ICRAMCS 2026
THE EIGHTH EDITION OF THE INTERNATIONAL CONFERENCE ON RESEARCH IN APPLIED MATHEMATICS AND COMPUTER SCIENCE
April 23-24-25, 2026 | Marrakech, Morocco

Difficulties in solving mathematical problems in secondary school in Morocco: causes and strategies for improvement

Communication Info

Authors:
Sounia EL BAKKALI[1]
Soufiane BENTAHRA [2]

[1] *Higher School of Education and Training, University Ibn Tofail, Kenitra, Morocco*

[2] *Faculty of Sciences, University Ibn Tofail, Kenitra, Morocco*

Keywords:
(1) Problem solving
(2) Mathematics
(3) Teaching
(4) Semiotic registers
(5) Secondary education

Abstract

Problem-solving plays a central role in mathematics education. Although it is essential for the development of critical thinking, creativity, and deep learning, many students still perceive it as a complex task due to its abstract nature and high cognitive demands.

This study examines the causes of insufficient mathematics achievement in Moroccan secondary schools, with a focus on problem solving. Despite successive reforms promoting a skills-based approach, national (PNEA) and international (PISA, TIMSS 2023) assessments reveal persistent weaknesses, particularly in the third year of secondary school, which affect academic success and the choice of scientific subjects.

Using a mixed methodology (questionnaires administered to 468 students and 142 teachers, as well as a pre-test and post-test administered to 120 students), the research confirms that prior gaps and language barriers (transition from Arabic to French) significantly hinder performance; that students in private schools and urban areas achieve better results; and that a structured teaching approach significantly improves problem-solving skills.

The results highlight the effectiveness of active teaching methods based on rich learning situations, the use of various semiotic registers, and the development of heuristics associated with metacognition. Finally, they emphasize the need for ongoing teacher training and the adaptation of teaching materials to the Moroccan context.

References

[1] Bemmouna, B. (2023). La résolution de problèmes au cœur de l'enseignement des mathématiques : Apprenons aux élèves à raisonner. Casablanca : Sochepress. ISBN 978-9920-500-16-6.
[2] Brousseau, G. (1998). Théorie des situations didactiques. La Pensée Sauvage.
[3] Duval, R. (1993-2006). Œuvres sur les registres de représentation sémiotique.
[4] Polya, G. (1945/1971). How to Solve It. Princeton University Press.
[5] IEA. (2023). TIMSS 2023 International Results in Mathematics and Science. International Association for the Evaluation of Educational Achievement. https://timssandpirls.bc.edu/timss2023/.