

**Measurable and meaningful:**

**A survey of the Australian public about their engagement with science**

Suzette Searle

National Centre for the Public Awareness of Science

The Australian National University

[suzette.searle@anu.edu.au](mailto:suzette.searle@anu.edu.au)

Susan Stocklmayer

National Centre for the Public Awareness of Science

The Australian National University

[sue.stocklmayer@anu.edu.au](mailto:sue.stocklmayer@anu.edu.au)

**Abstract**

This paper presents the preliminary findings of the most recent government-commissioned national survey of the Australian public about their attitudes and behaviours with regard to science and technology. For this study, science and technology were defined and asked about separately in the survey questionnaire. Respondents' attitudes, such as their interest in science and technology, trust in information sources and how much they value science and technology research as a contributor to the Australia's economic growth were investigated. Their comfort with the rate of scientific and technological change and whether they believe science causes or solves problems was also explored. Different types of engagement with science and technology through the internet, traditional mass media and specific activities and events were related to participants' age, gender and geographical location. Respondents' awareness of Australia's scientific and technological achievements was examined. This research is part of an Australian government initiative (2010-2014) called 'Inspiring Australia: a national strategy for engagement with the sciences'.

## **Introduction**

This paper presents preliminary quantitative findings from a Government-commissioned survey that provides a baseline overview of Australians' engagement with science and technology as a function of their attitudes, behaviours and values. The survey results are intended to inform government science and policy bureaucrats, the leaders of science academies and other organisations that represent Australia's scientists, science communication and policy researchers and science communicators in general.

This is the most recent of the national Australian science surveys conducted by universities or commissioned by the Australian government through department and agency programs over the last decade. As these various science surveys were designed with different emphases and have an insufficient number of questions in common, they do not constitute a longitudinal series that is able to demonstrate changes in public attitudes and behaviours over time. The surveys, nevertheless, show that Australian society values and is inspired by scientific endeavour (Lamberts, 2010; Market Solutions, 2008), has an interest in its science and critically engages with key scientific issues such as health and medical research (JWSResearch, 2013; Lamberts, 2010). Recent surveys also show that Australian society encourages young people to pursue scientific studies and careers (Harris, K.L., 2012; Larri, L. J., 2011; Larri, L.J., 2010; Rennie, 2012). The focus of questions asked in this study reflects an international trend in national science surveys where people are asked less about their knowledge of science and more about their attitudes, behaviours and values regarding science and science-related issues.

## **Method**

The survey questionnaire was designed by The Australian National University and Ipsos Public Affairs. Questions regarding science and technology were asked separately and these terms were defined for the survey participants. Science was defined as 'knowledge about the natural and physical world and how we find, observe, analyse and test that knowledge to be as reliable as it can be. It includes things like biology, chemistry, physics and astronomy, agriculture, geology, engineering, computer science and electronics'. Technology was defined as 'the practical use of scientific knowledge. Technologies include a range of things including electricity, antibiotics, sewerage

treatment, iPods, iPads, contact lenses, artificial hips, and weather forecasting' (Quantum Market Research, 2009; Sweeney Research, 2011).

Computer assisted telephone interviewing (CATI) was used to administer the survey and the landline telephone sample was 73% and the mobile telephone sample constituted 27%. Pilot fieldwork was conducted with 30 participants. The main research was conducted in February 2014 with an average survey length of 18 minutes. The response rate was 16% (i.e. completes/ (refusals + completes)). Data was weighted to 2011 Australian Bureau of Statistics (ABS) population data by age and gender, and to ABS data for level of education (ABS, 2013). All statistical significance testing in this report was performed using the Q computer software package (Bock, 2014). Significance testing was performed using independent samples t-tests for comparison of means and z-tests for comparisons of proportions, all conducted at the 95% confidence level using the effective sample size.

## **Results**

### **Sample population**

The overall sample size of 1,020 adults (aged 18+ years) was weighted to be representative of the Australian population in terms of age, geographic location (by states and territories; major cities, regional and remote Australia) and level of education (see Table 1. Representativeness of the survey sample). The effects of weighting the data means that the sample size for significance testing at its maximum level was n=983 resulting in an effective error margin for this project of +/- 3.1%. Therefore the accuracy of the results at an overall level is +/-3.1% at the 95% confidence interval. All percentage figures in this paper are rounded and therefore totals may not add up to 100%. The table below outlines the (a) population figures (with the exception of the education data, from the 2011 Australian Census of Population and Housing).

The table below outlines the (a) population figures, (b) as collected sample and (c) weighted sample for gender, age, location and level of education.

