

**The Wellcome Trust**

**Millennium Science Centres  
Impact Assessment Report**

**Executive Summary**

## Executive Summary

i. The millennium science centres were developed as part of a government, scientific community and industry backed initiative to promote public engagement with science and science education. Support for the centres' set-up was provided by the Millennium Projects lottery funding scheme (providing 50% of the core funding) and other organisations, including the Wellcome Trust (the Trust), a major independent research-funding charity. In 1997/1998 the Trust provided significant capital investment (approximately £14 million in total) to five of the millennium science centres. The centres that received this funding were:

- At-Bristol
- Birmingham Thinktank
- Dundee Sensation
- Glasgow Science Centre, and
- Newcastle LIFE Science Centre.

ii. This report summarises the findings from an impact assessment of the five Trust funded millennium science centres on public engagement with science and science education. The study's overall objectives were to look at how science centres promoted public engagement with science through:

- Objective 1: learning
- Objective 2: accessibility
- Objective 3: creating dialogue
- Objective 4: community and regional activities
- Objective 5: biomedical research
- Objective 6: raising awareness and interest of science.

by

- describing the usage and role of science centres in supporting formal education, and their effectiveness
- exploring teacher's perceptions of the value of science centres
- assessing the capability of science centres for the formal and informal education of science in both young people and adults
- collecting, collating and researching visitor demographic data to achieve a fully comprehensive understanding of audiences
- assessing their effectiveness in social inclusion and broadening access (with respect to visitors/target audiences)
- assessing the added value of science centres in providing platforms for public debate on scientific issues

- assessing the added value of science centres in providing platforms for specialists (e.g. scientists) and students to interact with lay audiences
- assessing the public perception of science centres and their value
- describing the partnerships created with other local organisations in relation to public engagement/education with science
- assessing the impact of science centres on the level of public engagement with science activities in the region
- describing the nature and extent of the biomedical-related exhibits and events
- assessing the impact of Trust-spend on the centres adopting biomedical science, and its related issues, into their remit
- evaluating science centres on their effectiveness in raising awareness of science; its issues, implications and applications in young and adult audiences, and
- assessing the impact and effectiveness of science centres in stimulating interest and excitement in science amongst young people and adults.

iii The impact assessment was conducted in two phases comprising:

***Phase 1***

- face-to-face interviews with members of staff at each of the five science centres
- desk review
- interviews with national stakeholders e.g. Ecsite-UK<sup>1</sup>

***Phase 2***

- telephone interviews with partners and local stakeholders
- teacher interviews
- schools focus groups
- 'Walk and Talk' observation exercises
- face-to-face exit survey with visitors
- omnibus survey with non-visitors.

Participant numbers are outlined in Table A.

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<sup>1</sup> Ecsite-UK: A branch of ECSITE, and forms a network of over 80 UK based science centres, discovery centres and museums. It was originally developed through funding from The Wellcome Trust. Ecsite-UK “*aims to raise the profile of science centres and establish their role as a forum for dialogue between science specialists and the public and as an informal learning resource for learners of all ages*”. It advocates government recognition for science centres. See <http://www.ecsite-uk.net/about/> for more information.

**Table A: Participant numbers**

Method	Participants	Total
<b>Phase 1</b>		
National Stakeholder interviews	Representative bodies, e.g. Ecsite-UK, government departments, national educational organisations	6
Face-to-face interviews: centre staff	CEO's, Senior and junior staff, and Trustees/Board of Directors	58
<b>Phase 2</b>		
Telephone interviews: local partners/ stakeholders	Scientific societies, local education authorities, regional development agencies, SETNETs/SETPOINTS, charities plus many more	65
Face-to-face exit surveys: visitors	Family groups, couples, individuals etc. visiting the centres	318
Omnibus survey: non-visitors	Household survey of non-visitors	2,608 Unweighted <sup>2</sup>
Face-to-face interviews with teachers	Schools that have visited the centres up to 3 months prior to phase 2 fieldwork	21
Schools Focus Groups	Schools that have previously visited the centres up to 3 months prior to phase 2 fieldwork	39 (222 individual pupils in total)
'Walk and Talk' observations	Schools visiting the centre during phase 2 fieldwork	12 (80 individual pupils in total)

