PROBLEM SOLVING TO DIFFERENTIATE GRADES OF MATHEMATICAL TALENT

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Mathematics education researchers have focused on mathematically talented students' behaviour. Three types of studies have been carried out most frequently: identification, description, and intervention. We present results related to identification.

Standardized psychological tests are widely used to evaluate general giftedness, but some studies show that, to evaluate mathematical talent, solving a set of selected mathematical problems is more reliable than standardized tests (Benavides, 2008).

We present results from an ongoing research project[1] aimed to analyse the behaviour of 3 secondary school students (A, B, C) with diverse grades of mathematical talent: A is very talented, B is quite talented, and C is less talented than A and B, although he has a very good performance in school mathematics. Student A was in grade 8, and B and C were in grade 7. Based on the types of proofs proposed by Marrades and Gutiérrez (2000), we analysed their solutions to a set of proof problems with different characteristics (topic, complexity, type of proof).

The students participated in a problem-solving workshop that lasted six 90-minute sessions. They solved 12 problems including variants and generalizations of the statements, proposed to induce them to make more complex and sophisticated solutions. The sessions were video-recorded, with a researcher being the teacher.

Each student felt confident, along the experiment, with a different kind of proof: Student A used examples to help organize deductive *thought experiment* proofs. Student B made mainly empirical *generic example* proofs, but he sometimes relied on specific examples (*naïve empiricism*). Student C relied often on examples (*naïve empiricism*), from which he induced (sometimes wrong) general rules, and other times he produced *crucial experiment* proofs.

We conclude that, to identify mathematical talent, a set of carefully chosen problems, which allow students to use examples and empirical reasoning as well as abstract deductive reasoning, may be a good tool.

References

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Marrades, R., & Gutiérrez, A. (2000). Proofs produced by secondary school students learning geometry in a dynamic computer environment. *Educational Studies in Mathematics, 44*(1/2), 87-125.

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