

Collaborative learning as a tool for the formation of moral values in the process of teaching mathematics

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Introduction

A review of the literature on mathematics education shows the importance of the formation of moral values in the process of teaching mathematics. According to interviews with Armenian mathematics teachers, they have difficulties in implementing the formation of (moral) values in the process of teaching mathematics, and sometimes they use mathematics lessons only to teach mathematical knowledge and skills. There are various reasons for this, one of which is the lack and/or scarcity of materials, methods or recommendations for including the formation of (moral) values in the process of teaching mathematics. The purpose of this research is to enrich existing studies, and present a designed lesson plan as a practical suggestion to address the scarcity of resources in this area.

Values and designed lesson plan

Bishop (2001) stated: “Values in mathematics education are the deep affective qualities that education fosters through the school subject of mathematics” (p. 94). He categorised values in the mathematics classrooms into three groups: the general educational, the mathematical, and the mathematics educational. The moral values that I am discussing here and in some of the research in this area that has been carried out in Armenia (e.g., Mikaelian, 2018) are mostly part of the general educational group, as they are not mathematical in nature. And, as Mikaelian (2018) stated: “Moral values are intended to regulate human behaviour and determine the nature of human relationships” (p. 56). The basic moral values are kindness, respect, mutual help, responsibility, tolerance, justice, duty, love, etc., and mathematics education has the potential to form these. Elsewhere (Yenokyan, 2019), as an approach to the formation of moral values in the process of teaching mathematics, I have proposed specific mathematical tasks, which in their context contain the information or manifestations of a concrete moral value. In addition, the current issue is supported not only by the above-mentioned specific tasks, but also by teaching methods such as project learning, collaborative learning, etc.

For the research presented here, on the basis of my and my student’s previous work on collaborative learning, I designed a lesson plan for teaching the topic “Signs of equality of triangles” through collaborative learning (“Tour in the gallery”), as a tool for moral values formation for 7th grade students (13–14 years old) in secondary school. Among the *teaching, educational* and *practical* goals for this lesson was the formation of the moral values of respect, mutual help, responsibility and tolerance. The class in which the plan was realised was divided into four groups, each group included students with different levels of mathematical knowledge and different genders. All groups were given assignments but also had complete freedom in how they presented the results of their research, solved problems and designed posters. When the groups finished their work, they hung their posters on the walls of the classroom, thus creating a “Gallery”. In groups, students counted from 1 to 4 and

then formed new groups according to the numbers in their group. These new groups were walking in the “Gallery”, stopping at each “exhibit”. The member of the group who had been involved in the creation of that “exhibit” acted as a guide, presenting their work in detail, answering questions, and making additions or corrections based on the participants’ suggestions. The tour ended when all the groups had seen all the exhibits. The teacher walked around in groups, listening to reports and making observations. After the tour, students returned to their initial groups and discussed their work again, this time comparing it with other posters and analysing the questions and suggestions that had arisen.

Discussion and conclusion

According to my observations, the students were motivated and it was noticeable that during their work they tried to help each other, discussed together how to design the posters, took responsibility for their results, respected each other and mostly behaved well in the “Gallery”. However, in the last part, during the discussion in the initial groups, some students were not so tolerant of pluralism or accepting of others’ results and/or suggestions and comments. According to the students’ responses, the lesson was mostly interesting, especially the “Tour in the gallery” was a new and interesting format for the class, some of them liked working in a team but some found it difficult. Some students also mentioned that they liked having the opportunity to design and present the results as they wished. It is noteworthy that during the designing of the lesson plan and the class, the main focus was on moral values. However, the designed plan could also be the basis for the formation of other values. For example, the teaching of the mathematical value of openness could be discussed in terms of Bishop (2001, p. 103), as during the lesson students had the opportunity to create posters and defend and justify their answers publicly in front of the groups. Also, during the preparation of the posters, students were free to choose the design and display their ideas. This could be a contribution to creativity or open-mindedness, which are mathematics educational values. The presented lesson plan could be a model for designing lessons on other topics (e.g., trigonometric functions) and it could be applied not only in Armenian schools but also in other countries where similar problems related to value formation in mathematics education are faced. During this type of lesson, teachers can use observation to find out how tolerant and respectful students are of each other, whether they accept pluralism, whether they help each other, whether they know how to work in a team, etc. Teachers can make notes on this information and then, from time to time, carry out analyses which will be helpful in giving feedback to students and in working on further activities for the formation of (moral) values.

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