating cultural diversity” and “intensifying a humanistic world view”. Compared to the other two approaches to the humanizing of the curricular teaching of mathematics, this approach is less mathematics-specific in the sense that it could take the same form in other subject matter teaching.

Developing meta-cognitive skills – for instance, learning how to learn – could be considered being part of this approach to develop general human (cognitive) skills through the curricular teaching of mathematics. Here, then, the teaching of meta-skills of learning to learn (mathematics) can provide opportunities to engage in an imaginative exploration of the conditions under which humans function cognitively, which is an important factor in human moral functioning, since morality (as understood here) is about understanding human (moral) functioning. For instance, questions like ‘What motivates me to learn (mathematics), what blocks my learning (mathematics)?’ can guide explorations of one’s metaphor of oneself as a learner, which is directly linked to self-guided moral development. Or questions like ‘Who determines the mathematics curriculum in the first place?’ allows exploring the political aspects of mathematics education (Noddings, 1993) which can guide imaginative explorations of the moral notions of norms and expectations.

This type of exploration provides also the opportunity to imaginatively explore students’ understanding of human vulnerabilities (cognitive and others) and individual differences as part of our human condition. The former can happen by making explicit students’ experiences about their sensitivity to and dealing with failure and success in their learning of mathematics, the latter can happen by making explicit students’ different ways of learning mathematics. Here the moral notions of empathy, tolerance, equality and equitability and metaphors around those notions can be explored.

References


