

TRANSFER OF FIRST YEAR MATHEMATICAL LEARNING IN STEM DISCIPLINARY UNIVERSITY ASSESSMENT

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BACKGROUND

University academics in STEM disciplines are concerned about their first year students' poor mathematical skills and knowledge applied in their disciplines. Mathematics is of critical importance for their success in subsequent learning and transfer of mathematics learning is seen as important. However, little research has investigated this issue in a naturalistic way, beyond experimental assessments.

AIMS

We quantitatively measure the transfer of mathematical learning in the natural context of first year mathematics service courses in university, using a *Transfer Index* (Roberts, Sharma, Britton & New, 2007) and an *ATAR Adjusted Transfer Index*. In addition, we explain how transferability of mathematics, mathematics attainment and ATAR can predict attainments in science/engineering.

RESEARCH STRATEGY

An important feature of our study is a naturalistic inquiry into transfer of mathematical learning. In other words, we examined transfer, using existing university assessment, including final exams and tests. Secondary data analysis is the research strategy employed.

POPULATION AND SAMPLE

The population is undergraduate university students in STEM disciplines in Australia. We employed cluster sampling. A single university in Sydney was chosen as a cluster due to considering costs and time. Our sample consisted of students studying first year mathematics service courses (N=1186).

DATA COLLECTION AND ANALYSIS

There were two types of data. First, attainments, such as *ATAR*, and demographic information, such as *age*, *gender* and *SES*, were obtained from university databases. Second, we produced primary data by calculating *transfer indexes*. Exploratory data analysis, correlational analysis and path analysis were conducted to examine the relationship between these variables.

RESULTS

We found transfer of mathematical learning in regular and advanced physics courses and in an engineering course. Unexpectedly, there were no questions which required knowledge and skills learned from mathematics service courses in final exams in biology and molecular bioscience courses.

CONCLUSIONS

ATAR and transfer indexes had significant effects on subsequent learning in physics and engineering with effect sizes (standardised beta) from 0.18 to 0.41 of a standard deviation. However there were limited opportunities to measure transfer because many of the courses examined did not assess mathematical knowledge or skills. This is surprising given the investment in mathematics service courses for students in these courses. We suggest better communication, between these disciplines and mathematics, could lead to better curricular and assessment planning that promotes mathematical learning within STEM degrees.

REFERENCES

Roberts, A.L., Sharma, M.D., Britton, S. & New, P.B. (2007). An index to measure the ability of first year science students to transfer mathematics. *International Journal of Mathematical Education in Science and Technology*, 38(4), 429-448.

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