

# Boosting Science Learning

## *the challenge*

Geoff N Masters

# *The Need*

an informed and science-literate society

science education as *education for citizenship* -- a level of scientific literacy that enables informed choices on such matters as ...

# *The Need*

- ☑ **Climate change** (greenhouse effect)
- ☑ **Hunger and Health** (pandemics; genetic engineering; cloning; radiation; stem cell research)
- ☑ **Sustainable Development** (water conservation; salinity)
- ☑ **Energy Use** (nuclear energy)

# *The Need*

a supply of world-class scientists

“Technological innovation is the main source of increased productivity, the major tool of economic competition in the world market, and the most important driver of economic growth.”

World Bank Report on Knowledge for Development

# *The Need*

"Whatever way you stack it, we need somewhere around an extra 75,000 scientists by 2010... I think the major needs are going to be at top end (doctoral level) and in the enabling sciences (chemistry, physics and mathematics)."

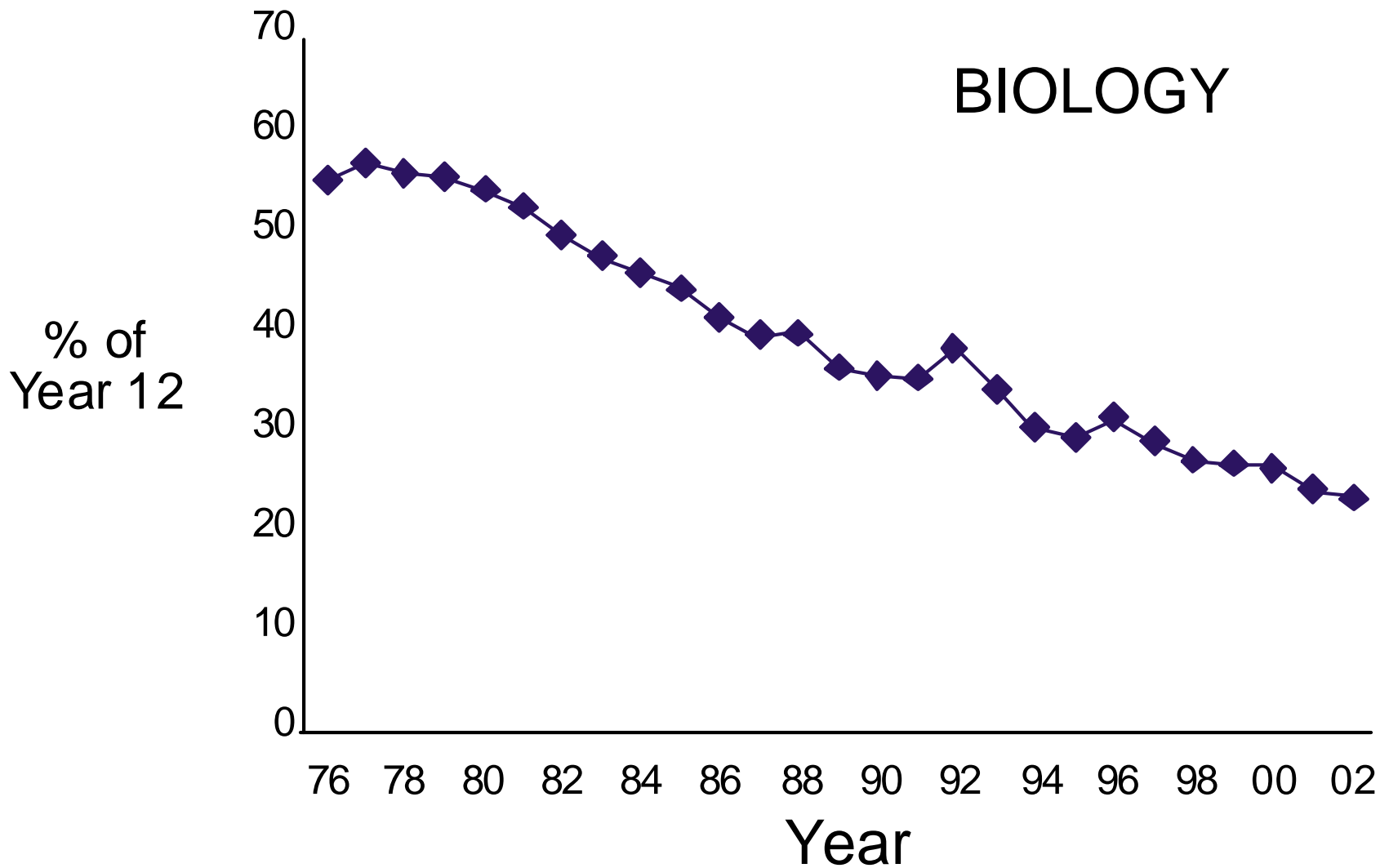
Peter Andrews, Queensland Chief Scientist

