RESEARCH UPDATE

The Building Bridges Research Project at the London Science Museum: Using an Ethnographic Approach with Under-Represented Visitor Groups

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Introduction and Project Overview

This research is based on the London Science Museum's 'Building Bridges' programme, which consists of a structured sequence of activities for Year Seven secondary school pupils (aged 11–12) and their families. The overall programme aim is to provide links between science at school, at the Science Museum, and as part of every-day family life. The activities occur over the duration of one academic year, and take place at the Museum, at school and at home. They include professional development courses for teachers, outreach visits to schools, visits by school groups to the Science Museum, and a family event.

The research presented here is a collaboration between the UCL Institute of Archaeology and the Science Museum, and focuses on families from under-represented visitor groups whose child members are part of the 'Building Bridges' programme. Previous insights have highlighted that families visiting the Science Museum come from a narrow demographic profile, with those from minority ethnic backgrounds and from low socio-economic statuses consistently

being under-represented (DBIS 2014). The research focus on under-represented visitors is important as the Science Museum seeks to inspire, engage and motivate the widest possible audience about science (NMSI 2009). The limited existing research on under-represented visitors, including families, has taken a predominantly museum-centred approach which often focuses on what families lack as a way to explain why they do not visit museums (Dawson 2014). Instead, this study takes a family-centred approach and focuses on the 'hidden' resources families have and how the Museum can tap into these. Indeed, findings from this research reveal the range of activities that families participate in, and the interests and aspirations that they have.

Collecting and Analysing Data

The research uses the ethnographic approach of participant observation to address the question: *What are families' references, values and every-day practices, and how might these relate to science?* The research participants were four case study families who are part of the 'Building Bridges' programme and are eligible for 'Pupil Premium', which is a stream of UK Government funding used here as an indicator of families' low socio-economic status (e.g. Atkinson and Mason 2014). Participant observation was based on

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the researcher meeting the families several times, totalling a contact time of around 45 hours overall. The researcher built rapport with families, visited their homes, accompanied them to local events such as football matches, to their schools and to the Science Museum. Rather than merely observing them as an outsider, the researcher blended in and took part in their activities, including cooking and conversation, to understand their lives more deeply. This participant observation provides information on families' actions and discourse, and was an informal way to gain their views, perceptions and attitudes with respect to the research question. During participant observation the researcher took hand-written field notes, in which she described what she heard and saw, and she also included her own feelings, reactions, and initial interpretations.

The researcher typed up her field notes as soon as possible after observations, and in doing so included reflections on how these observations related to her previous observations and to the literature. Typing up field notes was therefore the first stage of analysis (Emerson, Fretz and Shaw 2001). Open coding is being used during the ongoing analysis, which involves assigning codes to identify aspects linked to the research question. It is an inductive process that is shaped from 'the bottom up' by using data to allow findings to develop gradually as the project evolves. For example, when speaking about their views of science, parents referred to the school as the primary source of their children's understanding of science. They do not think of their every-day family lives as being important for their children's scientific understanding because they do not think of science as interesting and accessible to them as families. '*Views of science*' is therefore a code used to indicate parents' descriptions of their family engagement with science. Data is coded bearing in mind the codes already identified. This method allows for the continuous comparison of newly assigned codes to those that have been allocated previously (Glaser and Strauss 1967). Open coding and

the constant comparative method thus give rise to novel insights that had initially not been considered. The constant comparative method is also used to organise codes into higher-order categories, bringing together within one category codes that have common features (Merriam 1998). Analysing data is a collaborative process in that the UCL researchers and project staff at the Science Museum discuss the codes, the implications of emerging findings and how these findings can shape the 'Building Bridges' project, and wider Science Museum practice.

Emerging Key Findings

The emerging key findings indicate the importance of local communities in providing families with opportunities to socialise, develop interests and gain valuable information and advice that shape their every-day lives. Families often trust, respect and rely on these local communities rather than on official communication from government sources, local authorities or schools for information and guidance, for example when considering school choices or future careers. Family leisure time at home or in the local community often revolves around interests in technology, pets, gardening, cooking, sports and music. Most prominently, all pupils, and most parents, expressed some interest in technology, primarily in terms of their mobile phones, tablets and computers. Families not only frequently used such devices, but also spent time together exploring and understanding different applications, settings and technological features. For example, one family spent much of their leisure time tinkering with various electronic devices and technology applications, even on one occasion building a small radio.