**Overall Summary**

- iv. The impact assessment revealed that the five millennium science centres provide considerable resources for their local regions – contributing to local regeneration, supporting formal education and acting as regional 'hubs' for science based activities.
- v. The five millennium science centres offer a wealth of knowledge and expertise relating to the wider aspects of public engagement with science and science education. They have faced a number of challenges over the past five years, however, including:
- stabilising their income to ensure that there are sufficient funds to deliver their core operations
  - accessing new funds to allow the centres to develop innovative approaches to public engagement and science education
  - embedding themselves within mainstream education, and

<sup>2</sup> 19,876 weighted. A 72 cell matrix based on National Readership Survey (NRS) data is employed with SEX, AGE (16-24, 25-34, 35-54, 55+), SOCIAL CLASS (ABC1, C2, DE) and grouped Registrar General's Regions (North, Midlands, South) controls. The sample is then grossed to represent the GB adult population.

- addressing the issues surrounding social, cultural and financial accessibility.
- vi. To meet these challenges the centres have undergone considerable change, including:
- extensive organisational restructuring in response to financial pressures and/or the role of the centres changing over time, and
  - substantial redevelopment through the exhibition renewal ReDiscover programme (a joint venture between the Millennium Commission, the Wellcome Trust and the Wolfson Foundation).
- vii. The size, capacity and levels of resourcing greatly influences the volume and breadth of activities: smaller centres have to adopt a more focussed approach towards public engagement with science and science education.
- viii. There is very wide variation in the way the five centres operate and relatively little in the way of external requirements to collect consistent datasets. As a result meaningful comparisons of visitor numbers, annual costs etc. were virtually impossible.
- ix. We summarise key findings below:

***Objective 1: Learning***

- x. The centres provide a range of activities, programmes and events for both public and educational audiences (including primary and secondary schools, nurseries, colleges etc.). All activities have some educational content, whether explicit or implicit, and are designed to engage people with both scientific phenomena and discoveries. While public and educational programmes and activities often overlap, each of the centres spend considerable amounts of time developing annual programmes specifically designed to promote formal science education, and support schools within their region.
- xi. In all five centres, the numbers of schools and pupils participating have grown as a percentage of total visitors over the past five years, but it is important to note that in at least two cases this was accompanied by a decrease in total visitor numbers. The centres are increasingly catering for wider educational audiences, adapting programmes to suit different age ranges and introducing cross-curricular activities and events, whilst striking a careful balance between providing an educational experience and a 'fun' and interactive resource for schools and teachers.
- xii. Primary school teachers felt that they were well catered for with strong curriculum links. In comparison, secondary school teachers felt that more could be done to support secondary education, arguing that the depth of information needed at this level was not available. There appear to be several factors that can create this

imbalance, including a lack of curriculum content and difficulties in school timetabling. However, a number of teachers felt centres had not made enough effort to facilitate learning through the use of explainers/enablers, particularly in relation to the use of exhibits. In comparison workshops, shows etc. were well received by both teachers and pupils. This finding contrasted with the centres' own views that their strengths lay in their ability to interact with their visitors, indicating that there may be some mismatch between teachers' expectations for their visit and what the centres believe they are offering.

