

SAAE INTERNATIONAL WORKSHOP

Challenges of the Engineering Skills Shortage

An Australian Perspective

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THE AUSTRALIAN SCENE

- Currently around 1.3 million have engineering and related technology qualifications, about 12% of workforce
- The split is about 17% for professional engineers, 10% for engineering paraprofessionals and 73% for trades/artisans
- Professional shortage assessed as over 20,000 with around 6000 graduating each year; migration is playing a significant role
- Demand **and** supply issues need to be examined

GRADUATE SUPPLY

- Domestic engineering enrolments have remained static for a decade (around 50,000) – growth has been international students
- Only 17% are women
- Only 53% complete their degrees
- Problems include –
 - Too few school leavers, especially women, with adequate science and mathematics
 - High attrition rates
 - Image problem
 - Double degrees for the brightest students

DEMAND FOR STEM SKILLS

Assessing Future Demand – The Problem

- Occupational definition
 - Medical professionals/technicians
 - IT professionals
 - STEM trained teachers
 - STEM trained government employees

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STEM INTENSITY IN GDP

INCREASING INTENSITY	DECREASING INTENSITY
<ul style="list-style-type: none">• More technology intensive industries• Recognition of need for more highly qualified people to help compete• Greater international competition	<ul style="list-style-type: none">• Improved productivity of technical people<ul style="list-style-type: none">– particularly use of IT• Provision of technical services from off-shore• Lower trade barriers

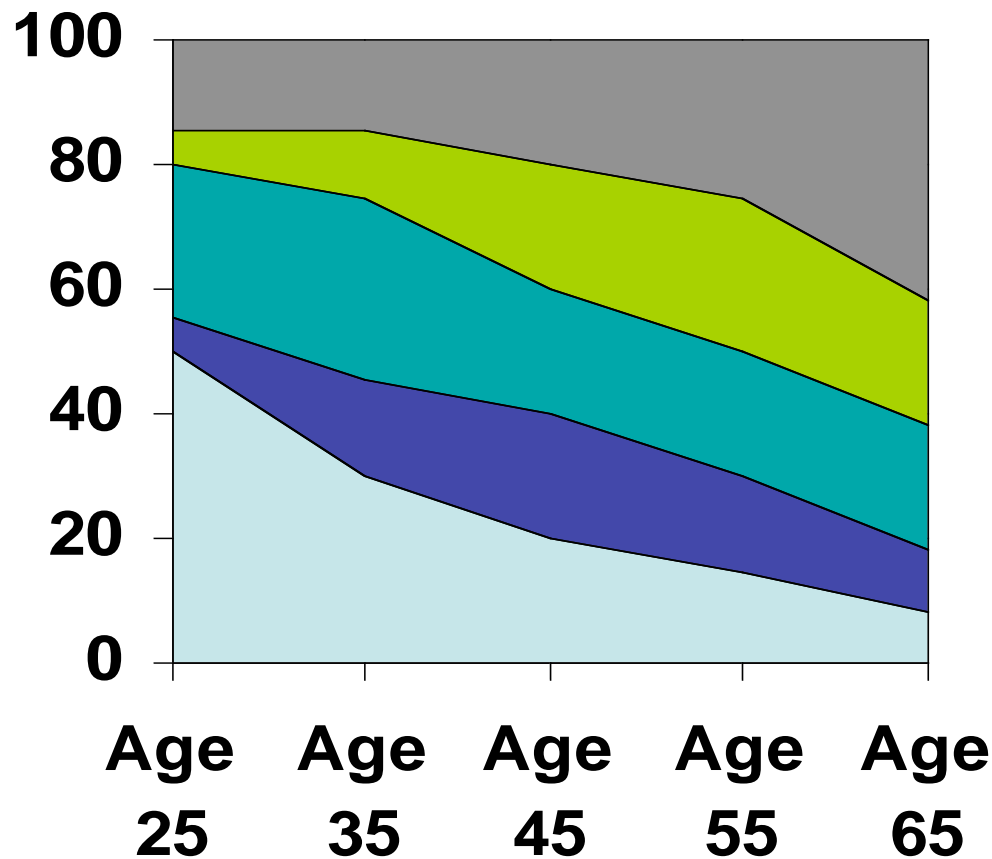
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- Changes in STEM trained people retirement age or working in other roles

EMPLOYMENT OF ENGINEERS AND SCIENTISTS

(Illustrative only)



- Technology Unrelated
- General Management
- Technology Related
- Engineering Manager
- Specialist Engineer

