

An evaluation of the effectiveness of the Questacon Smart Moves programme

B Fletcher

Questacon – Australia’s National Science and Technology Centre
King Edward Terrace, Canberra, Australia

ABSTRACT

Questacon Smart Moves is an outreach programme of Questacon – Australia’s National Science and Technology Centre targeting secondary students in regional and rural schools. It aims to raise awareness of science, technology and innovation in Australia and around the world. It also attempts to encourage more students to consider these areas as potential career options. Evaluation has been carried out over the lifetime of the programme at a number of levels. It has shown students after seeing a Questacon Smart Moves presentation are more interested in their science and technology courses at school up to seven months later and have changed their career choices to include science and technology options as a result of participation. Further long term studies are needed to see if this interest influences tertiary course and career choice. Whether this style of awareness programme would be as successful within other cultural contexts should also be investigated.

INDEX TERMS

Programme evaluation, Science awareness, Outreach, Innovation

INTRODUCTION

Questacon Smart Moves is an initiative of the Australian Government’s Backing Australia’s Ability – Backing our Future through Science and Innovation package. The programme aims to raise awareness of science and innovation among young Australians in rural and regional areas and to inspire them to pursue careers and opportunities in science, math, engineering, and technology. The very latest in these fields is demonstrated to students in rural and regional secondary schools across Australia. Questacon Smart Moves began in July 2001 with funding of \$3.7 million received from the Australian Government. The Australian Government has now funded the Questacon Smart Moves programme to 2011 allowing even more young Australians the chance to experience and engage with the programme.

The Questacon Smart Moves programme helps meet the following needs within Australia:

- Australian students are losing interest in science
- Cultural change to accept innovation is required in Australia
- More needs to be done to increase the potential of young entrepreneurs in Australia
- Education in Australia should not be geographically affected

The existence of these needs is supported by a number of reports.

In his paper *The Chance to Change: Final Report by the Chief Scientist, Batterham (2000)* stated that school students are losing interest in science and mathematics and that there is insufficient support for those who inspire our children to study science and mathematics. He also declared that “students need to be encouraged from an early age to consider careers in science, technology or engineering.” Also in *The Status and Quality of Teaching and Learning*

of *Science in Australian Schools* (Goodrum et al for DETYA, 2001) it was found that for many students in secondary schools, science is not seen to be relevant or engaging.

Both Batterham, and the *Sensis GEM Australia* report (Hindle and Rushworth, 2002) have called for work towards developing cultural change in Australia towards an idea's based "can-do" society where innovation and entrepreneurialism are more accepted and celebrated. The 2002 APEC Young Leaders and Entrepreneurs Forum reports (Anon.) support this view of innovation reform. One of the recommendations of the forum was to "increase the potential of young entrepreneurs by facilitating access to information and technology". This would "nurture a culture of entrepreneurship that fosters more jobs creation and improves regional growth", and would "promote programmes in which young entrepreneurs can learn necessary skills to create successful businesses".

The programme also supports goals from the *Adelaide Declaration on National Goals for Schooling in the Twenty-first century* (DETYA, 1999) that "student's outcomes from schooling (should be) free from the effects of negative forms of discrimination based ongeographic location".

The Questacon Smart Moves programme aims to achieve the following outcomes:

- Secondary students in regional and rural areas who recognise their potential to be Australia's future innovators, creating new business and employment opportunities related to science and technology.
- Secondary students in regional and rural areas who consider potential careers in cutting edge fields such as photonics, biotechnology, medical technology, energy, communications and information technology.
- Increase the awareness of cutting edge science and technology and innovation activities in an Australian context.

Statement of the objectives in relation with state-of-art review of literature: 1) the problems to start with; 2) the description of the specific situation the project is trying to address; 3) the objectives and the reason for the choice of these objectives.

THE SCIENCE COMMUNICATION PROCESS

The Questacon Smart Moves programme has two distinct components: an in-school performance programme and an annual youth entrepreneur conference.

The in-school performance travels to regional secondary schools throughout Australia presenting a free, up-to-the-minute snapshot of what's happening in cutting edge science, technology and business. It's an interactive, humorous and high energy look at Australian inventions, futuristic sciences and ethically charged issues like human cloning all designed to capture students' imaginations.

It is presented as a "magazine style" show with a series of segments dealing with different topics all related to the outcomes of the programme. It is presented by young scientists and engineers trained in presentation techniques and relies heavily upon using pop-cultural references and local content to increase audience relevance.

The annual youth conferences, the Questacon Smart Moves "Invention Conventions" provide the forum for innovative and entrepreneurial students from around Australia to showcase their projects and gain invaluable access to role models in science and technology. They are given

instruction in marketing and business skills as well as advice from industry leaders, IP experts and successful young entrepreneurs. The evaluation of this part of the programme has been carried out separately and is not included in the scope of this paper.

EVALUATION

From Jan 2002 to April 2005, the Questacon Smart Moves programme has seen 198,275 secondary students in approximately 1,100 regional and rural schools around Australia. This represents 50% of regional and rural Australian secondary schools and to reach them all has required around 150,000km of travel. It has conducted two youth conferences for a total of 45 young entrepreneurs.

Evaluation of the programme takes part to elucidate the success of both the day to day operations and the overall effectiveness of the programme. This has built a number of levels into the evaluation strategy to measure immediate, short term and longer term effects on students.

