Meeting the Needs of Talented Elementary Math Students

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As a math specialist in gifted education for over 20 years, I work with teachers across the country on meeting the needs of high ability math students. Regarding mathematically talented elementary students, the issue is a complex one and is influenced by many components. There are three main issues. First, there are different levels of math giftedness. Some students learn new concepts very quickly, are curious about the mathematics being studied, and persistent in problem solving. These are talented students who will definitely benefit from programming outside of the regular curriculum. Then there are others who are highly gifted and need not only an enriched curriculum but also one that is accelerated. The level of acceleration depends on the ability of the students. But it is important to realize that extremely few elementary students will have the necessary cognitive development to do very high-level abstract math as is found in advanced algebra and geometry. They can memorize the algorithms needed to solve problems and even apply them, but their understanding of the underlying concepts is often missing. This often takes the joy out of doing math for someone who is highly gifted in the subject area and he/she may reject continued pursuit of higher mathematics. This is truly a loss.

On the other hand, usually acceleration alone is not enough for highly gifted students. Moving a student to the next grade level often does not provide the advanced content that is rich in problem solving and that develops critical and creative thinking. Rather he/she is placed in an instructional environment meant for the general population. Once again, the pacing is often too slow.

The second issue is the fact that many elementary teachers have not specialized in mathematics in their educational preparation and so their mathematical background is not strong. Although teachers recognize the need to provide more challenging mathematics for talented students, they do not know what this is or how to go about it. The third issue is the difficulty in finding appropriate curriculum materials that challenge students to think analytically and creatively and learn substantial mathematics. Although logic problems and math puzzles can be stimulating, they do not provide enough. Students need to think deeply about complex math concepts to be appropriately challenged. This requires units of instruction and projects that encourage students to delve into the mathematics over a period of time.

Keeping these issues in mind and knowing that each district and, indeed, each student is unique, the following are some programming models used successfully by districts.

**Highly Gifted Math Students**

Students who are highly gifted in mathematics need a separate math program that is accelerated and provides opportunities for complex mathematical reasoning. Some districts use mentors, such as mathematics education majors or professors at nearby
colleges to work with these students during the school day. Other schools accelerate students by increasing grade levels for mathematics with additional engagement with high-level mathematics from mentors. The amount of acceleration depends on his or her ability and emotional and social maturity. Some schools use distance learning programs to provide math courses that they do not offer in the school building where a student resides.

No matter what the program of choice is, students do need opportunities to engage in mathematical discussions and problem-solving activities appropriate to their level just as real mathematicians do. They need to talk about mathematics with peers of like ability and teachers for it is within these conversations that “aha” moments occur, and understanding is stretched. This is where the thrill of discovery is fostered, and a life-long love of mathematics develops.

**Talented Math Students**

For the remainder of your talented math students, I recommend increased challenge beyond the standard curriculum. Insufficient challenge is sometimes due to lack of rigor in the content and sometimes due to the pace being too slow. The ideal solution for these students is flexible grouping with flexible pacing. We recommend that you pretest students, preferably for each unit, and then form a group of high ability students who have pretested out of the material. These students should receive instruction together using different materials that include advanced content with a problem-solving focus. Several schools use this model of differentiated instruction and find it provides the highest level of challenge for their top students. There is always the same core group of students in the top group and a few students that move in and out depending on the content of the chapter being pretested. In my work with students in research grants, pre and post achievement scores (both standardized and unit tests) from students in these groups have shown significant gains.

**Teacher Involvement**

It is important that a teacher actually work with the students engaging them in activities that promote high-level thinking and good mathematical discussion. If students are given “enrichment sheets” to work on independently and can do this successfully, it usually means the material is NOT challenging for them. It also does not allow for mathematical discussion with their ability peers. This is so important to foster understanding and spark interest and new insights. Talented students need to think and act the way practicing professionals in the field, i.e. mathematicians, do.

**Curriculum Materials**

Finding appropriate materials is another challenge. This is actually why we got involved with Project M³: Mentoring Mathematical Minds. We knew there was little material for young children with mathematical promise and we wanted to change that. In Project M³, experts in the fields of math education and gifted education developed new curriculum units in math for talented students in grades 3-6.

https://gifted.uconn.edu/projectm3/m3_meeting_the_needs/#