

# A science-led recovery, but where are all the scientists?

SINCE Barry Jones, the Minister for Science and Technology, first paraded before us his vision of a new-technology sunrise, a science-led recovery has become one of the hopes for Australia's future.

In the aftermath of early morning viewing of high-tech yachts from the vantage point of global television it is all too easy to become carried away by this techno-economic euphoria, but the question must be asked — can we as a society bring such a recovery about?

As long ago as 1979 the Williams report on education, training and employment identified technology change as the economic direction for the future.

It recommended that the supply of researchers and technologists should be stepped up in order to exploit these economic opportunities through home-grown research and development — yet four years later Barry Jones is making a plea for greater educational effort to provide the human base for technological revolution.

Opening Information Technology Week at the Power House Museum earlier this year, the minister is quoted in the Herald as saying, "We do not have a skill base to go with our achievements in information technology. We have got to be aware that time is running out . . . the need for an educational revolution is now."

The need for an educational revolution may be evident, and its urgency might be strong, but there are several barricades that will have to be torn down before the revolution can occur.

Although a fertile breeding ground for individual genius, Australia as a society has been highly derivative in its science and technology.

In a book called *The Structure of Science Education*, published in 1975, J. A. Passmore wrote: "We are not nowadays an innovative people, imitative rather, unwilling to take the risk inherent in leadership. So for all the achievements of individual scientists, science has never reached in Australia a degree of authority sufficient to incite revolt."

And revolt is what is needed to be able to grasp the opportunities of the new technology.

But not merely has there been a lack of leadership — there has been an alienation of students from science. Beyond this we have seen in recent years a movement towards the active rejection of science. In its place has come the acceptance of pseudo-science as a means of explaining the events that surround us.

As evidence of student alienation I refer to a note in *Scientific American* of August 1982 which claims that only about one third of all US high school students take three years of science, and between 1971 and 1980 the number of candidates training to become science teachers decreased by 65 per cent. This in a country that poured hundreds of



Barry Jones . . . skill base is lacking.

millions of dollars into science education in the post-sputnik years.

Closer to home Gail Morgan, in a recent Herald article, describes how her science classes under the Wyndham scheme turned her off the subject for life. "I can remember endless hours doing things with Bunsen burners and having no idea what I was doing."

Changes in science curricula since then have not significantly removed that alienating impact.

ASEP, the Australian Science Education Project, was designed to involve students in "learning by doing" with a heavy emphasis on practical work and the "discovery" of scientific theory.

Yet according to Neil Costa and Keith Tronc, writing in a recent issue of *Education News*: "Clearly the performing of laboratory experiments in cookbook fashion, without comprehending the underlying methodological principles, leads to little meaningful understanding."

As if lack of understanding were not alone sufficient to alienate students, Costa and Tronc also claim that students "frequently become bored performing practical work period after period."

With the rejection of scientific rationality has come easy acceptance of pseudo-science. Among my science classes the ABC television program *Towards 2000* is viewed mainly by the few students who already have an enthusiastic interest in science and technology.

Yet That's Incredible, with its sham gimmickry and its obsession with trivial absurdity, draws large audiences.

Colin Tudge, in the *New Scientist* of April 7 this year, wrote an essay on why *Hating Science Is Wrong* where he described how: "A whole slab of educated people, several generations of them . . . hate science." He says this is because of the mistaken belief that science is an inhuman method of thinking.

Tudge writes: "People are brought up to believe that to be

successful in science you have to first have your right cerebral hemisphere obliterated; and the people (like a lot of teachers) who perpetuate this nonsense should be fried slowly in rancid yak fat."

In this rejection of science Colin Tudge sees the reason for the apparent willingness to accept irrational pseudo-science. If you don't understand it, science is a fearful thing to accept on trust.

Faced with this formidable barrier to understanding it is easy for a mind schooled in science fiction to look for more fanciful explanations that fit comfortably into the human psyche.

According to Tudge: "To be confronted with modern science, and to have no route into it, is an awesome affront to human dignity . . . One response to this affront is to erect an alternative system of belief; to fabricate another, esoteric world of ideas that are proving so bothersome."

So how can we direct the minds of our children away from fantasy and back to science. One way is to teach science as a process that has been created by human minds and that is framed in human terms; to nurture and build upon the tenuous thread of familiarity that stretches from our own experiences to the complexities of atomic theory and of organic chemistry — from our nonchalant use of a telephone to an understanding of digital encoding and laser-based fibre optics.

Here we arrive at the front line of the science teaching revolution that may be about to provide the type of intellectual renaissance that Barry Jones is seeking.

A school of thinking exists under the catch-phrase Science, Technology and Society, which is attempting to develop a science curriculum built on a student's own world of personal beliefs so that his or her commonsense understanding is expanded out into the wider universe of science and society.

For most students this can give them satisfying explanations of the world around them which can be carried out of the classroom and into life itself.

For those who have an intrinsic curiosity for things scientific such an awakening can be built upon and directed more formally into the discipline of science — generating the creative excellence so essential to a society about to commit itself to high technology and scientific advancement.

Perhaps in this way the pitfalls of scientific disillusionment can be avoided and the sun may indeed rise on a brighter technological future. Let's hope so — because the economic and social risks of failure may be far too great to be acceptable in these the last decades of the twentieth century.

Owen Evans is a science teacher at Delroy High School in Dubbo.

but again the nuns at Domremy taught the curriculum as it was set down.  
In summing up, I would like to congratulate the nuns for their caring and loving guidance throughout my school years. I did not mind repeating the rosary. After all, it was a Catholic school my parents sent me to.  
Maree Wilson,  
Harrington Circuit,  
Kambah, ACT.

seemed to be to compare the education system then and now. There have been many obvious changes in 20 years. There are advantages and disadvantages to both systems.  
Gail has spoken as if the nuns at Domremy taught their own thing. These nuns (not all old and Irish) were dears, and did not beat any of the children as Gail has stated.  
With the introduction of the Wyndham system we had to deal with changes,

**The nuns defended**  
SIR: Referring to the article by Gail Morgan (*Herald*, September 22), I felt I had to write for two reasons.  
A class photo was shown of Domremy College students and I happened to be one, and secondly I felt someone should write to defend the nuns who were put down by Gail in her article.  
I certainly do not agree with all that Gail wrote. The idea behind her article

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