

# Our Dynamic Earth Education Impact Research: Workshop Review

Professor Jack Jackson OBE FRSE FSB, University of Strathclyde

Conducted May-June 2014

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Period of review: May-June 2014

### Background

HM Inspectorate carried out a review of the work of Our Dynamic Earth (ODE) in 2006 and carried out a follow up visit in 2009. The follow up report noted the significant improvements that had been made against the recommendations that were identified in the 2006 report. These included improvements to accommodation for educational presentations and workshops, the size and composition of the Education Team and the range of pre- and post- visit materials that were available to schools and other users. Additional significant improvements noted included changes to the galleries and to the Showdome, further evidenced by a recent visit to the centre, accompanied by Professor Stuart Monro. However, these latter aspects were outwith the scope of the current review which focused specifically on the work of the education service.

## Conduct of the Review

The reviewer met with the Education Team in May 2014 to discuss the scope of the review and to brief team members about how the review would be carried out. The Education Manager requested that the review should focus on the following:

1. Evaluation of the content of workshops in relation to the experiences and outcomes (Es and Os) of Curriculum for Excellence;
2. Evaluation of the interactivity and engagement of pupils and teachers in workshops in relation to the four capacities of Curriculum for Excellence and their cross-curricular appeal;
3. Evaluation of the content of website materials in relation to the experiences and outcomes of Curriculum for Excellence;
4. Use of accommodation and resources, including ICT, to enhance the delivery of workshops; and
5. Observation of the outdoor learning experience.

In order to successfully evaluate the content and delivery of workshops, including the outdoor learning experience, the reviewer attended eight workshops selected by the Education Manager to reflect the breadth of topics on offer to schools and other users. These are listed in the Appendix. Where possible the reviewer spoke to the adults accompanying the pupils to ascertain the relationship between the content of the workshop and the topic work which had been, or was being, covered in class.

## Evaluation of delivery of workshops

### *General overview*

Over the last eight years, there has been a significant transformation in the range and quality of experiences offered to children and young people at ODE. There are number of likely reasons for this, including:

- Improvements to accommodation and resources, for example:
  - creation of three suitably-sized workshop spaces with minimal internal storage thus allowing more space for movement and active engagement;
  - good quality tables and chairs which could be arranged flexibly to accommodate different group sizes and activities;
  - high quality lighting and sound systems to create an atmosphere of anticipation;
  - incorporation of data projectors and electronic whiteboards; and
  - provision of additional resources designed to increase hands-on experiences and interactive involvement.
- Expansion in the size of the Education Team:
  - staff were very well qualified across a wide range of appropriate disciplines (biology, geoscience, physics, environmental science, geography) which allowed them to develop and deliver workshops related to their specialist interests and to share their expertise with colleagues;
  - staff were very effective communicators and some additionally had teaching qualifications;
  - staff had a good understanding of Curriculum for Excellence and its implications for primary and secondary education and these principals, capacities and Es and Os had been applied in the design of new workshops; and
  - the increased size of the team allowed more time for staff to develop new, and further enhance existing, workshops, and to provide absence cover for colleagues.

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- Quality assurance and leadership
  - senior managers at ODE were very supportive of the work of the Education Team;
  - very good leadership was provided by the experienced Education Manager who had engendered a strong culture of self-evaluation and empowerment amongst the Education Team; and
  - staff morale was high and the quality of team work was very good.

### *Evaluation of the content of workshops in relation to the experiences and outcomes of Curriculum for Excellence*

Detailed analysis of the workshops observed indicated that good attention had been paid to the incorporation of a broad but appropriate range of Curriculum for Excellence experiences and outcomes. Across the workshops, Es and Os had been included from science, social studies, technology, expressive arts, English language and mathematics as appropriate. Understandably, in the design of workshops, the main focus was on science and social studies but, where opportunities arose, technology and expressive arts were suitably included. For example, technological Es and Os provided opportunities for pupils to discuss sustainability, conservation of resources, and recycling, and to engage in enterprise and team working. Similarly, expressive arts Es and Os provided opportunities to present to an audience, solve design problems and participate in singing. Pupils had many opportunities to practise literacy skills when answering and asking questions, finding and using information and recording observations. Although some opportunities were provided to develop mathematical skills such as gathering information and interpreting and drawing conclusions, some thought should be given to how other relevant skills might be incorporated in workshops.

