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Mathematics and Science in Liberal Arts
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Abstract

This project investigates the attitudes of two successive cohorts (2000, 2001) of students in the Dawson College Liberal Arts program toward mathematics and science. The purpose is to determine whether their studies in Liberal Arts, in particular the conception of mathematics and science presented in Liberal Arts courses, affect the attitudes which they show at the time of their entry into the first semester of college studies. Our hypothesis is that the program approach used in the Liberal Arts Program, which emphasizes curricular integration of different disciplines, and of subject matter and abilities, improves the attitudes of students with respect to mathematics and science. To test this hypothesis, a series of questionnaires examines the students relevant high school grades and averages, their initial attitudes, and their attitudes and relevant grades as they progress through their program of studies. The results show a marked difference between students attitudes to mathematics as compared to science. In both subjects, between 1/6 and 1/3 of the responding students reported an improved attitude; while a majority of all cohorts showed no change or a more negative attitude.

Objectives and questions asked by the research

The objectives of the project are (1) to analyze the main components of students attitudes; (2) to relate these to each other and to students performance in the relevant courses; (3) to investigate to what extent students attitudes may be changed by the way in which mathematics and science are presented to them and contextualized in the Liberal Arts program This project identifies student attitudes toward mathematics and science as falling into five categories: relative ease or difficulty, personal attitude, importance of teaching in determining attitude, importance of subject matter in determining attitude, current understanding of the aims and methods of the subject.

Methodology

After the initial collection of data on the students performance in high school mathematics and science, three questionnaires were administered to each experimental cohort: the first questionnaire, in the first term, before the students mathematics and science course; the second

questionnaire, in the mid-term of their respective courses; and the third questionnaire, at the end of their courses. The researchers were also teaching the mathematics and science courses; however, the research protocol guaranteed that the initial data and all student responses were anonymous. The data was analyzed using standard statistical measures to detect whether any changes of attitude occurred, and the magnitudes and distributions of those changes.

Findings

The main findings consist of: a portrait of each of the entering cohorts in respect of their high school records and attitudes towards mathematics and science; within each cohort the distribution of students ratings, expressed quantitatively, of their attitudes to these subjects; a comparison, for each cohort, of students attitudes from mid to end term in their respective mathematics and science course; and the difference in student attitudes towards mathematics as compared to science. A third cohort was included in the project for the purposes of mathematics alone.

Conclusions

This study finds no marked pattern of general improvement in students attitudes, except in the case of the 2000 cohort with respect to mathematics. However, some proportion of each cohort, ranging from 16% to 35% of respondents, report more positive personal attitudes toward both mathematics and science. The data support the conclusion drawn from teachers observations that these students view science as a vocation or a career whereas they consider mathematics a subject that may be useful in many fields including science. In all cohorts, students grades in mathematics are highly correlated with their reported understanding of the subject, whereas in science there is no such correlation.