<b>Gender</b>	<b>% population (a)</b>	<b>% sample (b)</b>	<b>% weighted sample (c)</b>
Male	49%	49%	49%
Female	51%	51%	51%
<b>Age</b>	<b>% population</b>	<b>% sample</b>	<b>% weighted sample</b>
18-24	12%	12%	12%
25-34	18%	18%	18%
35-44	19%	18%	18%
45-54	18%	19%	19%
55-64	15%	13%	15%
65-74	10%	14%	10%
75+	8%	7%	9%
<b>Location</b>	<b>% population</b>	<b>% sample</b>	<b>% weighted sample</b>
Major cities of Australia	70%	69%	67%
Regional Australia	28%	20%	22%
Remote Australia	2%	9%	10%
Refused / Postcode not known	-	1%	2%
<b>Level of education*</b>	<b>% population</b>	<b>% sample</b>	<b>% weighted sample</b>
Bachelor or higher	25%	35%	25%
Lower than bachelor	75%	64%	74%
Prefer not to say	-	1%	1%

Table 1. Representativeness of the survey sample

<sup>1</sup> All population data except educational data sourced from ABS 2011 Census data accessed via TableBuilder

<http://www.abs.gov.au/websitedbs/censushome.nsf/home/tablebuilder?opendocument&navpos=240> and the educational data was sourced from ABS 2013 data <http://www.abs.gov.au/ausstats/abs@.nsf/mf/6227.0>

### **Australians' attitudes towards science, technology and scientists**

The survey explored Australians' views about science and technology research and development, such as Australia's international standing and whether scientific research contributes to economic growth in Australia. A large majority of the respondents had positive aspirations for Australia's achievement on the world stage with more than three-quarters agreeing that Australia should to be a world leader in scientific (79%) and technology (77%) research and development. Sixty-seven per cent agreed that scientific

research makes a direct contribution to economic growth in Australia. They also expected that if this research was publicly-funded, it should be made publicly available (84%) - a clear message to the government departments and agencies that fund and communicate research in Australia.

Scientists too are highly regarded as making a positive contribution to society. More people regarded doctors (75%), teachers (69%) and scientists (60%) as very important in terms of their positive contribution to society compared with eight other professions. In terms of whom people trusted to explain the impacts of scientific or technological advances to them, it was all the scientists, such as well - known scientists such as Nobel Prize winners or Australians of the Year were trusted most (82%), followed by CSIRO scientists (78%), Australia's Chief Scientists (73%) and scientists in general (71%), who were trusted most amongst nine different professionals. Government politicians responsible for science at the state or federal government level (15%), radio talkback presenters (14%) and religious leaders (11%) were trusted least.

Perhaps reflecting these positive views about both science and scientists, nearly nine-out-of-ten (88%) respondents thought that a career in science is a good choice for people these days. Again indicating that they valued the role of science, a large majority (80%) of the participants also agreed to some extent that science was 'very important to solving many of the problems facing us a society today', with only 4% disagreeing. Conversely the majority disagreed that science (62%) and technology (54%) cause more problems than they solve, although a relatively larger number were either neutral (27% for science and 31% for technology) or disagreed (10% for science and 15% for technology). Participants had some degree of discomfort with the speed of scientific and technological change, however, with relatively more agreeing that it was too fast. For example, 35% agreed to some extent that 'scientific change happens too fast for me to keep up with' and more (40%) agreed that 'technological change happens too fast for me to keep up with'.

### **Public engagement with science and technology**

Several of the many ways that people engage with science and technology were explored in this study. Participants were asked about their frequency of listening to,

watching or reading about science and technology; their interest in finding out about science and technology, their frequency of searching for information and whether they had participated in particular science-related leisure activities over the previous 12 months.

### **Listening, watching or reading anything to do with science and technology**

Most (82%) participants recalled in the previous 12 months, listening to, watching or reading something to do with science and technology, through both traditional media and online, either daily (39%) or weekly (37%) or fortnightly (5%). Only 2% said never. Despite this, the media provided 'enough information about technology' for only 40% and 'enough information about science' for only 31% of the survey participants. A significant proportion were neutral (40% with regard to technology information; 44% with regard to science) or felt that they did not get enough information through the media (20% with regard to technology; 24% with regard to science).

Whether survey participants were interested in finding out about science and technology was explored by asking them to rate their agreement or disagreement with the statements *I'm not really interested in finding out about technology* and *I'm not really interested in finding out about science*. Most gave a score that indicated that they were similarly interested in finding out about both. For science, for example, 60% gave a rating of 0-3, indicating that they disagreed with the statement that they were not really interested, while only 14% gave a rating of 7-10, indicating that they agreed with the statement.

Forty-nine per cent of the survey participants had an awareness of Australian achievements in science or technology with the most (17%) naming the cochlear ear implant. Fifty-one per cent either could not name or did not know of any achievements.

### **Information searching**

The vast majority (86%) of those who sought information about either science or technology first went to the internet. Libraries and books (4%) and newspapers, magazines, journals and the print media (2%) were the next most frequent places where

people searched. A similar percentage of people searched first for technology information in libraries and books (3%) or asked friends and family (3%).

