

Finnish educators' conceptions of the social-emotional needs of mathematically gifted high school students

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This article presents conceptions of social-emotional needs of mathematically gifted adolescents of certain Finnish educators. The article is based on a qualitative research study conducted with the methods of semi-structured interviews and participant observation in a Finnish high school that offers a special programme for mathematically oriented students. The study shows that the educators considered the most essential social-emotional needs of mathematically gifted students to be the need to be respected as unique personalities, to meet other gifted, to feed and guide the intrinsic motivation.

Keywords: Mathematical giftedness, gifted students, social-emotional development.

Introduction

The purpose of this study is to present and analyse the conceptions of the social-emotional needs of mathematically gifted students held by certain educators who work in a mathematically oriented high school in Finland. The research is conducted in a unique Finnish school community that is focused on educating students who exhibit particular interest in mathematics. The data of this research was collected by interviewing five educators of the school and by participant observation in the school. The research context provides valuable knowledge as it brings together the practices and theories of research on gifted education (Ambrose et al., 2010; Laine et al. 2016).

Giftedness is a very complex concept and varies both qualitatively and quantitatively within gifted persons (Passow, 2004), and multiple definitions of giftedness have been written over the decades (Ambrose et al., 2010). This chapter presents the theoretical fundamentals on mathematically gifted adolescents and summarises former research on teachers' conceptions of giftedness and gifted education.

Being gifted means possessing promising potential in a certain domain of giftedness and being able to develop this potential into actual high performance. This domain, e.g. mathematics, is the field and the context in which the gifted activity occurs (Cross & Coleman, 2014). Mathematical giftedness in particular means the ability to abstract numbers, variables and functions and the relations between them. For a mathematically gifted person, it also means courage, persistence and intrinsic motivation to go further and deeper in such mode of comprehension (Gardner 1983; Reis & McCoach, 2002; Movshovitz-Hadar & Kleiner 2009; Subotnik, Pillmeier, & Jarvin, 2009). The development of such person is not only affected by personal characteristics, but also by the structure and properties of the individual's particular domain of talent (Coleman & Cross, 2000).

Mathematically gifted students need mathematical activities, and with the support of their surroundings, they are able to take an active role in their own learning and develop into professional mathematicians (Cross & Coleman, 2014; Usiskin, 2000). They have also certain social-emotional needs... A gifted person is able to fulfil his whole potential only if his intrinsic abilities, the support of his social surroundings and the social-emotional dimensions are in balance (Subotnik et al., 2009;

Usiskin, 2000). Exceptionally gifted adolescents often experience dissimilarity and even unpopularity among their schoolmates (Mönks & van Boxtel, 1985; Rimm, 2002), especially when the giftedness takes place in the domain of mathematics (Pettersson, 2008).

Many professional educators still view giftedness as a fixed and innate characteristic of a person (Laine, Kuusisto, & Tirri, 2016). Some of teachers even consider the gifted as students who actually do not need training or instruction (Laine et al., 2016). However, recent theoretical definitions of giftedness have shifted towards contextual and malleable conceptions (e.g. Ambrose, VanTassel-Baska, Coleman, & Cross, 2010; Cross & Coleman, 2014). Various researches illustrate this gap separating the theoretical knowledge of giftedness from the conceptions of professional educators (Ambrose et al., 2010). Research further shows that there is also a gap between the teachers' conceptions of gifted education and the educational practices they conduct. Therefore there is need for in-depth research to further our understanding of teachers' conceptions of giftedness (Laine et al., 2016).

Teachers' conceptions have a significant role in supporting young gifted students in advancing their talent (Mann, 2006; McNabb, 2003; Pettersson, 2008). Teachers tend to favor quite traditional conceptions of giftedness (Moon & Brighton, 2008). Generally, according to teachers, the most determining characteristic of a gifted student in the school context is a specific difference from others, which presents itself as the gifted student's capability to perform fast, intelligent and creative learning (Kaya, 2015; Laine et al., 2016; Mattsson, 2010; Moon & Brighton, 2008). It is interesting to note that teachers also associate mainly positive social-emotional characteristics with giftedness, such as enthusiasm, sensitivity and curiosity (Kaya, 2015; Laine et al., 2016; Mattsson 2010).

There seems to be a gap between the theories and teachers' traditional conceptions of giftedness. Therefore, the purpose of this study was to examine the educators' conceptions of the social-emotional needs of the mathematically gifted adolescents in a school with successful practices. We were especially interested in the conceptions that were also enacted in their practices.

Methodology

In this qualitative research the data was collected by interviewing all the teachers who had regularly supervised the summer schools (two mathematics teachers, the biology teacher) as well as the principal and the healthcare officer. Additionally... by observing, filming and participating in the mathematics classes in the autumn of 2011 and an overnight school session in January of 2012. A qualitative semi-structured interview technique was used in order to give the interviewees the possibility to conceptualize and describe the topic in the way they prefer.