# *The Reality*

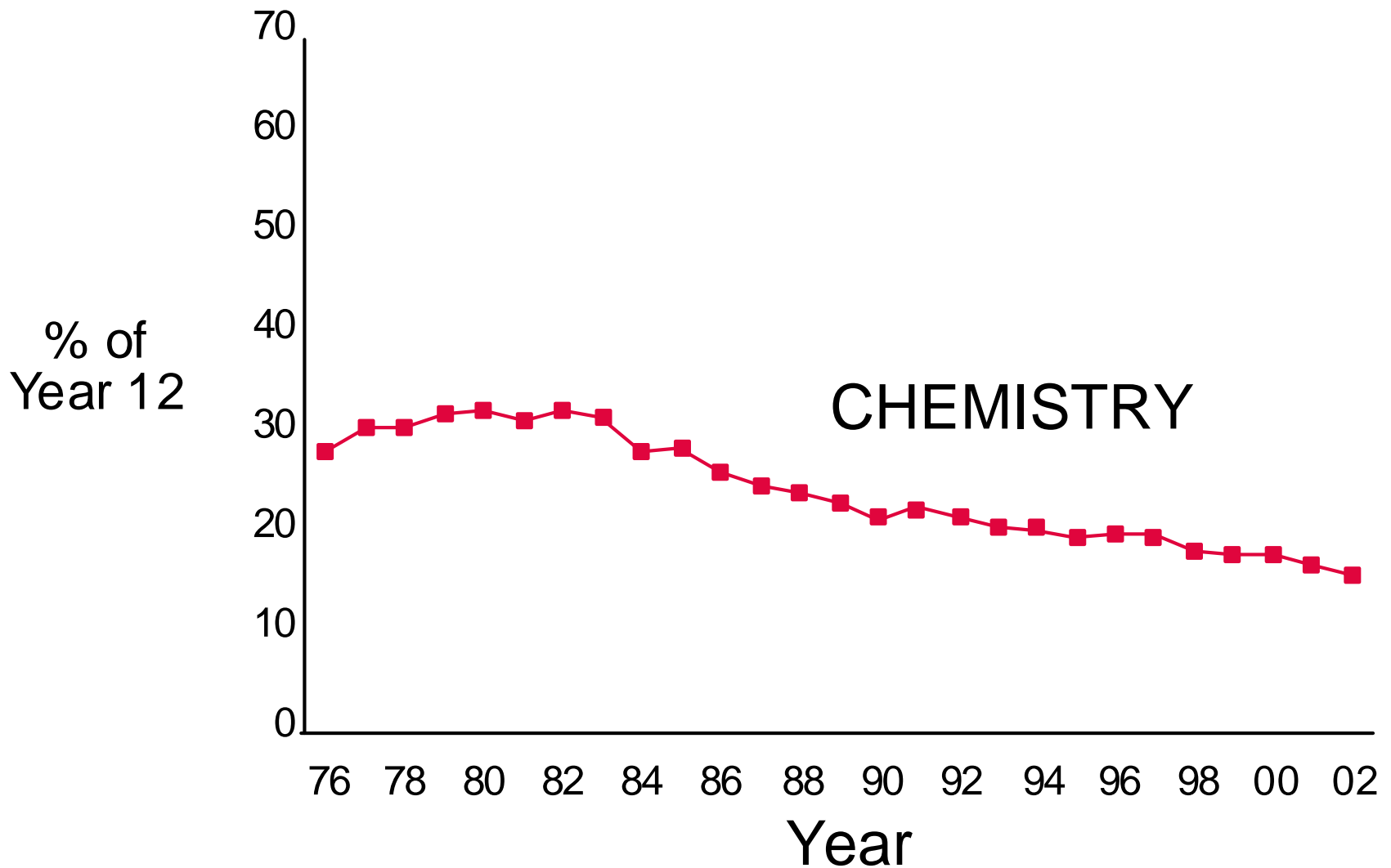
## decline in school science enrolments

The percentage of Year 12 students studying Biology, Chemistry and Physics declined steadily from 1976 to 2002.

