

De-mystifying science: Engaging the community to make a difference

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Abstract

There is clear evidence that for young people from relatively low socioeconomic backgrounds, science subjects can be invaluable by providing a means by which they can better engage with the modern world and take advantage of the opportunities it affords. For such young people, however, the classroom is not always a welcome environment to hear about science; different approaches are required in order to engage with such individuals. The main aim of this activity therefore was to raise the profile of science and pharmacy in an exciting yet informal manner and in so doing promote higher education.

The Manchester Pharmacy School hosted a Community Open Day event primarily targeting disadvantaged young learners and their families to explore the science behind the drug development process through a range of fun-filled, engaging activities and in so doing, raise awareness of higher education and what it can offer. Active contributions from local schools and drama groups enhanced community engagement. Feedback was assessed by a combination of structured questionnaire and free text responses.

Over 300 people attended, two-thirds (71%) of whom were from the local neighbourhood and not associated with the University. Visitor feedback gave the whole event an average Likert scale rating of 3.7 out of a possible 4. The community event was deemed an overwhelming success, providing an enlightened and positive view of higher education, science and pharmaceutical research. Activities such as this provide an excellent and alternative way of bringing higher education to the community in an exciting, educational yet informal manner.

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Introduction

Social responsibility (SR) involves people or organisations having accountability to behave ethically and with sensitivity towards social, cultural, economic and environmental issues (Investopedia, 2014). It is a commitment to bring social and economic benefits to local communities and global society at large. Social responsibility affects all sectors of society, including commerce, industry, healthcare and education, and can be accomplished by undertaking a wide range of activities, each of which may uphold one or more of the many aspects of SR (Investopedia, 2014).

Young people who are at a relative socioeconomic disadvantage can find it hard to connect with certain educational and cultural experiences. This is of serious concern given that such experiences can help develop personal, social and emotional skills, nurture relationships between young people and their peers and adults, and benefit their educational outcomes. Evidence suggests that young people from disadvantaged backgrounds are less likely to access informed science-based learning opportunities than those from better-off backgrounds (Wellcome Trust, 2014). To this extent, a wealth of inspiring and enjoyable science activities and experiences may be inaccessible to such young people as their main

involvement with science is mediated through formal schooling.

Manchester Pharmacy School has a long and proud tradition of widening participation, having an excellent reputation for recruiting students on to the MPharm programme from socio-economically deprived areas (Allison *et al.*, 2010). Over the years a number of approaches have been introduced, including the Pharmacy in Primary Schools Programme (PIPS) (Allison & Moore, 2007) and the use of contextual data in admissions (Allison, 2013). A fresh, less traditional but more inclusive approach is to engage in events and activities which benefit the community and which will build relationships with local people as well as provide an opportunity for young people to enjoy science in a way that is relevant and stimulating to them.

Despite the significant role that pharmacists play in society it often comes as a complete surprise to the general public the types of services that pharmacists can offer. More specifically, there is also much public misconception and misunderstanding about the drug development process. In order to address some of these issues and to engage the local community with pharmaceutical science in an informal manner, the Manchester Pharmacy School in conjunction with Gilead

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Sciences, hosted a family orientated Community Open Day entitled “From Bugs to Drugs”.

The aims behind the event were three-fold. Firstly, to bring science to the community by demonstrating the various stages involved in making medicines through a range of fun and informative activities; secondly, to help build a working relationship with the local community; and thirdly to help raise aspirations amongst young people to enter into Higher Education (HE) amongst those where HE may not be a primary consideration.

The Open Day Activities

Set against a public health theme, visitors were invited to journey through the different stages of the drug development process to find a cure for a new and highly infectious (and of course fictitious) microorganism (*Bacillus zombietis*) that turns human beings into zombies if infected. The organisms ‘spread’ through contact with infected surfaces and by inhalation and are extremely resistant to traditional antibiotics. The overall aim therefore was to identify the cause of zombietis and to identify, develop, optimise, test, trial and market a new, effective antibiotic.