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In the programmes for primary and secondary schools, workshops were arranged under the following broad themes – Our Dynamic Earth’s Processes, Biodiversity and Our Environment, Contemporary Science, Space and Outdoor Learning – and an indication was provided of the most appropriate stages for each workshop. Although some of these themes reflect those in Curriculum for Excellence, teachers might find it more helpful if the workshop themes were the same as in Curriculum for Excellence guidelines. For example, Processes of the Planet (Our Dynamic Earth’s Processes), Biodiversity and Independence (Biodiversity and Our Environment), Topical Science (Contemporary Science), and Space (Space). It is also surprising to note that the theme of Biodiversity and Our Environment is not included for secondary schools because ODE staff expertise and the local environment in particular would support such an approach. Whereas the primary programme contains a good range of workshops for early years and P1 to P7, the secondary programme contains very little for senior pupils in S4 to S6. While the current range of programmes may suit existing audiences, there may be opportunities to attract other audiences.

### *Evaluation of the interactivity and engagement of pupils and teachers in workshops in relation to the four capacities of Curriculum for Excellence and their cross-curricular appeal*

In all the workshops observed, staff were very effective at welcoming school groups and quickly engaging them in their workshop. This was sometimes done against a difficult background of late arrival of groups, where programmes had to be altered and/or workshops had to be shortened. On arrival, pupils were often excited and staff worked hard to settle them using slides, film clips or interesting artefacts to engage their interest. This approach worked well and, because staff were well prepared and all materials were at hand, pupils quickly progressed to activities which required them to, for example, handle and investigate materials, collect evidence, analyse data, draw conclusions, carry out experiments, discuss results or present information. There were often several activities that pupils worked round in small groups of three or four, spending about five minutes on each activity. Staff were skilled at asking and answering questions, especially

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more open-ended questions which required pupils to think and answer at length. They also made effective use of praise to reward success or to recognise contributions. In some of the workshops, pupils were very knowledgeable about the content and answered questions well and with confidence. This clearly reflected the fact that particular topics had been covered in class, a point which was confirmed by the teachers who accompanied the groups. All the workshops adopted a cross-curricular approach although this largely went unnoticed by pupils who focused on the tasks and associated activities.

In all the workshops observed, pupils had opportunities to display that they were successful learners, confident individuals, responsible citizens and effective contributors although the balance of these quite naturally varied from workshop to workshop. These four capacities are all aspirations for Curriculum for Excellence and it is reassuring to see that ODE staff have taken account of them in planning their workshops. In order to determine that pupils were successful learners staff typically asked questions about the content of the workshop. One very successful approach was where pupils used voting pads to answer a short series of questions at the end of the workshop. This quickly demonstrated what proportion of pupils was getting the correct answer and feedback was given to the whole group immediately which generated great excitement. Given that voting pads are available, their use should be considered for other workshops. In relation to confident individuals, pupils were given opportunities to 'achieve success in different areas of activity' and 'to take informed decisions'. There were many opportunities for pupils to demonstrate that they were responsible citizens when 'evaluating environmental, scientific and technological issues', 'developing knowledge and understanding of the world' and 'developing informed, ethical views of complex issues' in the context of workshops. In terms of effective contributors, pupils were given opportunities to 'work in partnership' and 'solve problems'.

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## Evaluation of the content of website materials in relation to the experiences and outcomes of Curriculum for Excellence

ODE has a range of curriculum materials on its website for use by teachers and pupils, covering for example, Natural Disasters, Space, Dinosaurs, Rain Forest, Weather, Biomes, Volcanoes and Supervolcanoes. These materials could be used to prepare pupils for a visit to ODE or could be used to carry out some follow up work on return to their classrooms. Although they do not specify the age or stage for which they are designed, the approach is most likely to appeal to primary or early secondary pupils. About half the topics mention the specific relationship with themes in Curriculum for Excellence and this approach would be helpful in other topics. All the materials are very colourful and attractively presented which will certainly appeal to pupils. They are clearly designed to be cross-curricular but with the main focus on science and social studies. Some of the topics were more successful than others in this respect since there was a danger that art and craft activities might predominate in some. Across the topics, there were some very exciting ideas for activities. These included, for example, factual information, experiments, things to design and make, games to play, ideas for role play, art work, music, and helpfully lots of useful websites to visit. As ever, the problem with materials of this kind is encouraging teachers to access them either before they come to ODE or after they leave. The most recent Education Impact Analysis indicated that about 40% of teachers accessed the support materials on return to their schools. That should be quite heartening.

