SCHOOL INNOVATION IN SCIENCE: CHANGE, CULTURE, COMPLEXITY

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ABSTRACT

The School Innovation in Science (SIS) initiative has developed and evaluated a model to improve science teaching and learning across a school system. The model involves a framework for describing effective teaching and learning, and a strategy that allows schools flexibility to develop their practice to suit local conditions and to maintain ownership of the change process. SIS has proved successful in improving science teaching and learning in primary and secondary schools. Evidence of variations in the nature and extent of the change is used to argue that the process is essentially cultural in nature, and that change occurs at different levels within a school. Processes supporting change thus need to be flexible and responsive.

1. INTRODUCTION

School Innovation in Science (SIS) is the largest school science initiative of its kind in Australia in decades. The project has been a major part of a set of initiatives developed by the Victorian Department of Education and Training (DE&T). During 2000 to 2002, the Deakin University-based research team worked with more than 200 primary and secondary schools to develop and trial a model for improving science teaching and learning in schools. The model has two major features:

- *The SIS Components*, which represent a framework of effective science teaching and learning (Figure 1), and
- *The SIS Strategy,* which is the process by which schools can improve their science teaching and learning (Figure 2).

The SIS Strategy provides flexibility for schools and teachers to plan and implement initiatives based on the particular needs of the school within an overall framework provided by the SIS Components. School science teams are supported to identify and capitalise on their strengths and experience. Tests of student learning, attitudes, and perceptions have been used to monitor student progress and outcomes, and changes in classroom practice have been monitored by a teacher interview and verification process. The change process has been monitored using field notes, interviews, questionnaires, and reporting protocols.

K. Boersma et al. (eds.), Research and the Quality of Science Education, 89—105.

In classrooms that effectively support student learning and engagement in science:

1. Students are encouraged to engage actively with ideas and evidence
Students are encouraged to express their ideas and to question evidence in investigations and in public science issues. Their input influences the course of lessons. They are encouraged and supported to take some responsibility for science investigations and for their own learning.

2. Students are challenged to develop meaningful understandings
Students are challenged and supported to develop deeper level understanding of major science ideas and to connect and extend ideas across lessons and contexts. They are challenged to develop higher order thinking and to think laterally in solving science-based problems.

3. Science is linked with students' lives and interests
Student interests and concerns are acknowledged in framing learning sequences. Links between students' interests, science knowledge, and the real world are constantly emphasised

4. Students' individual learning needs and preferences are catered for
A range of strategies is used to monitor and respond to students' different learning needs and preferences, and to their social and personal needs. There is a focused and sympathetic response to the range of ideas, interests, and abilities of students.

5. Assessment is embedded within the science learning strategy
Monitoring of student learning is varied and continuous, focuses on significant science understandings, and contributes to planning at a number of levels. A range of styles of assessment tasks is used to reflect different aspects of science and types of understanding

6. The nature of science is represented in its different aspects
Science is presented as a significant human enterprise with varied investigative traditions and constantly evolving understandings, which also has important social, personal and technological dimensions. The successes and limitations of science
are acknowledged and discussed.

7. The classroom is linked with the broader community.
A variety of links are made between the classroom program and the local and broader community. These links emphasise the broad relevance and social and cultural implications of science, and frame the learning of science within a wider setting.

8. Learning technologies are exploited for their learning potentialities
Learning technologies are used strategically for increasing the effectiveness of, and student control over, learning in science. Students use information and communication technology (ICT) in a variety of ways that reflect their use by professional scientists.

Figure 1. The SIS Components of effective teaching and learning in science.