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IS POST-COMPULSORY SCIENCE A STUDY OPTION FOR EVERYONE? FINDINGS
FROM AN INNOVATIVE SCIENCE PROGRAMME FOR YOUNG HUMANITARIAN
IMMIGRANTS IN AUSTRALIA

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ABSTRACT

Science and technology in Australia are enriched by immigrants from culturally and linguistically diverse (CALD) backgrounds. While national policies recognise the innovation potential of these groups, mainstream informal education does not incorporate science and technology learning opportunities specific to CALD migrants. This is concerning because a significant proportion of the increasing number of humanitarian immigrants to Australia recently are of post-compulsory school-age. This paper describes an initiative trialled last year to introduce post-compulsory science and technology education and career opportunities to thirty young humanitarian immigrants from Africa and Asia. The initiative focussed on communicating science cross-culturally and featured activities at seven science and technology outreach centres which the participants visited over two-days. Formative evaluation revealed a positive change in the participants' attitudes about their access to post-compulsory education and careers in science and technology. Their feedback indicated that more informal learning opportunities are needed to inform CALD immigrants about participating in science and technology. Conversely, feedback from national programmes to acclimatise humanitarian immigrants stated that such opportunities are not consistent with the priorities for the settlement of new immigrants. This study concludes that elitist views towards post-compulsory science and technology education can restrict CALD immigrants achieving their innovation potential.

FOUR-PAGE SYNOPSIS

Problem statement

Science and technology play an important role to enable the First World economy that is enjoyed by people in Australia. The Australian government is conscious that a sound education basis for science and technology is crucial to on-going national innovation (Commonwealth of Australia, 2009). National policies such as *Inspiring Australia* recommend that science and technology should build strong relationships with all groups of Australian society (DIISR, 2011). It is important, therefore, that mainstream informal science and technology education should include communities that are 'difficult to reach and are usually unengaged with scientific issues... such as migrant communities and English second-language speakers' (DIISR, 2011, p.4).

Immigration is a key feature of Australian history. Recent years have seen an increase in culturally and linguistically diverse (CALD) humanitarian immigrants of post-compulsory school-age. Of the 19,839 humanitarian immigrants from 2004 to 2008, 21% were aged between 16 and 25 years (Olliff, 2010). Only 44% of these young people had studied science

at Year 10, or had an equivalent level of formal education (ABS, 2011). Many may have experienced disrupted formal education due to entitlement restrictions and limited resources (Brown et al., 2006). Moreover, secondary education systems internationally vary enormously. And many humanitarian immigrants of post-compulsory school-age in Australia would not have comparative secondary education experiences to inform tertiary study and career options in science and technology (Olliff, 2010).

Nonetheless, education is ‘the most important aspect of their life as it is a source of hope and future’ for young humanitarian immigrants (p. 22, Chegwiddden & Thompson, 2008). The importance of education is underpinned by their parents’ career aspirations, which encourage them to seek tertiary qualifications in science and technology (Taylor & Rafferty-Brown, 2010). These findings complement studies that show young humanitarian immigrants to have high levels of resilience and that they can acclimatise successfully (Ziaian et al., 2012).

Despite the above attributes and inclusive rhetoric in policy, Australian science and technology outreach centres do not offer informal education with a focus on CALD immigrants (see Metclafe et al., 2012). Equally, the efforts to socially acclimatise young humanitarian immigrants in Australia are absent of informal science and technology education, despite recommendations for ‘innovative approaches to engage young refugees and migrants’ (DIAC, 2012). Informal education programmes with an emphasis on young humanitarian immigrants from CALD backgrounds are urgently needed to help them develop strong relationships with science and technology in Australia.

Objectives

This paper describes an innovative programme that introduced a group of young CALD humanitarian immigrants to informal science and technology education in Australia. The study evaluated their attitudes to post-compulsory education and career aspirations in science and technology. The study explored the feasibility of incorporating similar informal education programmes into existing activities that acclimatise young humanitarian immigrants. It is believed that other countries with CALD induced disparities in access to science and technology education would benefit from the findings of this study.

Design and procedures

A partnership was established with a regionally settled community of humanitarian immigrants in the township of Goulburn, which is located 90km north of the Australian Capital Territory in Canberra. Thirty participants aged between 15 to 25 years were invited to visit Canberra on two separate days in Spring 2012. They comprised sixteen females and fourteen males who had had recently arrived in Australia as humanitarian immigrants from India, Iraq, Liberia, Myanmar, Rwanda, West Africa and the Republic of the Congo. Before their visits, they were surveyed about their experiences of mainstream informal science and technology education in Australia. Semi-structured questions probed their attitudes to post-compulsory education and career aspirations in science and technology.

