

## IS MATH A GIFT?

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### ABSTRACT

“I am just not a math person” is a sentence we can hear very often these days. Students use it as an excuse any-time they do not know or understand anything. But is Maths really some gift a person gets or is not? Or is it more like ability which can be improved if practised enough? This is a brief preview of what do the Czech, Slovak and also foreign authors think of this issue.

### 1. INTRODUCTION

“He/she is a real talent, math genius!” and similar sentences are often said by teachers, students and parents. These shift the view of mathematics as something from wonderland which ordinary people can not understand. They say “I have never been good at math, I don’t have the gift for that”. But is it the truth?

### 2. THEORETICAL BASE

*Ability* is commonly understood as the set of mental qualities of an individual which are essential for successful accomplishment of specific kind of activity. According to this, in case of mathematics, the greatest ability has the pupil who wins the Mathematical Olympiad. Other understanding of ability is that it is the prerequisite of (fast) development and improvement in certain field. According to this view the ablest student is not the one who performs better but the one who, under the same conditions, evolves more. Ability is quite consistent quality, it is changing slowly. *Mathematical abilities* are defined in many ways. It is necessary to distinguish these basic factors:

- numerical factor – manipulating with numbers, fast and precise calculations;

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- spatial factor – important in geometry as well as in arithmetic (e.g. layout of space while writing calculations, positional number notation etc.);
- verbal factor – solving of verbally formulated problems;
- reasoning factor;
- general intelligence.

*Skill* is ability specialized for specific use, set of tools an individual adopted by learning or practice and which are essential for performing of specific activity. But what is important – it is not automatized and stereotyped. Skills improve with every use so every time it is something new to a certain extent.

In Mathematics more than in any other subject, the quality of performance is dependent on systematic gaining of special skills for understanding and solving certain types of problems. Such skill for pre-school children may be the skill to count from one to ten. Especially young children learn these skills spontaneously. Children at schools learn skills in reading and writing numbers, performing various arithmetical operations, managing and using of multiplication table, handling decimal numbers and fractions, operating with powers and roots etc. In geometry they adopt drawing of different geometrical figures, handling measures and weights, applying different formulas and theorems to geometrical problems etc. It is then understandable that children with high level of mathematical abilities who are neglected might have insufficiently developed and fixed *Mathematical skills*, or knowledge.

*Talent* is defined as inborn anatomical-physiological disposition of an individual, which is prerequisite for ability.

*Mathematical talent* is genetically determined. This is confirmed for example by the existence of very mathematically talented families, e.g. Bernoulli. The other confirmation were the researches with twins, which show great similarity between young children but as they grow older, the similarity is not so significant. That might be caused by the fact that for older children there are more problems in tests which require special skills or learning vast amount of school knowledge of mathematics. Which is why for younger children the genetic congeniality shows convincingly.

### 3. STUDY

Carol S. Dweck from Department of Psychology at Stanford University led the research asking the question: *Why aren't there more women in math and science?* It shows that there is a difference in how students cope with experiences that may question their ability – they can feel challenged or demoralized by them.

At the beginning there are students' beliefs about intellectual abilities. Do they view it as a gift, something you simply have or you don't or is it something that can be developed through practice and dedication for them? Former researches show that viewing ability as a gift led students to question their ability and lose motivation when they encountered setbacks. This affects more females than males. Moreover it is shown that these females are more susceptible to stereotypes which was confirmed by following female students at Columbia University through their calculus course. Many students thought that stereotyping was alive and well in their calculus section. It had a strong negative impact on women with belief of math ability as a gift in contrast to those who viewed it as something they could augment (it had only little impact on these women.)

So how can these types of women be encouraged? Obvious solution is to look for opportunities to praise these female's ability. But this approach is wrong because there are many undesirable consequences. It tells them that their ability is a gift. When these students hit a period of difficulty they tend to lose their confidence. As a result they lose interest in pursuing the task.

Much more better solution is addressing their beliefs about the nature of ability. There are some studies showing that if you convince students that intellectual skills could be acquired rather than simply bestowed as a gift it leads to important gains in females' math achievement. But can we use this in our own math classes? Of course we can. It is shown that even those subtitle "innocent" information about "great or genius mathematicians" used only to make the lesson more interesting influence students negatively. We should focus on presenting these persons as people who were deeply interested in and committed to math, and who worked very hard. This little difference can change our students' lives.

#### REFERENCES

- [1] C. S. Dweck, *Is Math a Gift?*, In S. J. Ceci & W. Williams (Eds.) (2006); Why aren't more women in science? Top researchers debate the evidence. Washington, DC: American Psychological Association.
- [2] J. Lazníbatová, *Nadané dieťa*, IRIS, 2007.
- [3] L. Hříbková, *Nadání a nadaní: Pedagogicko-psychologické přístupy, modely, výzkumy a jejich vztah ke školské praxi*, Grada, 2009.
- [4] L. Košč, *Psychológia matematických schopností*, Slovenské pedagogické nakladateľstvo, 1972.
- [5] B. Novák, J. Molnár, J. Švrček, *Mathematics for the talented ones as well as the others*, In Problems of Education in the 21st Century, Vol. 2, 2007, 59 – 66, ISSN 1822-7864.

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