

Assessment practices: Empowering mathematics and science teachers in rural areas to improve student learning and curriculum implementation

[Page Index](#)

[Description](#)

[Quick Links](#)

[Download Infosheet](#)

Project Title	Assessment practices: Empowering mathematics and science teachers in rural areas to improve student learning and curriculum implementation
Project Team	Professor John Pegg & Dr Debra Panizzon
Period	2003 - 2005
Funding Agency	ARC Discovery Grant
Organisational Base	SiMERR National Centre (formerly CRILT)

Description

[↑ Top](#)

The philosophy behind this research is that assessment needs to be informative and useful for both teacher and learner. For this to happen, there has to be a 'constructive alignment' of curriculum content, pedagogy, and assessment. This research employs empirically-based qualitative assessment techniques, which complement traditional assessment practices, as the foundation for teachers to make this synthesis in mathematics and science in rural schools in NSW. The significance of the research is in the insights it offers to how teachers can improve the learning environment for their students by addressing more appropriately student needs and higher learning outcomes.

This research project concerns an investigation of mathematics and science teachers in rural schools and their application of qualitative assessment practices to classroom situations. The purpose of the study is threefold, namely:

- to monitor teachers' development as they acquire skills and understandings that enable them to apply assessment practices which assist them to better understand individual student development;
- to improve the focus and strategies of teaching practice based on this new assessment information; and
- to explore the ways in which teachers incorporate the insights of assessment and student cognitive development into their structuring of subject matter in curriculum and classroom planning.

The significance and innovation of the research project lies in three important areas. First the assessment and instruction approach rests on an empirically established cognitive developmental model that provides the theoretical basis for the decisions taken concerning content ordering and placement.

Second, a related strength of utilising the SOLO model is the support the framework provides in helping teachers keep the list of criteria to an administratively manageable load, and, more importantly, not allowing isolated criteria to become ends in themselves. As such the encouragement of short-term success strategies by teachers focusing narrowly on isolated clusters of criteria at the expense of long-term holistic understanding is reduced.

Third, in the theoretical approach adopted to underpin the assessment, it is the mental structure of the understanding that is important and the criteria developed by teachers are merely examples which are typical of the types of levels of performance expected. They represent examples that highlight key underpinning principles. The examples students provide could vary depending on different learning experiences and activities, or on the background experiences students bring with them. However, the underlying cognitive structures remain the same. This differs significantly from the traditional outcomes-based education approach. In this latter case, the profiles established, based on student outcomes, are the actual focus of instruction and represent a single and possible narrow view of what students are expected to know.

The research proposed by this project flows directly from a completed Large ARC Grant titled Developmental-based assessment in mathematics, and the findings of the first year of a two-year QTP professional development grant run in conjunction with Catholic Education Office titled Developmental-based assessment and instruction in mathematics and science.

The ARC Developmental-based assessment in Mathematics research project set out to apply and develop, assessment techniques measuring the quality of students' understanding in mathematics, while examining closely the cognitive theory underpinning the procedures. Recent innovations in the SOLO (Structure of the Observed Learning Outcome) model of cognitive development formed the basis of response categorisations. The outcomes of the investigation of students and teachers, Years 5 to 10, included: further information about the usability of SOLO in assessing the structure of student understandings across a range of topic areas in the school years targeted; and insights into the ways in which curriculum content may be organised to better mirror student development.

In contrast the QTP project involved the creation of a professional development program to explore, and develop further, assessment techniques that measure the quality of student understandings in mathematics and science across a number of school years. This was not a research program but involved developing resources and methods to facilitate pairs of

teachers in schools acquiring competencies in utilising qualitative assessment practices. The theoretical basis for the project was the SOLO model.

During the QTP project, the cognitive model was used to explore ongoing assessment issues in a number of school-year groups within the social environment of rural primary and secondary classrooms. The topics in mathematics and science explored were defined by relevant NSW syllabus documents. The results were extremely successful (Pegg, Panizzon, & Inglis, 2003). In summary, within a professional development program the project team was able to (i) provide teachers with a balance to more common (traditional) approaches of assessment; (ii) assist teachers in their classrooms to focus on how well material is understood as opposed to how much is remembered; and (iii) introduce teachers to the notion of considering the quality of the learned outcome by exploring the nature of the structure of students' understanding.

Click [here](#) to download this infosheet.

 [Top](#)