The programme collects regular data from student exit surveys on the completion school visits to constantly analyse the success of the show for the target audience. Over the lifetime of the programme it has massed a large amount of information on the success of the school presentations on the immediate attitudes of students. In summary, this data (n=8786) shows that:

- 96% of students indicated that they had enjoyed the presentation.
- 24% of students are more interested in Science, Engineering and Technology careers as a result of participating in the programme.
- 66% of students that have participated in Questacon Smart Moves feel that there are good opportunities for them here in Australia in innovation or science and technology careers.

Additionally, the programme regularly surveys a random selection of teachers 1 month after their participation in the Questacon Smart Moves programme. The data collected (n=251) shows that:

- 99% of responding teachers said that the programme had a positive impact on their students
- 92% of responding teachers stated that they had heard their students talking about Questacon Smart Moves in class after attendance
- 60% of responding teachers said that their students expressed an interest in science, engineering and technology or entrepreneur futures.

In order to have a closer look at the programme's outcomes, an independent educational consultant Dr Keith Lucas carried out two series of student surveys. The first (Lucas 2003) surveyed students in schools two weeks after participating in Questacon Smart Moves visit (n=177) and the second looked at a different set of students seven months after participating in a Questacon Smart Moves visit (n=446). The survey was designed to look at how the students felt about their involvement, what they learnt and what they have done as a result. A summary of the results shows:

- After two weeks 6.2% of students changed their career plans because of new information they heard in the Questacon Smart Moves presentation.

- After two weeks 35.0% of students stated they were now more interested in their science and technology courses at school because of what they heard and saw at the Questacon Smart Moves presentation.

On completion of this study, Dr Lucas's conclusion on the educational effectiveness of the programme was that the "in-school presentation is very effective in raising students' interest in science, technology and entrepreneurship during the actual presentation and for a short time thereafter."

Dr Lucas's second study looked at a different set of schools in a very similar way but this time with a 7 month delay between the Questacon Smart Moves visit and the survey. This effectiveness seems not to be diminished 7 months after participation in a Questacon Smart Moves visit. This time the results had changed to:

- After two weeks 8.2% of students changed their career plans because of new information they heard in the Questacon Smart Moves presentation.
- After two weeks 39.2% of students stated they were now more interested in their science and technology courses at school because of what they heard and saw at the Questacon Smart Moves presentation.

DISCUSSION

The way that the Questacon Smart Moves programme has been evaluated to date has allowed elucidation of a mixture of operational and strategic outcomes. Collecting exit surveys from students is very useful for determining immediate reactions felt by the students but as such has limited use in looking at whether involvement has stimulated further actions.

It has allowed the presenters to continue to improve the relevancy of their presentations over the lifetime of the programme by changing content and style to increase the receptiveness of the audience as measured by their enjoyment. Using a crude measurement of success such as short-term enjoyment does not indicate the overall success of the programme. It can be used to increase the likelihood of overall success by ensuring engagement by the audience.

Some indication of success can be elucidated from the teacher feedback. Having the vast majority of teachers indicate that the presentation has had a positive impact on their students whilst good, does not give us much information without further asking them what they considered to be a positive impact. Similarly, it is positive that they are indicating that lots of students are asking about careers but considering that the survey is mostly completed by science and technology teachers (who would be mostly likely to hear this) and without a baseline is inconclusive.

The fact that the majority of teachers are noticing students discussing topics from the show amongst themselves gives us more of an indication of students having been involved in an awareness raising exercise being inspired to further action. While the extent and whether these students are more inclined to talk about science and technology topics cannot be determined, it is none-the-less showing students being inspired to carrying out a follow-up activity, albeit crudely.

The two Lucas studies were designed to delve into these issues further and to determine whether short-term success on our behalf was translating to longer-term effects on the students.

It is a positive indication for the programme that 35-40% of students are more interested in their science and technology courses as a result of the Questacon Smart Moves presentation. This is an example of how informal learning programmes and environments can assist the formal learning process. More interested students are more likely to achieve more and better than uninspired students.

Indicating that 6-8% of students had changed their career paths as a result of Questacon Smart Moves is a very positive indicator of success. It might seem that this is a small number but it is important to note that this is an indicator of change and not an overall number. It is also important to note that it is reasonable to consider that a science and technology career might not be suitable for all students. Larger figures may indicate students that are unsuitable might be being persuaded to consider what would turn out to be a mistake for them in the longer term. Finally, it is a small percentage but in a large number of students. It indicates a potential new 12,000 students to the science and technology field that would otherwise not have considered a career in this area.

Importantly, a student's indication of interest in a career does not mean they will follow through with it. Further measurement is planned for the future to try and measure a completion rate in terms of university entry.

CONCLUSION

The regime of evaluation set down for the Questacon Smart Moves programme was good for indicating operational success on both a short and long term timeframe. The levels of information add together to give a larger picture on how the programme effects students.

The current model for Questacon Smart Moves seems to be quite effective in inspiring positive, mid-term effects on secondary students in the Australian context. A question being asked is how effective could this programme in different cultural contexts. Australian schools have a great tradition of allowing travelling incursions to visit their students on a regular basis. This may not be so in other education systems.

This aside, it is the author's opinion that the show format itself has the potential to be effective for other contexts. Applying local cultural methods, in particular with regards to the local youth culture, to the basic presentation style could achieve similarly long lasting effects. It would not be surprising if there were already other programmes successfully using a similar format under different cultural conditions. If there were not, it would certainly be interesting to see if this style of awareness programme were translatable.

ACKNOWLEDGEMENTS

The Questacon Smart Moves programme is an initiative of the Australian Government's Backing Australia's Ability: Building Our Future Through Science and Innovation.

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