Growing importance of science and maths skills in the workforce

National Vocational Training and Education Research
“No Fills” Conference, Sydney, 7 July 2015

The evidence base
Recent years has seen an increased focus on science and maths skills ...
Most particularly, by the Chief Scientist, industry associations and other professional groups ...
The Commonwealth wants to strengthen science and maths in final school years …

“Under a plan being pushed by Minister Pyne, maths or science would become compulsory for all year 11 and 12 students.

It comes amid growing concerns about a decline in students studying maths and science in their final years of high school.

Mr Pyne will lobby for the changes at an Education Council Meeting with state education ministers”.

*The Age, 27 May 2015*
The focus has been on education/training without reference to the overall SM labour market …
The Project therefore sought out to identify …

- The importance of science and maths (SM) skills in the workforce;
- Where Australia is ranked in these skills relative to other developed countries;
- The intensity of science and maths skills for each occupation in the workforce;
- The rate of growth of employment in high-intensity SM occupations relative to occupations with low-intensity SM; and
- The importance of domestic and overseas supply to each occupation in terms of new entrants.
Three central questions were ... 

To what extent are skills in science and math important to occupations in the Victorian labour market?

To what extent are occupations with high intensity in math and science growing relative to those with a low intensity?

To what extent are these skills being sourced domestically or offshore for each occupation?
Australia appears to be mid-ranked in science and maths workplace skills …

Numerical proficiency in the workforce, OECD
STEM doesn’t adequately define the disciplines of science and maths in the workforce …
Methodology ...

The analysis of science and maths capabilities in this report breaks new ground, in that all 475 major occupations in Victoria being ranked according to the extent to which they are high, medium or low in SM intensity, measured by the field of study of workers in each occupation. For each occupation an intensity score has been calculated, ranging from zero to 100, showing the percentage of the workforce that has a science and maths field of (post-schooling) study. That is,

\[
SM \ (\%) \ intensity = \left( \frac{\sum \text{ of employees with SM fields of study}}{\sum \text{ of occupational employment}} \right) \times 100
\]

Occupations deemed to be ‘high’ level SM have 75% of workers or more with a SM field of study, occupations deemed to be ‘medium’ level SM have 40-74% of workers with a SM field of study and ‘Low’ level SM have 0-39% of workers with a SM field of study.
Occupations with highest percentage of workers with science and maths disciplines …
Occupations with lowest percentage of workers with science and maths disciplines ...
Importance of science and maths skills has grown in all sectors of the Victorian workforce ...

### Proportion of workforce with SM fields of study, 2006 and 2011

<table>
<thead>
<tr>
<th>Industry</th>
<th>% of SM qualified workers, 2006</th>
<th>% of SM qualified workers, 2011</th>
<th>% point change between 2006 and 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining</td>
<td>53.25</td>
<td>57.96</td>
<td>4.71</td>
</tr>
<tr>
<td>Construction</td>
<td>51.01</td>
<td>53.29</td>
<td>2.28</td>
</tr>
<tr>
<td>Professional, scientific and technical services</td>
<td>49.63</td>
<td>53.24</td>
<td>3.61</td>
</tr>
<tr>
<td>Electricity, gas, water and waste services</td>
<td>50.39</td>
<td>52.74</td>
<td>2.35</td>
</tr>
<tr>
<td>Health care and social assistance</td>
<td>50.93</td>
<td>52.41</td>
<td>1.48</td>
</tr>
<tr>
<td>Financial and insurance services</td>
<td>43.04</td>
<td>48.59</td>
<td>5.55</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>39.16</td>
<td>41.92</td>
<td>2.75</td>
</tr>
<tr>
<td>Other services</td>
<td>35.21</td>
<td>36.88</td>
<td>1.67</td>
</tr>
<tr>
<td>Information media and telecommunications</td>
<td>32.50</td>
<td>35.99</td>
<td>3.49</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>30.91</td>
<td>34.39</td>
<td>3.48</td>
</tr>
<tr>
<td>Public administration and safety</td>
<td>32.83</td>
<td>34.10</td>
<td>1.28</td>
</tr>
<tr>
<td>Transport, postal and warehousing</td>
<td>28.43</td>
<td>32.38</td>
<td>3.95</td>
</tr>
<tr>
<td>Administrative and support services</td>
<td>26.13</td>
<td>28.33</td>
<td>2.20</td>
</tr>
<tr>
<td>Rental, hiring and real estate services</td>
<td>24.73</td>
<td>27.99</td>
<td>3.26</td>
</tr>
<tr>
<td>Arts and recreation services</td>
<td>19.68</td>
<td>21.11</td>
<td>1.43</td>
</tr>
<tr>
<td>Education and training</td>
<td>18.54</td>
<td>20.75</td>
<td>2.21</td>
</tr>
<tr>
<td>Retail trade</td>
<td>17.76</td>
<td>20.22</td>
<td>2.46</td>
</tr>
<tr>
<td>Agriculture, forestry and fishing</td>
<td>14.96</td>
<td>17.21</td>
<td>2.25</td>
</tr>
<tr>
<td>Accommodation and food services</td>
<td>12.57</td>
<td>14.71</td>
<td>2.13</td>
</tr>
</tbody>
</table>

Source: Elgin Economics using Census data
Workers with science and maths skills constitute an increasing share of the Victorian workforce ...

Proportion of workforce with science and math field of study:

- 2006 – 33.4
- 2011 – 36.5
- 2016 – 38.6
Many ‘high’ science and maths occupations have a significant offshore supply* …

* This is not unique to ‘high’, as a number of medium and low SM occupations have a high offshore contribution, such as sales assistants, checkout operators, cooks and retail managers.
SM skilled employment is growing at a faster than non-SM skilled …

Percentage growth rates between 2006 and 2011 for ‘like for like’ occupations

- High SM: 19.33
- Medium SM: 18.77
- Low SM: 11
SM skilled employment will be higher in 2016 in all sectors, except manufacturing and mining ...
In summary...

- International benchmarks place Australia as a middle-to-upper ranked country in terms of science and maths (SM) capabilities in the workforce, ahead of the USA and UK.

- Focusing on STEM capabilities alone does not adequately reflect the need for, and spread of, SM capabilities in the workforce.

- Based on Census analysis of the workforce by occupation and field of study, it is estimated that around 36.5 per cent of people employed had completed a science or maths field of study in 2011, rising from 33.4 per cent in 2006.

- The report forecasts that the percentage of the workforce with a science or maths field of study will rise to 38.6 per cent by 2016.

- Employment in occupations with high SM skills is growing between two and four times faster than in occupations with low or no SM skills.

- Migration is playing a critical role in ensuring that Victoria is able to grow its workforce with high SM capabilities.