When questioned as to how often, if at all, they searched for information about science almost half (46%), said either daily (9%), weekly (28%) or fortnightly (8%) and of these, 49% had convenient access to the internet. It is worth noting that 87% of the all the participants in this study had convenient access to the internet. Of the 18% who said they had never searched for information about science in the previous 12 months, 43% did not have convenient access to the internet. When asked about technology, the frequency of searching for information was similar with a total of 44% who had searched either daily (9%) to weekly (27%) fortnightly (8%). Of the 14% who had never searched in the previous 12 months, 46% did not have convenient internet access. The overall percentage (12%) of people in this study who did not have convenient access to the internet is surprising as Australia is generally thought to be highly technologically connected.

### **Engagement activities**

The survey participants were asked whether they had undertaken any or all of nine particular activities related to science or technology within the past 12 months. The large majority (87%) had spoken with friends, family or colleagues in social settings about something to do with technology, while 77% spoke about science in this way. Two-thirds had visited a science centre, science museum, botanic garden, zoo, aquarium, observatory or space exploration centre while 42% had gone to, watched or listened to a public meeting, debate, lecture or seminar on a science related subject. Interestingly, 34% had commented about science or technology issues through social media. On the basis of age it was those aged 18-34 who most frequently visited a science-rich venue (75%) or who had had gone to, watched or listened to a science-based event (52%). This age group was also most likely to comment about science or technology issues through social media (49%). On the basis of gender the only significant difference was that relatively more (48%) males had gone to a science-based event compared to females (36%). On the basis of location, it was those who lived in major cities (90%) who had spoken significantly

more frequently with friends and colleagues about anything to do with technology in the previous 12 months than those who lived in regional or remote areas (see Table 2.

Activities undertaken in the past 12 months by gender, age and location).

	Total	Male	Female	18-34 years	35-54 years	55-74 years	75 years plus	Major cities	Regional	Remote
Spoken with friends, family or colleagues in social settings about anything to do with technology	87%	89%	84%	91%	89%	83%	71%	90%	84%	74%
Spoken with friends, family or colleagues in social settings about anything to do with science	77%	80%	75%	81%	81%	75%	55%	79%	76%	68%
Visited a science centre, science museum, botanic garden, zoo, aquarium, observatory or space exploration centre	66%	64%	68%	75%	70%	57%	46%	69%	65%	51%
Gone to, watched or listened to a public meeting, debate, lecture or seminar on a science-related subject	42%	48%	36%	52%	44%	35%	17%	45%	39%	26%
Commented about science or technology issues through social media	34%	36%	32%	49%	37%	20%	8%	37%	30%	18%
Attended adult education classes related to science or technology	17%	18%	16%	24%	16%	13%	10%	18%	17%	12%
Volunteered for an organisation that involves science or looking after or observing nature	16%	16%	15%	14%	17%	16%	14%	13%	17%	23%
Participated in public discussions about anything to do with science or technology	15%	18%	13%	15%	18%	13%	15%	15%	18%	9%
Gone to events at National Science Week held across Australia every August	5%	4%	6%	6%	8%	2%	1%	5%	5%	4%

Table 2. Activities undertaken in the past 12 months by gender, age and location

Statistical significance (95% confidence levels) are displayed by green and red figures; green figures indicating the figure reported is significantly higher; red indicating the figure is significantly lower.

## **Discussion**

Preliminary results from this study indicate that the Australian adult population has positive attitudes about science and technology in general, believing, for example that research and development makes a direct contribution to the economic growth of the country and agreeing that Australia should be a world leader in this regard. The majority of respondents trusted scientists more than other professionals to explain the impacts of scientific or technological advances. As taxpayers, they expected that if research was publicly-funded it should be made publicly available. A high number felt that among 11 professions, scientists' positive contribution to society was important, third only to doctors and teachers.

In terms of their everyday lives more than two-thirds of the survey participants consciously engaged with science and technology in a number of ways; through conversations with friends and colleagues, the traditional media, searching the internet and visiting science-related venues and science-based events. There was, however, concern about the pace of both scientific and technological change, with a slight majority agreeing that the pace of change for both was too fast. The internet was where most people first looked for information about science and technology, reflecting the relatively high percentage of the population with convenient access to the internet in Australia. Nevertheless, 12% of the population does not have convenient access.

## **Conclusion**

Preliminary key findings from this national survey of the 1,020 adults in 2014 indicate that a majority of Australians continue to have generally positive attitudes to science and technology and many engage frequently with science and technology information or participate in a science-related activity. This study provides valuable baseline information for all those with an interest in the public's attitudes and behaviours concerning science and technology in Australia and those who wish changes in these to be monitored as the 'Inspiring Australia' strategy continues to engage Australians with the sciences.

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