



Innovative
Research
Universities

Our Submission

Draft National Science Curriculum K-10

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Charles Darwin University
Flinders University
Griffith University
James Cook University
La Trobe University
Murdoch University
The University of Newcastle

Introduction

Innovative Research Universities (IRU) welcomes the implementation of a National Science Curriculum K-10 and offers the following comments which may assist with its future development.

The Science Curriculum is ambitious, and if successfully implemented, will significantly enhance the scientific literacy of the population. In our judgement, the new curriculum represents a significant improvement over the present curricula implemented by some of the State education authorities.

Areas requiring further consideration

In our view, there are three issues requiring further consideration before the curriculum is finalised and implemented.

Treatment of mathematics in the curriculum

The draft science curriculum apparently develops skills and understanding of measurement and models from K-10, and acknowledges in the preamble that 'mathematics knowledge and skills are fundamental to learning science'.

The draft curriculum, however, does not explicitly state the level of mathematics knowledge and achievement expected as part of the science content descriptions and standards.

For example, Years 8-10 are the years where significant mathematical analysis skills could be appropriately introduced into the science curriculum, building on the analysis and modelling skills acquired in previous years. Presently there is no indication of the level of mathematics expected.

In addition to incorporating mathematics into the science curriculum, it would be appropriate to ensure that scientific ideas are discussed in the mathematics curriculum to emphasise the applications of mathematics to science.

Implications for pre-service training and professional development of teachers

Teacher scientific literacy will be a major challenge for the implementation of this curriculum. The science literacy of students entering primary teacher education courses varies, reflecting the knowledge of the population at large, with a significant percentage displaying levels of science knowledge equivalent to only the lower levels of the draft curriculum.

The curriculum, however, will require scientifically literate teachers who have had training in both the pedagogy of teaching science and scientific practice.

The Year 6 content, for example, requires a sound understanding of a range of science principles and issues, while a Year 10 teacher would require understanding ranging from 'the structure and function of DNA, genes and chromosomes' to 'evidence supporting the big bang theory' and 'plate tectonics...continental movement, and the characteristics of the Australian continent'.

With a focus on inquiry-based learning, it will take considerable confidence on the part of teachers (both at primary and secondary levels) to deliver such a curriculum. Many teachers, especially at secondary level, are likely to be challenged in covering 'science as a human endeavour'.

In brief, the broad range of science concepts and inquiry skills required to teach the curriculum will severely test many new and experienced teachers.

A very significant revision of teacher training programs will be required to ensure that all graduating teachers acquire the scientific literacy demanded by the new curriculum. A major program of teacher professional development will also be essential if the teacher workforce is to possess the capability to effectively deliver the curriculum.

Feasibility of expectations

The draft curriculum sets very high expectations for student learning which may not always be realistic at the specified year levels.

In addition, we question whether the amount of content to be covered is feasible given the time available for science in school timetables. This is particularly apparent in Year 10. This could potentially come at a cost to the depth of student learning.

Summary

In summary, we commend the general direction and much of the detail of the curriculum document, but would wish to see some clarification of the mathematical skills to be used. We also believe that significant professional development will be required to equip the existing teacher workforce for delivering the new curriculum. In addition significant revisions to teacher training courses will be required, both in terms of the breadth of science content and preparation for delivering an inquiry-based science curriculum.

About IRU

Innovative Research Universities (IRU) is a network of seven comprehensive universities committed to conducting research of national and international standing and applying their collective expert knowledge, capabilities and resources to enhance the outcomes of higher education.

The members of IRU are:

- Charles Darwin University
- Flinders University
- Griffith University
- James Cook University
- La Trobe University
- Murdoch University
- The University of Newcastle.

We teach over 150,000 students each year, representing 15 per cent of all Australian university enrolments¹. This includes over 20,000 education students and approximately 23,000 students studying sciences, engineering or information technology.

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¹ All figures are for 2008.