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Title Lessons from the USA: informing knowledge and expectations of university through subject specific student ambassador outreach

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Introduction

Student ambassadors are ubiquitous internationally in universities' outreach activities with school pupils, and university students are widely assumed to make ideal role models. (Gartland, 2014).

Lower socio-economic groups, girls and black and minority ethnic young people are under-represented in STEM study post sixteen and in STEM careers. Research points to the importance of pupils' 'self-identity' in STEM and indicates young people and particularly girls, decide careers in STEM are not viable for them at an early age (Archer et al., 2010; Macdonald, 2014). Supporting pupils to better identify with STEM is vital for greater diversity in these subject areas. The importance of adults in motivating and encouraging progression in STEM has been widely acknowledged (Macdonald, 2014; Rodd, Reiss and Mujtba, 2013) and lack of positive role models continues to be an issue, especially for girls who often see STEM careers as male domains (Macdonald, 2014). Despite widespread assumptions that adults working with pupils are role models, this is not an automatic process (Gartland, 2014). There has been little research into the deployment and matching of ambassadors with pupils and the efficacy of different models of activity (Gartland, 2014, 2015; Sanders and Higham, 2012).

This paper focuses on STEM outreach led or supported by university student ambassadors at four USA universities. It explores questions about organisation, funding, targeting, matching and pedagogical practices.

Methodology

The four universities were located in North Carolina and Boston and were identified via published work about K-12 STEM outreach activity. Thirteen different outreach programmes, including outreach in a range of STEM subjects were considered. My study focused on the accounts of academics, organisers and ambassadors; further research should also engage with the 'voices' (Fielding, 2004) of pupils.

I developed a loosely structured schedule for conversations to enable participants to relay their understandings, knowledge and experiences freely. (Kvale 1996; Charmaz, 2014). Drawing on similar research at two UK universities, I focused on purposes, location and setting, content and processes (Colley et al., 2003; Gartland 2014). I analysed notes and documents drawing on a grounded framework (Charmaz, 2014), line-by-line coding all data and developing in-vivo codes using participants' language. This ensured that I started 'from the words and actions of respondents' (Charmaz, 2014; 121). By comparing different

organisers' and ambassadors' accounts of activity and my own field notes, I was able to develop insights into issues and approaches across programmes.

Organisation and Funding

Much of the outreach activity observed is familiar to UK universities - aspiration raising, encouraging progression to university, and raising awareness of opportunities in STEM. Funding constraints are an issue for university-led STEM outreach in both countries. In the USA organisers face clear financial and logistical challenges to reaching wider audiences, particularly young people in rural and remote areas. This resonates with the UK situation where pupils from rural areas and areas of multiple deprivation are also hard to reach.

A key difference is that in the USA, National Science foundation (NSF) funding and a focus within institutions on public engagement promote more active engagement by university academics than in UK universities (Watermeyer,2015). This led to a focus on subject specific pedagogy in outreach programmes, frequently missing in the aspiration raising activity of UK universities. Additionally, there is a greater focus within US universities on public engagement and promoting science literacy amongst communities. These broad foci provided opportunities for project organisers to develop innovative hands-on activity for pupils and local communities without constraints of strict funding criteria or providing proof of impact on young people's subject choices or levels of achievement.

Targeting, matching and pedagogy

Efforts were made to work with underrepresented groups and many programmes targeted local public schools. The reach and extent of engagement with underrepresented groups was, however, limited by funding constraints, logistical issues and geography.

In the UK clear benefits have been identified for sustained activity with pupils (Macdonald, 2014). Some programmes observed in this study, worked with targeted small groups, providing select groups of young people with activities supporting the development of social and cultural capital as well as science capital (Archer et al, 2010). However, criticism has been made of outreach that focuses on 'a small, select few' (Macdonald, 2014: 12). Attempting to reach wider audiences by working inclusively with whole class groups in schools, however, provided limited engagement for individual pupils. Research indicates the need for consistent STEM focused enhancement activity throughout young people's school career (Macdonald, 2014:6). It is unclear, given funding constraints, how universities in either country can develop programmes that both reach wider audiences and provide young people with consistent long term access to activity. The increasing emphasis on the need for proof of impact also discourages engagement with diverse audiences of pupils with no established interest in STEM subjects, as proving success in changing their orientation to STEM is clearly problematic.

Archer et al (2010) suggest that science 'appears to be constructed as "too feminized" for (many) boys and "too masculine" for (many)girls' and identify the need to 'consider how we might bridge the gap between children and young people's everyday identities …and the identities and messages conveyed by school and "real" science' (Archer et al, 2010: 21). A significant question is whether ambassadors can help young people to 'bridge the gap' and if the classed, raced, aged and gendered identities of ambassadors is relevant. Indications from ambassadors' accounts in this study, reflecting research in the UK (Gartland, 2014), are that matching aspects of students' and pupils' identities supports identification.

In the US pedagogy and subject specific pedagogies, were prioritised in the planning of outreach activity. There was a widespread understanding of the need to employ different pedagogies in these contexts. Active and experiential approaches, relevant to particular subject disciplines, were used across programmes, positioning ambassadors as facilitators, supporting pupils' learning. School pupils' accounts in research in the UK, indicate these pedagogical approaches are more effective in supporting identifications between ambassadors and pupils (Gartland, 2014, 2015). However, such approaches are often lacking in the UK where activity is focused on recruitment and organised by marketing teams.

Conclusion

This study raises questions and issues for both countries related to the organisation, funding and targeting of student ambassador outreach activity. There are clear tensions between reaching more diverse students and the constraints imposed by funding and the need to measure impact. An important difference between the two countries is that in the USA, there is more involvement of academics in STEM outreach, and a sharper focus on subject specific pedagogy. This promoted interactive learning activity enabling ambassadors to work collaboratively with pupils and supporting their engagement with STEM subjects

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