In Canberra, they visited seven science and technology outreach centres: Questacon - The National Science and Technology Centre, Discovery Centre of the Commonwealth Scientific and Industrial Research Organisation, Geoscience Australia, Australian National Centre for the Public Awareness of Science, Canberra Reptile Centre, Canberra Walk-in Aviary and the National Dinosaur Museum. They participated in informal learning activities facilitated by outreach staff at each of the centres. The activities were sourced from existing demonstrations and exhibits at the centres, yet contextualised to suit the participants’ learning and communication requirements. For example, where applicable the presenters shared scientific information, such as tectonic movement, natural mineral deposits, plant and animal species, etc. that was specific to the participants’ countries of origin in Africa and Asia. The

participants were encouraged to explore scientific concepts through hands-on demonstrations. Scientific information was presented through visual and tactile means. While all presentations were conducted in English medium, any scientific jargon was paraphrased into simple English by the presenters with input from the participants. Asking questions was encouraged, even if the enquiry did not bear on the scientific concept that was then under discussion.

The visits were timed to allow presentations by the staff and free time for the participants to explore activities on their own. The visits did not allow the participants to exhaust all the activities at a given centre, thus offering the option of a subsequent visit if they later chose. Mealtimes were structured into both days, during which random groups of up to five participants were asked about their perceptions of access to science and technology education and careers in Australia. Survey feedback from all participants was collected at the end of each day and a focus group with ten participants was conducted in Goulburn a month after their visits to Canberra. Interview and survey data were explored using Grounded Theory to identify emergent themes.

Findings

Perceptions about restricted access

Only two of the thirty participants had visited a science and technology outreach centre previously. Although they had visited Canberra many times, they did not believe they had access to these centres. Studies confirm that young humanitarian immigrants who have been settled in regional areas experience pronounced perceptions of restriction (Moore et al., 2008). Interviews during mealtimes revealed misconceptions about their entitlement to access mainstream informal education, even though some of these facilities offered free admission. With the exception of one participant, all the others indicated that they were willing to revisit the science and technology outreach centres in Canberra, stating that they now felt more confident: 'Before I didn't know what to do if I came here. I used to feel scared...but now I know this is a place I *can* visit.'

Programmes to socially acclimatise young humanitarian immigrants in Australia were informed about the possibility of incorporating informal science and technology education into existing acclimatisation activities. Their feedback, conversely, identified that science and technology do not 'link well with the Settlement Dimensions of Social Participation, Independence, Personal Well-being or Community Connectedness' (DIAC, Personal Communication, 19.06.2012). This apparent inconsistency with priorities for settlement of new immigrants and the absence of science and technology programmes from acclimatisation efforts may stem from elitist views towards post-compulsory science and technology education in Australia (Tytler, 2007). More informal science education programmes for young humanitarian immigrants are, therefore, needed to change the status quo.

Attitudes to post-compulsory education and career aspirations in science and technology

In the pre-visit surveys, only one participant expressed interest in a science career: 'I want to be a doctor'. Consistent with earlier studies (Moore et al., 2008), traditional views about careers in science and technology were shared by other participants, stating that they did not wish to be 'doctors' or 'engineers'. In Canberra, the participants were introduced to a range of careers that ensue from post-compulsory science and technology qualifications. Based on these insights, the participants could evaluate traditional perceptions about science and technology in relation to their popular career options, such as aged-care, manual-labour, etc. As a result, 67% of the participants developed positive attitudes to post-compulsory science and technology education, while career prospects in science seemed achievable to 13%. The student who wanted to be a doctor concluded that he preferred a career in medical research instead, and has subsequently enrolled at university. It would be beneficial to evaluate

longitudinally, therefore, the impact of informal education that explores a particular aspect of science and technology.

Ambiguity about accessing tertiary science and technology courses was highlighted by all the participants as a chief deterrent: 'I love science... but I am really nervous because I don't know how to get into university in Australia'. Post compulsory education options can confuse young humanitarian immigrants who are accustomed to limited higher education pathways in the countries of origin. It is a challenge to navigate multiple education, training and employment pathways including technical and further education (TAFE), university, apprenticeship and traineeship courses that are normally offered to Australian students with a minimum compulsory schooling up to Year 10 (Olliff, 2010). The study finds, therefore, that effective informal science and technology education for young humanitarian immigrants needs to inform clearly about pathways into post-compulsory education in Australia.

Interactive informal learning experiences

The participants rated Geoscience Australia, Canberra Reptile Centre and Questacon as the most popular science and technology outreach centres they visited. In particular, they mentioned their hands-on experiences with rock specimens at Geoscience Australia and the seismic simulation at Questacon, thus supporting studies that high-energy learning environments are better suited for young humanitarian immigrants with experiences of trauma (Brown et al., 2006).

While young humanitarian immigrants, in general, attain spoken English proficiency at a higher rate, they take longer to develop comprehension of specialised academic language (Hakuta et al., 2000). Based on observations, therefore, it is misleading to assume that the participants in the present study may not have had difficulty comprehending verbal information at the science and technology outreach centres. Their positive recall of scientific information that was presented through visual and tactile means, suggests that mainstream informal science and technology education for CALD audiences would benefit from experiential learning situations rather than verbal presentations.

In conclusion, communities with restricted socio-cultural entitlement to education may build on the findings of the present study to implement and evaluate longitudinally the impact of informal education to enable better access to education and careers in science and technology.

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