A FRAMEWORK OF DESCRIPTORS TO CHARACTERIZE FLEXIBILITY AS A TRAIT OF MATHEMATICAL GIFTEDNESS

Mora, M.[a], Jaime, A.[b], Gutiérrez, A.[b]

[a] Univ. de Costa Rica (San José, Costa Rica), [b] Univ. de València (Valencia, Spain)

Mathematical creativity is an element of mathematical giftedness (MG), consisting of fluency, flexibility, and originality (Leikin & Lev, 2013). Problem solving is an accurate way to identify MG students (Kattou et al., 2013). We used the context of mathematical olympiads to observe MG students' flexibility when solving problems. Our research objectives are i) to present a theoretical framework characterizing flexibility by a set of descriptors of MG students' problem-solving processes and ii) to particularize it to some types of problems used to identify MG students.

Researchers have related mathematical flexibility during problem solving to: using several representations; adapting to changes in the demand of the problem; changing the line of thought if an obstacle arises or the solution is too long or complex; producing significantly different solutions (Leikin & Lev, 2013). We argue that flexibility is also related to changing to a new and more efficient way of solution. As for the first objective, we define mathematical flexibility as the ability to change the way of solving a problem when its conditions change or when an obstacle or a more interesting new idea arise. Operatively, through this definition, mathematical flexibility can be evidenced in MG students' solutions by the following descriptors:

DF1. Moving from one system of representation to another more efficient or combining several systems of representation.

DF2. Beginning a new way of solution because the student: blocked and did not know how to continue the solution; noted that the current solution does not lead to the answer, or it is too long or complex; had a new idea suggesting another more efficient solution procedure; adapted to changes between parts of the statement.

DF3. Producing significantly different multiple solutions of the same problem, based on: different systems of representation; different solution strategies; performing the steps of the solution in different orders.

As for the second objective, we shall present in the poster examples of the problems we used in the olympiad and the particularizations of some descriptors to those problems.

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References

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