

ABSTRACT

Some Variables Mediating the Choice of Heuristic in the Solution of Mathematics Verbal Problems

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This study was undertaken between 1988-89 to investigate:

- (1) variables which influence the choice of heuristic strategies in problem solving, and
- (2) the relationships between heuristics and performance in mathematics problem solving.

Ability variables investigated were mathematics achievement, verbal mental ability, non-verbal mental ability, reading comprehension, and field dependence/independence.

The main sample consisted of a study group of fifty-one and a comparison group of forty-six grade ten (form four) students selected from five secondary level institutions in the Corporate Area. The study group did a mathematics word problem test using the thinking-aloud approach while the comparison group did the same test using a silent-response mode.

Among the findings were:

1. The overt verbalization of heuristics has no significant effect over silent-response procedures in the outcome of

problem solving.

2. The following variables have significant direct relationships with the choice of "productive" heuristics and significant inverse relationships with "confusion and hesitation" heuristic variables: mathematics achievement, verbal mental ability, nonverbal mental ability, reading comprehension, and field-independence.
3. A Principal Component Analysis revealed that General Mathematical Skills is a component accounting for the greatest variance in mathematics problem solving.
4. The possession of mathematical conceptual knowledge predisposes to (or is associated with)
 - (a) more efficient use of heuristic strategies,
 - (b) more frequent verification of problem solving processes, and
 - (c) some concept manipulation skills.
5. Reading comprehension is positively associated with the ability to translate word problems into algebraic statements.
6. The Creole lexis influences reading comprehension and thereby mediates heuristic choice in a number of cases.
7. Trial and error frequency does not discriminate between good and poor problem solvers. However, good and poor problem solvers demonstrate tremendous qualitative differences in the use of trial and error.

8. In the verification phase, poor problem solvers tend to emphasize the checking of routine algorithms and avoid other verification processes while the converse is true of good problem solvers.
9. Field-dependent individuals display superior performance to field-independent individuals on most problem solving tasks requiring the disembedding of data, but the results are not clear cut with respect to some other data disembedding tasks.
10. There is a tendency of poor problem solvers to show greater proneness to misinterpretation and misrepresentation (structural errors) than to miscalculation and manipulative errors (executive errors). The implications of these findings as well as others have been discussed.