Other examples of family activities and interests include one family who enjoyed playing with and caring for their pet cats, such as preparing their food. When one of their cats had kittens, the parents, children and neighbours enjoyed watching the kittens grow and develop. They weighed the kittens regularly and recorded their weight

to make sure that the smallest kitten got sufficient milk. Another family spent most weekends in their garden planting, weeding and harvesting herbs and other edible plants. The parents and children in this family knew about a range of plant growing patterns and the needs of different plants. They sought additional information to support this hobby, such as reading up about herbs, speaking to neighbours about plants and watching TV gardening programmes.

Science is not an overt interest for these families, or an activity that they explicitly seek out. In their eyes, science does not play a part in their every-day lives. When asked to what extent engaging with science might feature when tinkering with technology, caring for animals or gardening, the families agree that these hobbies are related to science to varying degrees. However, neither parents nor children think of their hobbies or other interests as relevant to understanding scientific concepts.

Despite these limited interactions with science at home, all families think of science as an important school subject for academic success. Parents are aspirational for their children, wanting them to achieve highly at school, including in science. They encourage their children to focus on the science homework set by their teachers, but do not also encourage them to explore how science may feature beyond the curriculum in their own lives, or to engage with science more broadly. Parents and children view science knowledge as 'facts' and textbook-based, and this shapes their views of both school and non-school science engagement. As a result, they do not view after-school activities or family visits to science museums as relevant for their academic aspirations.

For the case study families, the 'Building Bridges' project sits within the realm of 'school' rather than 'home'. Parents appreciate the school visits to the Science Museum because they believe that teachers guide pupils towards educationally relevant content in a manner that they themselves are unable to. Children enjoy the project as part of their school experiences, and this enjoyment is most pronounced when teachers include project activities in their regular lessons, and make clear links between science on the project and science during lessons. For example, one teacher used a 'Mr Potato Head' figure to explain changes to materials under pressure (**Fig. 1**). Pupils interacted with the figure to find out how the figure's

Figure 1: Example of a 'Building Bridges' outreach activity (Photo The Science Museum, London).

foam-filled inside spilled out under pressure. When such links are made children and parents appreciate the project's relevance to learning at school.

Despite the project's aim to provide links between science at school, as well as at the Science Museum, and as part of every-day family life, the families speak about the project primarily as supporting learning at school rather than also as a project for families. For families, the Science Museum is primarily a setting for school visits or guided tours with an explicit focus on the curriculum. Even as part of the 'Building Bridges' project families do not perceive the Museum as setting in which to enjoy themselves or to have fun through encountering science, because they do not think of themselves as having the necessary resources to engage with the content there. However, when the researcher accompanied the case study families to the Science Museum it was evident that the families do link their experiences and interests to what they encounter in the Museum, and that their interests and aspirations could be used to encourage museum visits and to link science at school and in the Museum to their every-day lives.

For example, one family enjoyed a gallery about space travel. They spoke about the rocket and other items on display using their prior knowledge, and their experience of technology, and they speculated on how astronauts might hear sound in outer space. Their prior experiences of sound and technological devices, as well as their broad interest in technological innovations allowed them to talk knowledgeably about the objects on display, and to use the information provided on labels. Another family spent time in a gallery dedicated to the human mind. They reflected on information about individual differences in human brains, and how such differences might apply to other animals. This included discussing the perceived personality disparities amongst their cats, and issues of nature versus nurture.

But when asked about the relevance of their prior experiences and interests to what they saw in the museum families drew clear distinctions between their own perceived 'casual' talk about science, and 'real' science encountered at school. In contrast to school visits, they do not think of family visits to the Science Museum as relevant to achieving highly at school or understanding 'real' science.

Conclusions and Next Steps

These findings suggest the importance of focusing on the hobbies and aspirations of families from under-represented backgrounds to support their enjoyment, engagement and learning about science in museums, as well as to encourage them to recognise the value and relevance of their existing interests for such learning. Both Science Museum and schools could build on families' academic aspirations by explicitly highlighting the importance of museums in supporting school science and fostering the interest and curiosity associated with academic success. Furthermore, they could increase opportunities for families to explore every-day science as part of museum visits, for example by focusing on familiar technology such as mobile phones.

The 'Building Bridges' project was enjoyed and valued as part of school learning, yet, despite its aims it did not truly engage families of pupils from under-represented audiences because they did not think of their every-day lives as relevant to the project. Future projects could focus on communicating the importance of families' existing activities and interests for science learning. Such communication could be channelled through local communities, for example by establishing enduring links with the community centres, libraries or sports clubs that families appear to rely on for support, advice and guidance. These suggestions, based on findings gained through this in depth ethnographic approach, could provide opportunities to open up museums to a wider visitor base.

More information on the Science Museum 'Building Bridges' project can be found at: https://transformingpractice.sciencemuseum.org.uk/2017/08/13/the-building-bridges-project/.

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Competing Interests

The authors have no competing interests to declare.

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