

# SECONDARY SCHOOL STUDENTS' STRATEGIES IN SOLVING ARRANGEMENT PROBLEMS

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Despite the relevance of combinatorics in the school curriculum and in discrete mathematics, not much attention has been given to the teaching of this topic in Italy. To fill this gap, our aim was exploring Italian students' combinatorial capacity and solving strategies, as well as its changes with instruction. In this poster we analyse performances and strategies in two arrangements problems. We based our work on Fischbein and Gazit (1988), who analysed the combinatorial capacity of children since 10<sup>th</sup> year of age, and on the set of combinatorial solving strategies described in Godino et al. (2005). Our sample was made of 115 secondary school Italian students (grade 10, 11 and 12), 51 of which had received instruction on combinatorics and 64 with no instruction. The students were given two open-ended arrangements problems of distribution and selection type each one, and an analysis of the content of their written responses was performed in order to codify the correctness and strategies used.

Both problems were difficult (4.7% and 7.8% correct solutions in the no instruction group in the distribution and selection problem, respectively), although there was an improvement in the instruction group (45.1% and 47.1%). As regards the solving strategies, the students with no instruction mostly solved the problems with either systematic or a-systematic enumeration or the product rule. Students in the instruction group used a wider set of strategies, including systematic or a-systematic enumeration, a formula, product rule or sub-problem decomposition, with a few students using sum or quotient rule or tree diagram. Nevertheless, students of both groups tended to commit the same kind of mistakes, such as producing incomplete lists of configurations, not considering the order of elements, or incorrectly using additive rule instead of the product rule. In summary, this exploratory research provides new insights on the procedures that Italian students activated and their errors, an information that would allow a teacher to improve his/her teaching of combinatorics, by correctly reinforcing the students' spontaneous strategies.

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## References

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