## Use of accommodation and resources, including ICT, to enhance the delivery of workshops

As indicated earlier, very significant improvements had been made to the accommodation and the coloured lighting down the approach corridor helped to create an atmosphere of anticipation and awe. Subdued lighting in the rooms helped the pupils settle in small groups at the round tables although the group size had to be adjusted on occasion to form more evenly sized groups. Where appropriate, staff organised the furniture in the room to suit the audience as, for example, when very young pupils attended for a story telling workshop, tables were moved aside and a protective mat was laid so that pupils could safely sit on the floor near to the presenter. The three rooms were relatively spacious and provided sufficient space for pupils to move safely around the room as when they were rotating around a number of activities at different tables. What was most impressive about the rooms was the availability and highly effective use of audio-

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visual and interactive technologies. Each room had two screens, one which was mainly used to display slides and video clips and the other was an interactive whiteboard where staff and pupils could interact with images and data. In almost every workshop, staff made very effective use of both screens. Slides and short video clips were of a very high standard and served to demonstrate and exemplify a range of different topics in a very effective manner. This really engaged pupils' interest and allowed them to gain a better understanding of topics such as continental drift, climate change, extreme weather conditions, the structure of the earth, and life in a tropical rainforest. Pupils were given many opportunities to use the interactive whiteboard for a variety of purposes and they showed confidence in annotating diagrams and photographs, manipulating data and watching short video clips.

### Observation of the outdoor learning experience

During earlier visits to ODE it was recognised that the centre was located very close to Holyrood Park which incorporates a range of very interesting features including Arthur's Seat, Salisbury Crags and St Margaret's Loch, all of which are very relevant to the themes of ODE. Although the potential to develop workshops in the immediate environment was recognised by staff, there were a number of difficulties that had to be overcome, the most significant of which related to health and safety issues. However, with funding, support and advice from a number of individuals and organisations, staff had developed an outdoor learning experience to 'provide inspirational and transformative learning in the outdoor environment' which was intended to be the first in a number of possible workshops.

Two members of staff and a class teacher accompanied a small group of 10 P5 pupils on the outdoor learning experience. The weather was dry, sunny and pleasantly warm. ODE staff briefed the pupils about a range of health and safety matters before they set off to explore the different rocks arranged in time sequence to reflect the major periods in the Earth's history. Having set the scene some 350 million years ago, pupils then set off for the park, safely crossing the main road. Pupils had been given a folder containing photographs of 12 plants and animals they might see on the walk although few were in fact spotted. The walk was very well judged and staff took good account of the age and abilities of pupils. Short bursts of walking were interspersed with stops to look at different rock formations, including sedimentary rocks, rocks which had been transported by glaciers and lava flow. Pupils were well behaved and engaged

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throughout the walk. Pupils were given a short stop for a snack and, having been given a current photograph of Arthur's Seat, they were asked to draw what the volcano might have looked like 345 million years ago. The teacher accompanying the group was very pleased with the workshop and felt the pupils had gained a lot from this first-hand experience of the outdoor environment.

Given the success of this first outdoor experience, there are clearly opportunities to add extra workshops focusing on, for example, themes such as biodiversity and independence and people, place and environment. While understanding the need to be cautious when working in the outdoor environment, there may be ways of reducing the staff input on such outings especially when groups are accompanied by teachers. Providing appropriate risk assessments are carried out and staff have mobile phones or similar, then it should be possible to resolve most problems that might arise.

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## Appendix 1 – Workshops observed

Supervolcanoes – 14 secondary school pupils studying geography plus 2 adults from Hurworth School in Darlington; workshop taken by Tiffany Jones

Climate Change – 15 primary school (P4) pupils plus 2 adults from Belmont House School in Newton Mearns; workshop taken by Anna Danby

Wild Weather – 24 primary school (P4/P5) pupils plus 3 adults from Newington Primary School in Annan; workshop taken by Vicki Levy

Journey to the Centre of the Earth – 27 primary school (P5-P7) pupils plus 4 adults from Quarter Primary school in Hamilton; workshop taken by Laura Mayhew

Outdoor Learning Experience – 10 primary school (P5) pupils plus 1 adult from Cowie Primary School near Bannockburn; workshop taken by Anna Danby and Emma Paterson

Anton's Tropical Adventure – 12 primary school (P1) pupils plus 4 adults from Dunbarney Primary School in Bridge of Earn; workshop taken by Anna Danby

Space is Big – 11 primary school (P7) pupils plus 3 adults from Spean Bridge Primary School; workshop taken by Vicki Levy

Quake Rattle and Roll – 19 primary school (P4) pupils plus 3 adults from Moorfoot Primary School in Gourrock; workshop taken by Laura Mayhew