- xiii. All five centres offered some form of continuous professional development (CPD) for teachers and felt that it formed an integral part of their educational 'offer'. However, very few teachers interviewed were aware of the CPD opportunities, and those that were aware gave mixed responses regarding their value particularly for experienced teachers. There were also doubts about the CPD programmes value for teachers who were not science specialists but who may be required to teach science, particularly in primary schools.
- xiv. School focus groups and 'Walk and Talk' observations revealed that pupils benefited most when the visit had specific learning objectives. Often, in these cases, pupils were able to talk in some depth about their experiences at the science centres and relate it to things they had done in the classroom; particularly by those who had participated in workshops or shows. The different learning opportunities were discussed enthusiastically. In contrast, pupils who had visited the centres with no specific learning objectives were less able to talk about specific exhibits, workshops or shows and could not recall what they had learnt during their trip.
- xv. Whilst the centres offer a range of informal educational activities for all audiences, activities are focussed on children between 7-11 years old and family groups. There may be potential for expanding adult audiences which should be explored.

### ***Objective 2: Accessibility***

- xvi. There are no requirements for centres to collect or collate data in a uniform manner and as a result visitor data varies considerably (see Appendix I). Consequently, only the broadest of comparisons can be drawn. The available data indicates that the science centres attract a fairly narrow audience, consisting of slightly more women than men, typically aged between 35-44 years old and visiting as part of a family group. Visitors are predominantly of White-European background, although in 2 out of 5 of the centres this may reflect the relatively low numbers of ethnic minority groups in the local population.
- xvii. To attract a wider audience, the centres provide substantial resources to develop links with local communities; usually in the form of targeted activities to support

schools and communities geographically isolated from the centres, and special measures to access disability and community groups. How successful these efforts are is difficult to assess: centres argued that relationships with these communities are often fragile making robust evaluation of specific projects difficult. Furthermore, many of the partnerships which enable the centres to deliver these activities exist on an informal basis which precludes measuring specific outcomes.

### ***Objective 3: Creating Dialogue***

- xviii. Breaking down existing barriers between scientists and the public forms an important part of each centre's remit. Numerous one-off activities promote dialogue between the public and specialists/scientists, as well as providing opportunities for scientists to get involved with public engagement more widely. Exhibitions are designed to engage the public, however, larger scale activities, such as debates involving specialists, do not form part of the core-offer at the five science centres and often rely on available funding and key partnerships to take them forward.
- xix. On the whole, specialist and scientific partners spoke highly of the centres perceiving them to provide a valuable opportunity for specialists to interact with the public. Moreover, centres are continually looking for innovative ways of engaging scientists and the public in research by bringing students and specialists into the centres. The report suggests the centres may be able to build upon their current offer by developing more strategic links with policy and organisations with similar remits, thus increasing their capacity for public engagement.

### ***Objective 4: Community and Regional Activities***

- xx. The five millennium science centres were perceived favourably by both visitors and non-visitors. Visitors to the centres felt that 'user friendliness' was the most important factor in determining whether or not they visited. For non-visitors the most important factors were the time available to visit and admission cost. Visitors and non-visitors perceive the science centres to be primarily educational institutions and aimed at children.
- xxi. Visitors were interested in science, and felt that they had learnt much more than they expected from their visit. They also felt that the science centres had encouraged them to think more about scientific issues and questions. Furthermore, many felt that they had been encouraged to go away and learn more, with the majority stating that they knew how to obtain information about science if they wanted it. In contrast, most non-visitors felt that they were neither interested nor uninterested in science, but knew how to obtain information about science if they wanted it anyway.
- xxii. Each centre has a number of partnerships on a local, regional, national and international basis which can be loosely defined as educational, intellectual, social or

financial partnerships. The extent to which partners are involved with the science centres depends on the reasons linking with the centre and the level of resources available.

- xxiii. Partners tended to speak favourably of the science centres and were clear that – whilst often there was no measurable impact – the centres had raised the profile of science in the region and had made it more accessible. In some cases they could point to more specific impacts of the science centres, such as the development of local science festivals and helping local organisations to increase their educational outputs. There were also a number of examples on a national and international basis, demonstrating the centres' ability to contribute to public engagement with science more widely.
- xxiv. Whilst partners spoke highly of the centres, there was some evidence to suggest that partnerships were often patchy and opportunistic. On the one hand, this represents centres' flexibility in responding to funding opportunities, changes in community issues and developments within scientific research. On the other hand they may be seen to lack direction with no coherent strategy for what the partnership could bring to the centre's longer term development.

