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EDUCATION
How to solve it?

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PROCEDURE AND UNDERSTANDING IN NUMBER THEORY

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ELTE

Our research is a part of a larger survey on the status of Number Theory in Hungarian elementary- and highschool education. The research originated from an observation that Hungarian university students do not remember basic notions and theorems of number theory from the high school curriculum. Earlier, surveys on the importance and use of Number Theory were proceeded in (Zaskis, 2006), or (Ball, 1990) where it was shown that problems with the addition of fractions arise from the deficiencies of the basic concepts of the number theory.

First we assessed what was taught to the students from number theory and what they remember from these. In this part of our research we compiled two tests. Then we wanted to check if the pupils know what they earlier stated to remember. The tests involved elementary questions from number theory. We formulated the questions in a way that they should be answered by pupils of grade 6. The questions of the test were related to the fundamental theorem of arithmetic, greatest common divisor, least common multiple, divisibility rules, divisors, division algorithm and relative primeness. We asked about the same concepts in different ways, for example:

- In a bath there are two pools. One of them is cleaned every 24 days, the other one every 28. If both of them are cleaned the same day, the bath is closed the whole day. When will be the bath closed next time, if it is closed today?
- Find the LCM of 12 and 8.

The tests were done by more than 1200 pupils of grade 8-12 from different types of schools throughout the country. The tests were graded by the quality of the solution, e.g: started but did not finish, made a numerical mistake, etc. Students made many typical errors and we collected them. In our talk we analyse the many typical errors and find what is behind them. For example there were many problems by finding the greatest common divisor of two numbers. Pupils typically factored both numbers, but obviously, they did not know why.

Students forget the most fundamental issues of number theory because they learnt only the procedure behind and did not understand the concept. Our next move would be a series of case-studies on what pupils have in their mind about Number Theory.

References

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