IDENTIFICATION OF COGNITIVE CHARACTERISTICS OF MATHEMATICALLY GIFTED PRIMARY SCHOOL STUDENTS

Adela Jaime, Angel Gutiérrez
Departamento de Didáctica de la Matemática - University of Valencia (Spain)

The need to pay due attention to mathematically gifted (m-gifted) students is being recognized by most current curricula. To do it adequately, it is necessary to be aware of the specific characteristics of these students' ways of mathematical reasoning. Some researchers have described abilities integrating the mathematical talent for Secondary school students (Krutetskii, 1976; Ramírez, 2012), but this information is very limited for Primary school students (Freiman, 2006). The aim of this research is to identify styles of reasoning characteristic of m-gifted Primary school students when solving problems. Our hypothesis is that these students tend to solve problems in quite different ways, some times in very surprising ways, including originality, intuition, efficiency, visualization and other mental abilities.

By applying a case study methodology, we observed four m-gifted children, aged 7 to 9 years and studying mathematics in grades 2 to 4. They were asked to solve this problem: *The colour of a traffic light changes in this way: Green, yellow, red, green, yellow, red, etc. Which colour will the 26th light be? Which colour will the 330th light be?* Multilink cubes were available. Data were video recording of students actions and dialogues, and their written calculations.

We present and compare the ways those students solved the problem, to evidence that they put to work diverse mental abilities and mathematical contents to solve the problem in different ways. These results confirm our hypothesis stated above, and allow us to identify characteristics of m-gifted students and degrees and styles of m-giftedness.

The results reported are part of the research project *Analysis of Learning Proccesses by Primary and Middle School Mathematically Gifted Students in Contexts of Rich Mathematical Activities*, funded by the Spanish Ministry of Economy and Competitivity as part of the Non-oriented Fundamental Research Sub-program of the R&D&I National Program (EDU2012-37259).

References

Freiman, V. (2006). Problems to discover and to boost mathematical talent in early grades: A challenging situations approach. *The Montana Mathematics Enthusiast, 3*(1), 51-75.

Krutetskii, V. A. (1976). *The psychology of mathematical abilities in schoolchildren*. Chicago, USA: The University of Chicago Press.

Ramírez, R. (2012). *Habilidades de visualization de los alumnos con talent matemático* [Habilities of visualization in mathematically talented students] (unpublished PhD dissertation). Granada, Spain: University of Granada. Available in <http://fqm193.ugr.es/produccion-cientifica/tesis/ver_detalles/7461/descargar>.

2013. In Lindmeier, A. M. & Heinze, A. (Eds.). *Proceedings of the 37th Conference of the International Group for the Psychology of Mathematics Education*, Vol. 5, p. 78. Kiel, Germany: PME.