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Talking Science

The Answers Are All Around Us

There is no doubt that those responsible for science education need some answers. The problems are clear for all to see. DAVID SYMINGTON and RUSSELL TYTLER argue that the answers are all around us if we ask the right questions of the right people. What are these questions and who should we be asking?

Most people find some aspects of science exciting. It is difficult to imagine a television news broadcast without reference to science-based issues. Medical breakthroughs have become a regular feature of television news broadcasts. Other issues in the news include global warming, saving Australia’s river systems and genetic modification of food, to name but a few. And commercial stations would not deal with these matters if people weren’t interested!

But what of school science? Does it capture the interest of students? There is ample evidence to suggest that often the answer to this question is ‘no’. There are falling enrolments in science programs at universities. Research shows that the majority of students don’t find school science interesting or relevant.

This situation has captured the attention of Australian governments, at State and federal level, who are looking for ways forward. They realise that science is shaping, and will continue to shape, the future, and that national prosperity demands both a sound understanding of, and a level of comfort with, science across the population, and a highly skilled scientific workforce. And Australian governments are not the only ones expressing disquiet with the current situation. In many countries the same concerns are being expressed.

Questions and answers

We want to propose a set of questions which we believe should be asked and indicate where we believe the answers can be found. The starting point must surely be to ask ‘What are the purposes of school science?’ But who should be asked this question? Normally it is teachers, educational administrators and university academicians whose answers to this question have been canvassed. We have recently asked a sample of community leaders in Victoria, many with little formal science education and no teaching experience, what they thought about this question. Their answers provided valuable insights shaped more by their life experience than by their own school science.

They recognised the validity of a variety of claims for school science (for instance, economic reasons, practical use and cultural knowledge). However, generally they argued that it was most important that priority be placed on students becoming interested in, and comfortable with, science and that students be prepared to be lifelong learners with respect to science and its applications. They believed that the other desirable outcomes, such as having sufficient scientists and technologists to ensure that Australia’s future prosperity is secured, would follow if students’ interest was captured and they were capable of, and committed to, lifelong learning.

We do not want to pursue these arguments here but simply to note that there are many people in our community who, because of their life experiences including science in many contexts, could contribute to discussion about what should be happening in school science. It is important to reconsider who can effectively contribute to discussion of such matters beyond the traditional group of people with expertise in science and education.

Interested students
If capturing students’ interest is such a crucial matter, we need to find answers to the question ‘What aspects of science hold interest for today’s students?’ Unfortunately, this is a question which has rarely been seen as critical in deciding curriculum content. Rather, it is assumed that the curriculum content should reflect what we believe the students should know. Recent studies in Australia and England suggest that what the experts have considered as best for students to learn has not captured their interest and students come to the conclusion that school science is of little relevance to them.

Who can provide us with answers to this question? To find an answer to the question is not as simple as it may appear at first. Students are unlikely to be able to express an interest in topics about which they know nothing. This is not to suggest that their answers to the question should not be sought. However, there are others who can provide pointers.

Some researchers have been exploring what knowledge will be relevant to students and citizens in their lives. It can be safely assumed that such utilitarian knowledge is likely to be perceived by students to be of value, and hence of interest. Learning sequences related to students’ personal health and wellbeing, their leisure pursuits or current events and issues flow from such ideas.

Another source of information is teachers who have worked with students on topics which have proved to be of interest to students. At a recent national forum on the future of science, mathematics and environmental education organised by Deakin University the participants heard from teachers who have been seeking to engage their students in meaningful learning. Peter Durance of Stawell Secondary College described the involvement of students in science activities built around the local wine industry. Peter described how the chemistry teacher was reinvigorated in his teaching through aligning his teaching with an enthusiasm of his own. John Sharp from Ocean Grove Primary School described how students were energised by their involvement in a science drama competition, and their involvement in a remarkable Dominoes Robotics project which involved online collaborative mentoring through video conferencing and group activities. It is clear that there are many teachers who, through their innovative practice, can give guidance to what interests today’s students. It is important that lessons learnt from what are not currently mainstream curriculum activities are made more widely known and their contribution more formally recognised.

Lifelong learning

A third question which needs to be addressed is ‘How do you prepare students so that they will be lifelong learners in areas where science has an impact?’ One potential source to this question is the community. The National Forum recognised the importance of schools linking with the community of which the students are, and will be, a part. Students need to become aware of the science-based issues that community members are required to address, how they go about learning as adults and where the sources of information are.

Sue Legge from Orbost Primary School described the involvement of students from the East Gippsland cluster of schools in monitoring the changes to the Snowy River as the waterflow is increased. Year 7 teachers at Maroondah Secondary College developed a ‘force and motion’ learning sequence based around playground design, culminating in a visit to a playground to test out the science and design ideas that students had developed.

One of the interviewees in the study of community leaders explained how he, as an accountant with no formal background in science beyond secondary school, had been able to learn sufficient science to enable him to be effective as the managing director of a large, successful manufacturing company. Such members of the community have much to contribute to considerations of preparing students for lifelong learning.

There is a need for schools to become more interconnected to the community so that students may learn what is involved in being a lifelong learner in areas which have some scientific basis.

In conclusion

There is an increasing awareness of the need for change in the teaching and learning of science if the next generation of Australian students is to be prepared effectively for life in the 21st century. Schools systems, schools and teachers need to rethink the way the curriculum is managed. Rather than thinking simply in terms of content sequence, we need to allow teachers the flexibility to guide students to enjoy, to really think about and to use the ideas of science in real situations. This should involve students interacting with, and drawing on the expertise of, a wide range of people in the community.

We suggest that many of the answers to emerging problems in science education are all around us. It does take a change of mindset, however, to capitalise on the opportunities offered by our teachers’ enthusiasms and knowledge, and the expertise and wisdom that exists in the community.
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