Respect for Science

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As a scientist, I am always fascinated when I see young children exploring the wonders of science by interacting with the world around them. On a recent visit to a relative's home I noticed her six-year-old daughter picking up pebbles of different sizes and dropping them into her glass of pineapple juice. To my surprise, her mother immediately scolded: "Samantha, stop messing about with your drink… why can't you sit down quietly and read a book like Dennis?" Incidents like these teach Samantha that reading is a socially acceptable occupation but that experimentation is not, especially if it is likely to leave a stain on the carpet or a mess on the floor.

For many children this is a common experience at home, and often this acquired "cultural" bias is reinforced in formal school settings. At primary school, students like Samantha are exposed to reading, writing, art, and music at an early stage. She learns mathematics and some science, which is often restricted to reading content from the textbooks and writing definitions and examples from the blackboard. At that level, these students do not play with batteries or magnets, nor do they mix coloured solutions or collect leaves and seeds. This anachronistic bias makes our education system less effective than it should be, by giving undue prestige to studies which are distinguished by the fact that they do not involve getting hands dirty.

To me the problem is one of respect, and perhaps even self-respect, and the most disturbing aspect of this cultural bias is its effect on the way science teaching/learning occurs in school and the way it is assessed. Being able to "read and understand" is an explicit outcome of formal education, and very often this ability to comprehend is measured by students' ability to "write" responses to questions. Science is perhaps unique among all disciplines in that it is not limited to reading, understanding, and writing, but also involves manipulative skill development and inductive, deductive, critical, and creative reasoning skills.

Volumes of research literature speak to the hands-on, minds-on approach to science learning and to the intricate mesh between theory and experimentation in science. The literature also suggests that science students should be exposed to activities and experiences in the classroom that facilitate this approach. Despite research findings, very little is provided in the way of assessment to gauge students' development in these areas, so that the traditional methods of assessment continue to push science teaching/learning back into the conventional form rather than taking it forward into the realm of alternative and authentic.

As educators, therefore, we need to decide on what outcomes we want for our students and our society from science education. What should a 16-year-old be able to do with his or her science? If, for example, an expected outcome of science education is that students acquire the ability to work together as a group in the design and construction of a piece of equipment and to be able to understand, explain, and justify what they are

doing, then it might be reasonable to suggest that perhaps they should be given the opportunity to do that as part of their assessment, or perhaps even be (partly) assessed as a group!!

This suggestion may appear to be impractical at the moment, but it is clear that the current assessment practices in science do not articulate with the nature of the discipline, and that this discrepancy has denied science the respect that it deserves.

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