The drug development process was shortened for the occasion to six distinct stages, titled as: What’s the disease; Attacking the disease; Designing the medicine; Making and improving the medicine; Testing the medicine; and Releasing the medicine. Each of the stages had at least three different hands-on activities associated with it. The activities were specifically designed to be educational and informative about the key factors associated with each stage of the drug development process and to attract all age groups, from primary school pupils to high school pupils and even parents and carers. Furthermore, each stand was self-contained but also linked to the others to produce a continuous story which participants could follow if they wished. Each stage also contained a take-away information leaflet giving details about that particular stage of the drug development process.

The initial stages had a strong microbiological theme in order to set the scene, whereby Stage 1 focussed on the acquisition of microorganisms by contact (for example, walking on a ‘contaminated’ yoga mat; handshake contact) through the use of a fluorescent gel and a UV torch, or using the gel and a UV cabinet to illustrate the outcome of poor hand washing. Results from these two activities were used to explain to visitors the difference between resident, beneficial bacteria and transient, possibly harmful microorganisms and the importance of good hygiene practice. Visitors were given the opportunity to look down light microscopes (Stage 2) at a range of different microorganisms, including *Staphylococcus aureus*, *Escherichia coli* and *B. zombietis*. This proved to be extremely popular with all age groups, particularly in teenagers. At Stage 3 a game of skittles was chosen to represent antibiotic resistance. The game looked specifically at promoting the importance of

using the right antibiotic as well as completing a course of treatment. Each skittle represented a different bacterial species and the ball an antibiotic. The idea was to roll the ball (antibiotic) at the skittles. Those that were knocked down were susceptible whilst those that remained standing were resistant. A discretely placed piece of velcro helped *B. zombietis* (and also MRSA) to remain resistant. Removing the 2nd or 3rd ball from the participant before they could roll it represented stopping the course of antibiotics too soon. A photographic demonstration of real life antibiotic disc diffusion plates were on display at Stage 5 to illustrate how preliminary antimicrobial properties might be assessed. Comparisons in activity for a range of antibiotics, including the ‘new’ product were shown against different bacteria, including *B. zombietis*.

Pharmacy-specific activities included ‘Dipstick’ testing for infections; measuring tablet dissolution (times tablet races, comparing different levels of **disintegrant** and binder); formulation jigsaw to illustrate typical non-active ingredients found in a tablet; participation in a mock clinical trial whereby participants were introduced to the concept of randomisation through selection of differently coloured chocolate balls and self-assessed quality of life measurements before and after drug (more chocolate) or placebo (jelly bean) consumption; looking at different types of pharmaceutical formulation for the same medicine; and producing some creative packaging for the new medicine. Other activities that were equally enjoyed by the visitors included extracting some of their own DNA, use of Molymod organic chemistry modelling kits to build ‘new’ medicines/antibiotics, and 3D computer molecular modelling. Adding to the fun was ‘Professor Penelope Peewee’ (a local drama artist/children’s entertainer) who ran an extremely interactive role play activity on three occasions for 7-12 year olds. Their task was to hunt and destroy zombies that were in the building, brilliantly played by Year 9 pupils from a local high school. These combined activities provided stiff opposition to the science activities in terms of popularity with both the kids and their parents.

Qualified pharmacists, academic and research staff, postgraduate and undergraduate students were present throughout to assist with all activities. Postgraduate students, young researchers and academic staff used their own research experiences to discuss drug development and associated research techniques, direction, ethics and future developments whilst undergraduate ambassadors led most of the hands-on activities and helped answer any general pharmacy queries. Senior staff from Gilead Sciences were also present to discuss the pharmaceutical industry approach to new drug development. In addition, there was also a stand providing information about HE and pharmacy as a career, as well as a ‘Pharmacy Art Corner’ for all budding artists wishing to exhibit their interpretations of the drug development process. Prizes were available for the best art work according to age group, as well as for successful completion of a super quiz.

