

A B S T R A C T

The study investigated the logical and formal reasoning ability among sixth form Mathematics students and their relationship to achievement in the Cambridge Advanced Level (Syllabus B) Mathematics course. The study was carried out at a rural traditional high school. The sample consisted of the eleven students who were preparing for the Cambridge A'Level Mathematics Examinations in June 1985.

The students were placed in a Control Group (C) and an Experimental Group (E) by matching them on their lower sixth form End of Year Examination marks. Four main variables were investigated - three independent variables (logical reasoning ability, formal reasoning ability and general mathematical reasoning ability) and one dependent variable - achievement in A'Level Mathematics.

Researcher designed worksheets were used to develop the logical and formal reasoning abilities of the Control Group. Their logical reasoning ability was assessed by Brandon's Mona Reasoning Test, while their formal reasoning ability was measured by performance on researcher designed tests. Their general mathematical reasoning ability was assessed by analysing their performance on two given questions. The analysis scheme was modelled on Hollowell's Flowchart for coding Problem-solving Processes and Schoenfield's General Plan for Tackling Problems. Their achievement was measured

by their performance on the 1983 Cambridge A'Level Mathematics Paper I. Case studies were done on each of three students who obtained the highest, middle and lowest mark, respectively on the A'Level Paper.

The results of these investigations showed that:

- i) The A'Level Mathematics course permitted the development of logical and formal reasoning abilities.
- ii) The course with logical and formal reasoning is more effective in developing the logical, formal and general mathematical reasoning abilities ($p < 0.05$ in each case) than the course without.
- iii) Logical and formal reasoning abilities are significantly correlated ($p < 0.05$).
- iv) There is no significant correlation between reasoning abilities and students achievement in the A'Level Mathematics Examination, and
- v) The levels of logical and formal reasoning abilities are not reflected in A'Level achievement.