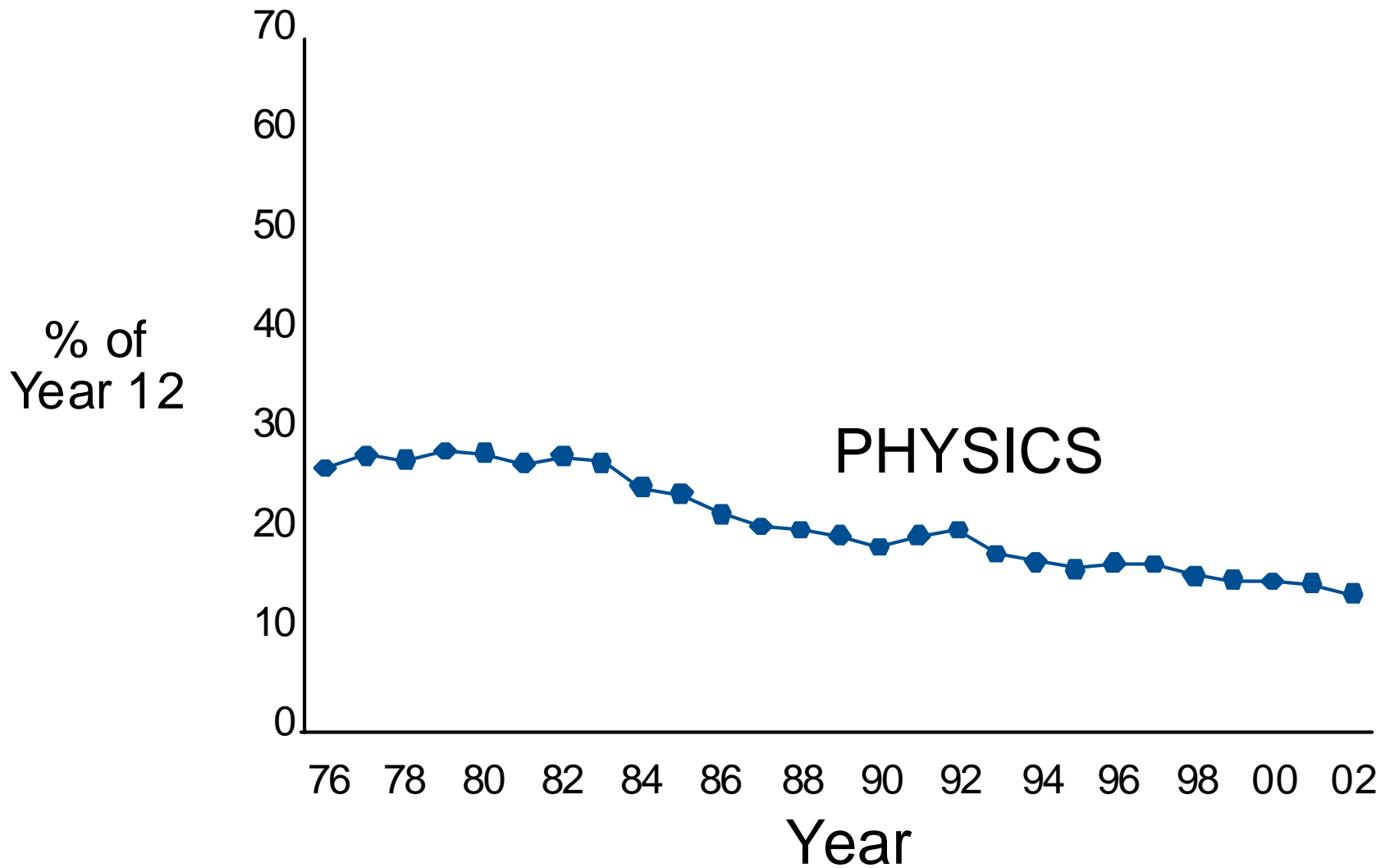
# *The Reality*



# *The Reality*



# *The Reality*



# *The Reality*

Many young people complete Year 12 with minimal exposure to school science and relatively low levels of scientific literacy.

# *The Reality*

## decline in tertiary science enrolments

The number of university students studying physical and materials sciences fell by more than **31%** between 1989 and 2002.

Australian Council of Deans of Science

# *The Reality*

The proportion of Australian PhD's in Science and Engineering dropped from **46.9%** to **37.2%** between 1989 and 2002.

Australian Government's Innovation Report 2004-05

# *The Reality*

In 2001, only **1%** of tertiary graduates in Australia were in the physical sciences.

(UK: 5.2% OECD mean: 2.6%)

# *The Reality*

Male physicists outnumber  
female physicists by **9:1**

Australian Institute of Physics

# *The Reality*

## shortage of Australian scientists

"Far from solving the problem of finding 75,000 researchers in Australia, ... we are producing less of the very scientists we need."

Peter Andrews, Queensland Chief Scientist

# *The Cause?*

science does not engage students

Liking for science declines  
between Year 4 and Year 8.

Trends in International Mathematics and Science Study

## *The Cause?*

Students' early foundations (including their grasp of mathematics) are strong determinants of their later uptake of physical sciences studies.

## *The Cause?*

Year 10 students generally have negative views of science and scientists and are not motivated to pursue science careers.

Ghali & Treagust, 2003

## *The Cause?*

Many high school students perceive school science to be:

- uninteresting
- unimportant
- irrelevant to their lives
- a matter of learning provided facts
- difficult to learn

# *The Paradox*

The very courses that have been designed to provide a rigorous foundation for the future study of science appear to be turning many students off science.

# *The Paradox*

Not only are these courses not meeting the needs of the majority of students, they also are not producing significant numbers of students wishing to pursue science as a career.

*The Solution?*

Research Conference 2006

*What will it take to boost  
science learning?*



Enjoy the conference!