Widening Participation Context

The University of Manchester is situated in an area of Manchester where in general uptake into HE by the local population is below the national average (Noble *et al.*, 2004). Accordingly, schools in the immediate vicinity of the University were visited individually and provided with leaflets and posters to either give to pupils directly or to advertise the event in key, communal areas within the school. In addition, the venue was in easy access to the neighbourhood and the event and all activities free of charge. Both the accessibility and cost of events can often be seen as prohibitive barriers to many young people and families from disadvantaged backgrounds (Wellcome Trust, 2014). A significant feature of this Open Day which set it apart from other similar university events was the direct engagement with the local community. Contributions of art work and theatre, for example, from local and neighbouring communities and schools helped to make this an event by the community, for the community.

Figure 1: Dipstick testing and analysis



Evaluation

The event was run for four hours on a wet Saturday in May, 2015 during which time approximately 300 visitors attended. On the basis of feedback questionnaire returns, approximately two-thirds of visitors were not associated in any way with the University of Manchester. From a Public Engagement standpoint, this is what the organisers had hoped to achieve (Adamson and Poultney, 2010).

Feedback took the form of either short structured questionnaires or free text comments that could be posted on the wall near the exit. The written questionnaires were designed to be visual (a pharmaceutical theme) and required little writing. They included commands and questions such as “Circle the words that best describe how you feel about today” and “What did you think were the best parts of the event?”. They also included rating scales to assess overall impact and enjoyment of the event as a whole. Individual stages were not assessed

independently. Feedback from visitors that completed a questionnaire (255 out of 303 attendees) was overwhelmingly positive, giving the whole event an average Likert scale rating of 3.7 out of a possible 4, with 98% stating “I liked it a lot” (74%) or “I liked it” (24%). The whole event clearly met the objectives of providing fun, thought-provoking and interactive activities. The vast majority of respondents said the event was “fun”, “interesting”, “educational” and “inspiring”. Significantly, 74% of those that completed a questionnaire were not associated with the University. Moreover, many even asked if we would be repeating the event or whether we could present it in a school setting. No negative comments were received. Although this may reflect some form of social desirability bias due in part to limitations of the questionnaire through the lack of forced-choice questions, all questionnaires were completed anonymously in areas away from staff and submitted in one of many collection polling-booth style boxes near the venue exit in an attempt to collect honest responses.

Event Review and the Future

Striving for social responsibility helps individuals and organisations have a positive impact on society as a whole. Engaging in events and activities which benefit the community will build relationships with local people and can help promote the welfare of the local community. The classroom is not always a welcome environment to learn about science, especially for those who are more disadvantaged from formal learning (Allison, 2013). To this end, it is important that opportunities to engage with science outside of formal education in the classroom are as accessible and engaging for disadvantaged groups as they are for families from better-off backgrounds (Adamson & Poultney, 2010).

Our intention at the outset was to raise the profile of science in an exciting, non-formal manner and that applied aspects relating to the drug development process could be delivered to a wide ranging, local audience through a series of fun-filled, hands-on activities with appropriate key messages and explanations delivered by both university and non-university personnel. In addition, the interplay between academic and industrial research could be demonstrated, presenting a holistic picture of the drug development process. Overall, the Open Day was deemed an overwhelming success, not only in terms of visitors leaving with an enlightened and positive view of both HE and pharmaceutical research, but also in terms of community engagement. By couching our activities in a themed but informal manner, the organisers succeeded in introducing pharmacy, research and indeed the benefits of HE to a much wider audience than through formal schooling. On this basis, the organisers plan to repeat these community open days bi-annually in order to have more of a fresh audience each time.

It is clear from the positive feedback that young people enjoy practical activities in which they can get actively involved rather than just watch. These often have the

greatest impact when they are informal and are organised in places where the young learners can be with their friends and family.

Events such as this, therefore, have the potential to raise aspirations by de-mystifying the worlds of academia and research and provide a means by which young people from low socioeconomic backgrounds can better engage with the modern world and take advantage of the opportunities it affords. If only a handful of participants were to engage with science at school and in future careers as a result of attending open days such as this, then that would be claimed as success. For those individuals, events such as this would have made a difference.

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