

CARPENTER, TRACTORS AND MICROBES FOR DEVELOPING MATHEMATICAL THINKING: HOW DO 10TH GRADE STUDENTS AND PRESERVICE TEACHERS SOLVE CHALLENGING PROBLEMS

Avikam Gazit

Beit Berl & Kibutzim Colleges, the Open University of Israel

The aim of this preliminary research was to investigate the challenging problem solving capacity of 10th grade students of two achievements levels and of mathematics pre-service teachers for elementary school.

Challenging problems have no algorithm in advance to work with.

Such problems perform a new, unknown situation to the solver who needs to use his independent ideas. The problems at the mathematics classroom are often dull, routine and almost do not retain deep impression on the learner. If the teacher gives his students usual tasks, than he is suppressing their interest, hindering their intellectual development. But, if the teacher gives them challenging problems such as, riddles, puzzles and amazing problems, that according to Piaget (1975), perform cognitive resonance and stimulate their curiosity.

Littlewood(1953) declared that a good mathematic riddle worth much more than a dozen fair exercises. Polya (1945) wrote that a great discovery may solve a great problem, but a nucleus of discovery may be found in solving every problem. Bruer (1994) made a cynic comparison between word problem solving and black holes: a large amount of energy is brought in both, but no light is coming out...

The research question of this study was: are there any differences in solving challenging problems between 10th grade students: high achievers (n=10) and low achievers (n=10), in mathematics, and mathematic pre service teachers for elementary school (n=15)

The research instruments were 3 challenging problems-riddles concern proportional thinking and sets (Gazit, 1996, Hebrew)

RESULTS

10th grade students, low achievers gave 14 correct answers out of 30 possible (46.7%); High achievers gave 13 correct answers (43.3%)

Pre-service teachers gave 9 correct answers out of 45 possible (20%).

The results are contra verse to what we do expect. We need to develop problem solving capacity by using challenging materials.

References

- Bruer J. T., 1994, How children learn mathematics, *Executive Educator*, V 16, no8.
Gazit A., 1996, *Thinking to the Point - Challenging Math Problems*, Massada, Tel-Aviv (Hebrew)
Littlewood J. E., 1953, *A Mathematician's Miscellany*, London, Methuen.
Piaget J., 1975, *The Equilibrium of Cognitive Structures*, Harvard University Press, Cambridge, MA
Polya G., 1945, *How to Solve it*, Princeton University Press, Princeton