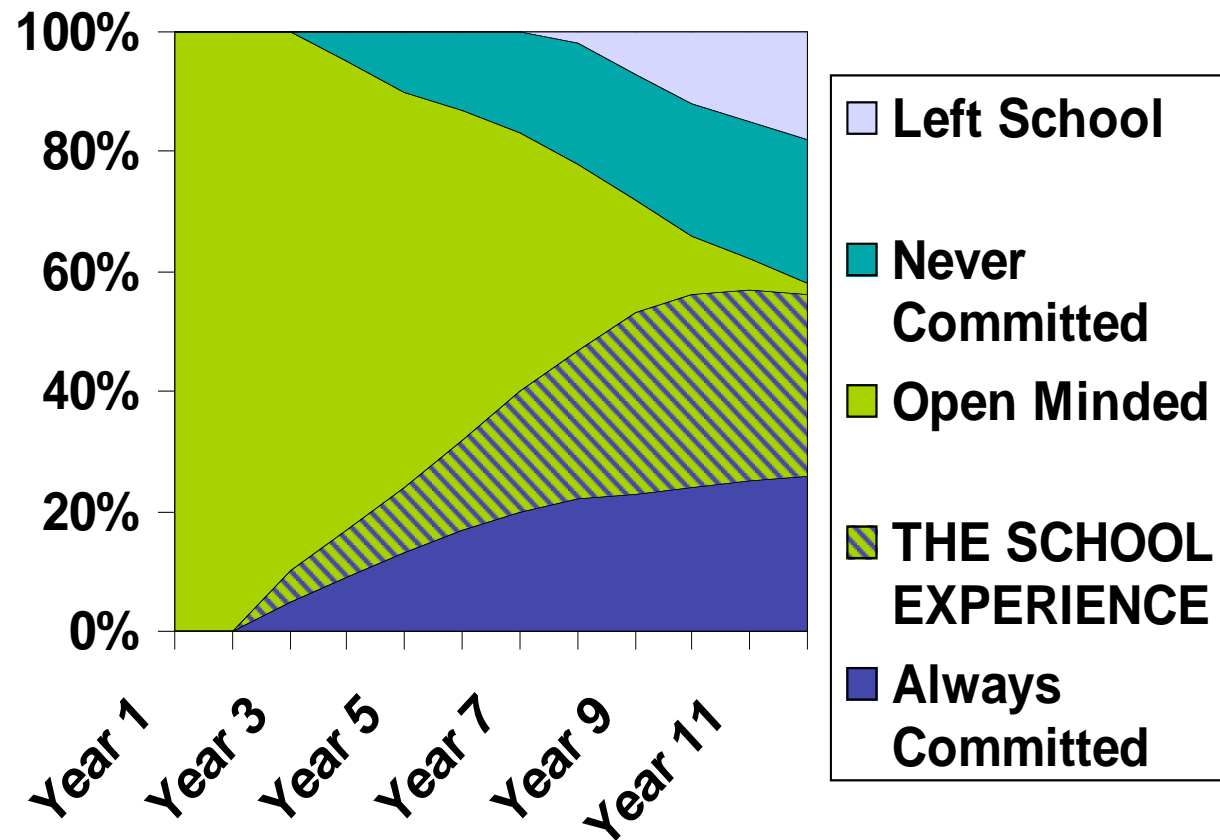
DEMAND MANAGEMENT

- Continued need for enhanced career structures and reward systems to retain skilled people in skilled jobs
- Less early year specialisation to retain flexibility and maximise career options
- Mid-career development opportunities
- Job redesign to make best use of skills
- Greater efforts to recruit and retain women in workforce

MATCHING SUPPLY WITH DEMAND

- Precise demand impossible to measure but will at least grow at same rate as GDP
- Multi-pronged approach required –
 - Capture more of the school population in technology oriented studies
 - Capture more of the appropriately qualified school leavers in tertiary STEM studies
 - More (and more inspirational) teachers for STEM studies in all sectors
 - Provision for professional development and career change