The researcher spent time with the student participants of the overnight school and participated in the social and mathematical activities of the event. Short informal discussions were conducted with the students while participating. As the data was collected in the authentic environment of the research subjects by means of participant observation, this study contains characteristics of ethnographic research (Delamont 2004; O'Reilly 2005).

The data was transcribed and analysed with inductive content analysis. Inductive content analysis means categorizing and combining units of the analysis into larger aggregates (Elo & Kyngäs, 2008). A whole statement was chosen to be the unit of the analysis. The whole statements included one thought, conception or opinion varying in length from a couple of words to several sentences. These

units were first categorized into codes. After that, as is done in inductive content analysis (Elo & Kyngäs, 2008), the codes were connected into categories and such categories into main categories, and finally the results were interpreted in the light of the theoretical background of the study.

Results

The purpose of the school is to gather together and educate adolescents interested in mathematics. The students of the school are offered a wide range of instruction in mathematics and diverse learning environments such as the Night of Mathematics and an annual summer school in Lapland. The educators interviewed in this study generally described their students as gifted. They defined mathematical giftedness as the ability to picture, learn and remember mathematical causations rapidly and with clarity. They described two types of giftedness appearing in the school: students with multiple talents and those with a single exceptional talent. The students with multiple talents were interested in societal influencing and social activities. On the other hand, the exceptionally talented tended to impress their teachers with their commitment to studying and with their high level of mathematical reasoning skills.

Principal: Roughly speaking there are those Renaissance talents who are widely talented and then those exceptionally gifted, who focus on the area of their deepest interest.

The uniqueness of the school's students was emphasized in the interviews. The interviewees were unwilling to stereotype the students and rather described their personalities, interests, social skills and profiles of giftedness as very individual.

Principal: I don't want to give any stereotyped answer here. I don't want to say that they are this kind or that kind.

According to the educators, many of the students have experiences and memories of feeling different and isolated during elementary school. Sometimes a change of school climate can be essential for a gifted adolescent.

Mathematics Teacher2: And we offer a community where you can discuss the Schrödinger equation during a break without being sneered at.

Biology Teacher: I just received a message where the parents were thankful because it has been so great [for him]. To be accepted in the group and let him be himself and encouraged and so on.

According to the interviews, the students with exceptional mathematical giftedness had more challenges in terms of social skills than those who were gifted in various fields. Moderately gifted students are usually relatively popular among their school mates and age peers, while the exceptionally gifted are more prone to being left alone (Gross 2002; Rimm 2002). Any school environment requires various social skills from students (Payton et al. 2008). According to Mathematics Teacher 1, both "social sharks" as well as those who have "obvious problems in that respect" could be found among the students of the school.

Biology Teacher: Some of them have very poor social skills. ...It is often related to this narrow field of giftedness.

Every student was welcome to participate in the social activities of the school to the extent of their own preferences. According to the interviews, one important social skill for the students is tolerating of all kinds of personalities. In the interviews, the diversity among the students was seen as an important part of the school's social climate.

Mathematics Teacher1: Of course one can choose to enjoy small groups or solitude.

Mathematics Teacher1: We have a vast variety of personalities and a tight community, which means that it becomes a tolerant community.

To study and associate with other gifted students was considered one reason behind the distinctive solidarity of the school community. These views are congruent with the literature (Gross 2002; Rimm 2002). Even though a variety of social skills existed among the students of the school, the common interests made social interaction easier.

Health-care officer: To find congenial people. And I know how the teachers describe, how they [the students] make experiments in the physics lesson or somewhere, the burning enthusiasm they show.

According to the interviewees, the students of the school were able to form close friendships with each other. The class-based structure and diverse range of informal activities formed the basis for the development of friendships at the school.

Biology Teacher: And then across the groups of each year's class, because on Mondays [when extra courses in mathematics are taught] and at overnight schools, they spend time together, there are no boundaries.

Associating and studying with other gifted students are emphasized both in these results and in the literature (e.g. Subotnik et al. 2009; Rimm 2002). The positive social climate of the school was constructed upon acceptance of the dissimilarities of students, diverse social interaction, shared experiences and interest in learning mathematics. These features were also seen as suitable for enhancing giftedness.

Intrinsic motivation is one of the most essential social-emotional characteristics for the development of mathematical giftedness (e.g. McNabb, 2003; Subotnik et al., 2009). The importance of motivation was also emphasized by the mathematics teachers interviewed in this study.

Mathematics Teacher2: They are very motivated. And that is more determining than giftedness. Of course they need some kind of giftedness. But with some kind of basic giftedness you can go very far.

