A PROCEDURE FOR USING AND EVALUATING CONCEPT MAPS

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INTRODUCTION

Concept mapping as a technique for assessing and representing a learner's cognitive structure has now been used by science education researchers for a number of years (Moreira, 1979; Stewart, Vankirk and Rowell, 1979). However, it has been through the work of Novak and co-workers that concept mapping has recently emerged as a learning/teaching strategy (Novak, 1981). Novak describes concept mapping as

a process that involves the identification of concepts in a body of study materials and the organisation of those concepts into a hierarchical arrangement from the most general, most inclusive concept to the least general, most specific concept.

(Novak, 1981, p.3)

In this approach students prepare free diagrams in which the concepts are related to each other through propositional statements as shown in Figure I. The propositions represent the relationships between concepts. In terms of Ausubelian theory the acquisition of relationships between concepts is central to the process of meaningful learning (Ausubel, 1978).

The use of concept mapping in science instruction is now well documented and the approach appears not only to assist student learning of concepts but also has motivational value (Novak, 1981; Williams, 1982). However, the quantitative procedures for evaluating concept maps does not appear to be well developed.

This paper presents details of a new procedure for constructing and evaluating concept maps. The procedures were developed over a one year period and concerned the use of concept maps to revise chemistry topics for students preparing themselves for TAE (matriculation) chemistry in Western Australia.

DEVELOPMENT OF AN ALTERNATIVE CONCEPT MAPPING PROCEDURE

Development Procedure

In the development of a typical concept map, the first step is to choose a suitable stand-alone topic and then to identify the concepts which make up that topic. We chose oxidation-reduction theory because it is a relatively new topic in upper school, is very abstract in conceptual form, and is usually taught as one section of the syllabus.

Some twenty key concepts were identified both by discussions held with chemistry teachers and after an examination of texts. These concepts were then presented to trial groups (typically 8-10 students) who used the concept list to construct a concept map using the method of Novak (1981). In summary this involved the following steps: ranking of concepts in order of 'most
FIGURE 1  Topic: Oxidation-Reduction