An Analysis of Geology Curricula in Secondary and Tertiary Education.

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APPENDIX

ERRATA

p 45 10th last line should read:
   "A review of the content of junior secondary school science curricula shows that the
   geoscience..."

p 48, Section 3.4 First sentence of the third paragraph should read:
   "Each of the statements in each of the eight areas of learning is divided into content
   and process strands which reflect the major elements of learning in the area."

p 63, Section 3.55 Section heading should be:
   "Comparison of Geology/Earth Science Curricula"

p 53 4th last line should read:
   "In Victoria a 4 unit course over two years was available..."

p 85 First sentence of last paragraph should read:
   "For all questions except question 4 the students who had studied geoscience at
   senior secondary level performed better than those who had not."

p 186 Sections 7.42 and 7.421 and Figure 7.2:

GP1 and GP2 on Figure 7.2 denote the Bachelor of Applied Science students and
the Bachelor of Education students respectively.
ABSTRACT

This work investigates the geology curriculum at three levels and the relationship that exists between one level and the next. For the secondary school level the emphasis is on the senior geology/earth science curricula and the way in which they link to the introductory geology curriculum at tertiary level. The introductory tertiary geology curriculum is viewed from the perspective of the effect of prior knowledge on student performance and the advanced tertiary geology curriculum is investigated in the context of quality teaching and learning using the structural geology part as a focus.

The review of the senior secondary school curriculum compares geology/earth science curricula for the Australian states and the K-12 science curriculum statements for Australia, the United States, and England and Wales. The content of each of the Australian state senior secondary school geology/earth science curricula is described in detail and the aims and objectives and assessment methods are compared. The development of the goals and the content of the Earth Systems approach to science education is reviewed and is used as a framework for comparison of the content of all of the curricula including the K-12 statements. The content of the Australian state senior secondary school geology/earth science curricula is also compared using a more traditional framework.

The reviews of the Australian state senior secondary school geology/earth science curricula are used as the basis for studying pre-requisite knowledge required for introductory tertiary geology/earth science subjects. The methods and results of the study are described and recommendations are made for further study using a modified methodology.

The advanced geology curriculum study is concerned with the context specific skills that are important in coming to an understanding of what is good teaching in geology using the advanced undergraduate structural geology curriculum as a case study. It describes the results of an action research project which was carried-out with subsequent groups of second year undergraduate students at the University of Adelaide and the University of
South Australia. During the project the teaching methodologies were modified to try to improve the quality of student learning. The modifications involved changing the way information was delivered to students including the move towards the electronic classroom, changing the structure and organisation of the curriculum and introducing and encouraging students to use new learning strategies, particularly concept maps.

The outcomes of the modifications were evaluated quantitatively using end of year subject examinations results, and qualitatively by analysing student evaluation of the subject and teaching questionnaires, student interviews, and reflective journals kept by the students. The quantitative results showed that there was a statistically significant improvement in student learning as measured by exam performance as a result of the modifications and this was supported by their comments in the evaluation questionnaires and their journals.