SCIENCE INTEREST IN SCHOOLS



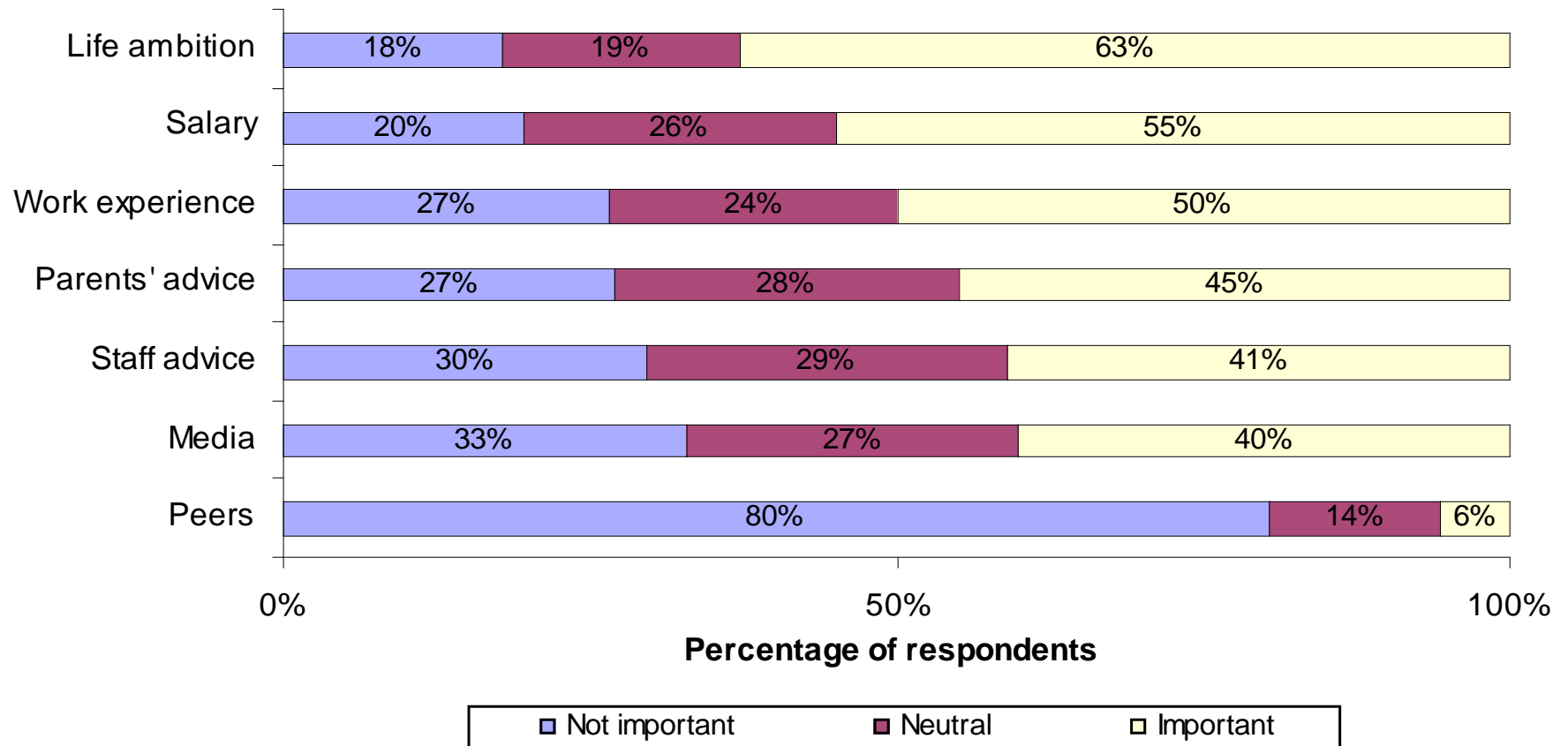
'THE SCHOOL EXPERIENCE'

- More good science and mathematics teachers are essential
- Better support for science teachers and their schools
- More engaging curriculum
- 'Influence the Influencers'
 - More than just careers guidance

FACTORS INFLUENCING CAREER CHOICE

YEARS 11 & 12

(DEST Youth Attitudes Survey 2006)



SOME SUGGESTIONS

- Supplementary funding for schools based on their success in attracting students in to tertiary STEM studies
- Provision of more meaningful and structured work experience, ideally at industry level
- Establish a teacher mentoring program by appropriate technical people in industry
- Mature age entry for STEM professionals into teaching
- Curriculum relevance – AAS -‘Science by Doing’
ATSE - ‘STELR’*

* Science and Technology Education Leveraging Relevance

STELR

Science and Technology Leveraging Relevance

- Schools to be provided with specially equipped laboratories
- Specific theme chosen of general interest to school attendees – propose **Renewable Energy**
- Most physics, chemistry and mathematics concepts can be demonstrated if equipment can be provided to generate power from wind, solar, biomass, hydro etc.
- Would need support through teacher education, safety instruction, etc.

POST SCHOOL STEM

- Curriculum and pedagogy needs to match aspirations of entrants and needs of employers
- Courses need to provide for flexibility in later life, to maximise choice
 - The 3+2 (Bologna/Melbourne Model) is attractive, if time to professional accreditation is not extended
- The world requires more interdisciplinary skills
 - need to maintain strands of rigorous, in-depth study
- Need to address tertiary STEM teachers
 - emerging problems with remuneration, research focus
- More focus on professional development
 - provide support for retraining and career change

REVIEW OF ENGINEERING EDUCATION

- Major review to be published by Carrick Institute in next few weeks
- Comprehensive 12 month study recommends –
 - Raise public perception, generally and in schools
 - Focus on engineering teams
 - Best practice engineering education
 - Adequate resources for of engineering courses
 - More intensive engagement with industry
 - Attract and retain people from non-traditional backgrounds
- Full report should be available shortly on www.carrickinstitute.edu.au

CONCLUSIONS

- Some continuing mismatch between skills supply and demand will continue
- Skilled migrants can be the balancing factor for the present
- Demand can be tempered by initiatives to retain more skilled people in the jobs requiring their skills
- Supply needs a major focus on what is happening in Australian schools
- Post-school education needs to emphasise flexibility, relevance and professional development