Even though motivation is often seen as a person's inner characteristic (Subotnik et al. 2009), the interviewees highlighted the significance of peer support in connection with maintaining motivation. The shared motivation and interest in mathematics was also apparent in the overnight school, where groups of students solved mathematical problems together while demonstrating amazing enthusiasm.

Health-care officer: It is the passion for [mathematics] that creates common good things in the class or the group or among the students.

Mathematics Teacher2: The social pressure can influence them one way or another... They support each other very much in studying.

The observations of the overnight school showed that the students were able to discuss their perfectionism, too. The conversation was humorous, and the participants were laughing at their perfectionistic characteristics.

Student1: I am not a workaholic at all!

Student2: No you're not. You only scared all the freshmen with your stories last year.

Sometimes high motivation comes with negative phenomena such as unbeneficial perfectionism. The biology teacher and the healthcare officer had seen that achieving certain objectives or failing to do so may cause stress and exhaustion.

Principal: It [exhaustion] does not occur often, but someone every year.

Health-care officer: Often great giftedness and striving for perfection and achievements are a part of the personality. There is a risk of stress and fatigue and exhaustion.

The interviewees tended to see perfectionism as a practical problem of the educational system rather than a problem in the adolescents. The perceptions of the interviewees were summed up by the healthcare officer. According to her, negative perfectionism can be prevented and treated by guiding the students, being adaptive and offering constant care to the students.

Health-care officer: Flexibility and a flexible education system are what secure the path of the adolescents somehow. And also the caring, in particular, daily care.

Studying with the other gifted students in a supporting school climate was described to help the adolescents to form a realistic self-image and a strong self-confidence as people and mathematicians.

Mathematics Teacher1: It is easy to obtain perspective, [because] some really are incredibly good. –
– But nobody is the best of all.

Health-care officer: It is amazing to notice how they somehow gain self-confidence.

The gifted students were described as both ordinary and special at the same time, as they encounter the common social-emotional challenges of adolescence but also have special characteristics and needs due to their mathematically oriented and ambitious environment. The influence of the domain of mathematics on the development of mathematically gifted adolescents cannot be ignored.

Discussion

All qualitative research should be subject to realistic reflection on its general reliability (Lincoln & Guba 1985). In this particular study, the use of triangulation of data collection increases the validity of the research. Nevertheless, a longer participatory observation could have offered more profound information on the social interactions of the students. Additional reliability was achieved by presenting the interviewees with the results of this study.

This research studied educators who possess particular experience in the context of Finnish education on teaching students who are recognised as gifted. Therefore its results differ from earlier studies on conceptions of giftedness of Finnish teachers (Tirri & Kuusisto, 2013; Laine et al., 2016). The interviewees of this study described giftedness as advanced performance and a modifiable characteristic of a student as well as of the whole school community. Finnish teachers tend to relate gifted students only with positive social-emotional characteristics, such as creativity and high level

of motivation (Laine et al., 2016). The interviewees of this study were prone to discuss also social-emotional challenges related to lives of the gifted adolescents. Still, the positive attitude to giftedness, enthusiasm for teaching and pride of their students were easily heard within the interviews. Research has also noted that the amount and especially the quality of cooperation with gifted students determines the teachers' conceptions of and approaches to giftedness (Kaya, 2015).

The concept of dissimilarity is widely included in definitions of giftedness as well as in the conceptions of giftedness commonly held by teachers. If someone is thought to be gifted, she is also seen as somehow, although often positively, different from others (Shani-Zinovich & Zeidner, 2009). In this research, the school was described as a meeting place for mathematically gifted students who are, in some way, different from many other adolescents. Therefore it is significant to understand the difference as a subjective experience of a gifted adolescent. Although the society, parents and teachers usually appreciate giftedness, exceptional talents often experience isolation within their age group (Gross, 2002; Rimm, 2002).

The organization and the curriculum of national school systems should meet the needs of every student including the gifted ones (Cross & Coleman, 2014; Kaya, 2015). The school investigated in this research does not represent a common high school in Finland. Neither does it reflect general Finnish attitudes toward special education of highly performing adolescents (Laine et al., 2016; Tirri & Kuusisto, 2013). A person's individual growth and particular social environment determine the social-emotional challenges of a mathematically gifted child instead of the mathematical giftedness per se (Wilson, 2015). Finnish teachers are highly qualified and skilled at differentiating learning contents both for fast and slow learners (Laine et al., 2016). However, this research shows that even the most devoted and competent teacher cannot replace the need of meeting, studying and making friends with other congenial peers. As a conclusion, when planning education for gifted students the social-emotional aspects of gifted education and the gifted students' need for meeting congenial adolescents should be considered.

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