#### ***Objective 5: Biomedical Research***

- xxv. The extent to which biomedical exhibitions have been adopted by the five millennium science centres differs from centre to centre, with some having an explicit focus on biomedicine and its related themes, others including biomedical topics and issues as part of an overall wider scientific remit. All five centres recognise the importance of biomedical topics, and offer biomedicine-based public debates and lectures, shows, permanent and temporary exhibitions, workshops, arts programmes and teacher CPD.
- xxvi. Biomedical content is often dependent on the types of partnerships that the centres have developed public demand and funding which may influence immediate issues such as exhibition renewal and/or specific educational programmes. While this approach may have useful benefits in terms of temporarily improving visitor experiences and interest, it may actually be harmful in the long-term if it does not support strategic development and sustainability.

#### ***Objective 6: Raising Awareness and Interest***

- xxvii. The centres have the capacity to raise awareness and interest in science through the use of extensive and varied programming throughout the year. Whether or not these resources are targeted at the widest audience possible and actually raise awareness in a number of different groups, however, is open to debate. In the past five years the

millennium science centres have made relatively few attempts to try and assess their impact, looking predominantly at specific projects rather than at their whole offer.

- xxviii. The existing evidence suggests that the centres appeal to the ‘interested amateur’ and that visitor numbers are heavily biased towards young children and families. Yet this evidence is unlikely to be truly reflective of the whole offer at the centres, and efforts to ensure that they appeal to a wider range of audiences. The lack of cultural diversity at those centres in regions with large ethnic minority populations remains a puzzle and should be looked at in more detail in the future.
- xxix. Understanding the complex relationship between who the centres want to attract, versus who they have to attract to remain financially viable is key to understanding how the centres sit within the educational and scientific landscape, requiring a better understanding of what works, how it works and why. A paucity of credible and valuable data prevents any robust assessment of the centres capacity to raise awareness. Addressing this is could be one of the biggest challenges centres face.

## Conclusions

- xxx. Whilst the paucity of data currently collected – particularly in relation to outreach work – makes rigorous impact analysis very difficult, the impact assessment identifies a number of areas where the centres have tangible impacts and can draw the following conclusions, including:
- there are high levels of activity from each of the centres, often with significant educational content and valued highly by at least a proportion of stakeholders
  - the number of educational visitors to each of the five centres has grown over the past five years
  - there tends to be more primary schools than secondary schools visiting the centres
  - many of the centres’ activities have strong links with the primary school curriculum, but the links are less explicit at a secondary school level
  - educational visitors with additional classroom support and specific learning objectives in mind, tend to report much more positive responses than those who visit without specific learning objectives
  - core audiences are predominantly European, aged between 35-44, female and visit as part of a family group, in many cases there was very little evidence to demonstrate that the centres engaged black or minority ethnic groups
  - the centres provide many outreach activities but the effectiveness of these measures has rarely been assessed
  - biomedical exhibitions form a key part of the offer at each of the centres

- current partnership work is highly valued by each of the centres and in many cases can be very successful. In a number of cases, partnerships may be confined by poorly specified goals and different expectations

## **Recommendations**

xxxi. Key recommendations arising from the impact assessment include:

- ensuring that centres facilitate school visits round the exhibitions to improve the experiences for both teachers and pupils
- providing better links to the secondary school curriculum should be considered by the centres
- reviewing the role that the science centres play in providing teacher CPD
- centres should look at the opportunities to expand adult audiences through supporting lifelong learning
- establishing a consistent data collection system whereby datasets can be compared across science centres to inform strategic decisions, understand the position of the sector more widely, lobby policy makers/potential funders/stakeholders more effectively and provide information on the sustainability and maturity of the science centre sector as a whole.