



Earth Science Education Forum (England and Wales)

Minutes of the 57th meeting

Held in the Earth Science Training Room, Natural History Museum, London,
1.00 pm, 08 December 2015.

Present

Annette Shelford (NHM Learning Team/Real World Science)
Chris King (Earth Science Education Unit)
Isabel Markham
John Stevenson (BGS)
Martyn Bradley (Geology Trusts)
Susan Brown (Rockwatch)
Tom Hose (GeoConservationUK)
Nikki Edwards (ESTA)

1 Apologies

David Bailey (Geologist and science communicator)
David Brook (London Geodiversity Partnership)
Judi Lakin (GSL)
Lesley Dunlop (English Geodiversity Forum)
Maggie Williams (Liverpool Uni.)
Nic Bilham (GSL)
Pete Loader

Presentations

Oliver Moore, Natural History Museum: update on the NHM Learning Programmes. Andrew Brookes, Natural History Museum: storyboard of schools' theatre programme on volcanoes

Annette Shelford, Natural History Museum.

'Real World Science: Museums working in partnership to unlock the learning potential of their natural history collections.'

Slides and summary of presentation.

2 Minutes of the 56th meeting, 13 October 2015

The minutes of the 56th meeting were accepted as a true record. A copy has been placed on the ESEF website.

Action: JS

3 Matters arising

3.1 National Curriculum (KS3 & 4)

CK reported that the A level geology criteria is currently out for consultation until 15 December; first teaching is scheduled for September 2017.

CK reported that consultation for GCSE geology is complete and that the WJEC/Eduqas are preparing for the development of the new GCSE Geology specification for first teaching in September

2017. WJEC/Eduqas is the only awarding body developing reformed subject content for the GCSE geology specification.

NE explained for clarity that exam syllabuses are now called specifications, which are written by the various exam boards. The specifications must fit the criteria written and developed by Ofqual. Ofqual checks the specification meets the subject criteria and gives the specifications final approval.

3.2 *Training for secondary geology teachers:*

CK reported that the summer school is scheduled to go ahead in 2016 at Keele.

CK reported that the Earth Science Education Unit at Keele would close down as of the 31 December 2015 and that he would also retire from Keele on the same date. The ESEF would like to thank Prof. King for his contribution to the ESEU over the past 15 years, without which we may not have seen such a long-running and successful national earth science CPD provider. Hope remains that a new organisation will be set up in coming months to continue ESEU's work.

3.3 *Geology for non-geologists training 'Geolab':*

NE reported that GEOLAB events are scheduled for Westmoreland and Newcastle in 2016.

3.4 *Destination survey for A-level Geology students:*

A new survey is being carried out, led by OCR, to identify data showing the positive impact of studying A-level geology.

3.5 BGS GeoBritain Map (previously known as the *National Geology Database*)

JS reported he had added a new category to the BGS GeoBritain map, 'Rock and fossil loan boxes for schools'. This new category highlights museums that have loanable resources that schools can book out and use in school classrooms. Most providers provide resources for free but some charge for their loans.

JS also reported that he had submitted a short article about the GeoBritain map to the ESTA, TES and GeoConservation UK newsletters.

3.6 *Geological poster map of the United Kingdom and Ireland:*

Nothing to report.

3.10 *Future talks/presentations*

29 March 2016	Susan Brown – 'About Rockwatch'
15 June 2016	Natural England SSSIs? TBC

4 **Finance report**

Nothing to report.

5 **ESEF website (www.esef.org.uk)**

The website is up to date.

6 **All-Party Parliamentary Group for Earth and Environmental Sciences update**

Nothing to report.

7 **Potential collaborative projects**

Nothing to report.

8 **ESEF Achievements**

9 **AOB**

MB provided the following written update about the Holloway Award of the Warwickshire Geology Conservation Group (WGCG). The WGCG will offer a number of bursaries in memory of Rob Holloway who died in 2010. To meet Rob's wishes beneficiaries may include, amongst others, schools and their pupils, university Geology and Earth Science undergraduate and post-graduate students and young professionals in the 'extractive and mineral processing industries. To date WGCG has regarded the following as appropriate recipients of awards – individual Primary Schools, Summer School Training of Secondary geology teachers, degree students undertaking geology projects, geology students undertaking relevant work experience placements and graduate students undertaking research projects with a geological application early in their careers. In addition, WGCG has been supporting outreach and educational activities as well as individual institutions where geology is used to contribute to the developing the 'public understanding of science'. Applicants should contact warwickshiregcg@gmail.com for further details.

Note: the WGCG has offered two bursaries of £1500 each to support the Summer School in Learning and Teaching Geoscience (training new geology teachers) for the summers of both 2016 and 2017.

MB also provided the following written update about Geology Trusts' news. Herefordshire & Worcestershire Earth Heritage Trust has been granted money by the Heritage Lottery Fund for a two year project to develop educational smartphone apps related to four specific sites, suitable for children aged 10 - 18, and hopefully to be of interest to adults with an amateur interest in geology too. University IT students will be helping with the graphic design for the app content under direction from geologists and Earth science education professionals. School students will help develop the style of the apps and trial them. At the end of the project, it is hoped that those young people will also help introduce the apps to adults (maybe Ramblers or U3A groups) to add an extra dimension not only to their walks in the countryside, but also to how they use their smartphones!

The Warwickshire Geological Conservation Group is using money from a generous legacy from a former member to award grants to support post graduate student projects. They continue to develop town trails and the recently completed Stratford geological trail will shortly be followed by a Kenilworth trail. An exposure of the red castle Triassic sandstone beside a cycle and walking path in Kenilworth has been cleared by volunteers from WGCG and Sustrans. An information board explaining the geology of this desert period is about to be erected. At Warwickshire Wildlife Trust's Brandon Marsh Nature Reserve, WGCG has built a wall beside the education centre to illustrate a north south transect of the Warwickshire rock sequence.

10 Dates of future meetings

29 March 2016

15 June 2016

Summary of presentation to ESEF, December 2015

Annette Shelford

SLIDES START AT PAGE 7 OF THIS DOCUMENT

Real World Science: Museums working in partnership to unlock the learning potential of their natural history collections.

Annette introduced herself as the lead practitioner of a national partnership of museums who work together to engage young people with science through their natural history collections. The priority audience is secondary school students (KS3, KS4 and KS5) but increasingly we are working with upper KS2 to support transition and as a result of curriculum changes- evolution at KS2 is generating more interest in visits. Real World Science is about doing what it says- providing real world contexts to science within the curriculum, and bringing scientific enquiry to life through the use of real specimens, real scientific research, and real equipment (see examples below).

Slide 2: summarises the partnership members and provides some facts and figures about the levels of contact we have with students.

Slide 3: describes the way we work; Annette's role is primarily to support the museum educators in each of the partner museums to work together; our current methods are through offering funding to partners to enable collaborative development of new learning programmes for schools and to support the museum educators' professional development through knowledge exchange.

Slide 4: summarises the aims of the project.

Slide 5: summarises our guiding principles which underpin all of our work together.

Slide 6: a brief summary of what the result of 12 years of collaborative learning programme development look like to our audiences. Annette highlighted the number of earth-science related programme that exist, and that most of the new programmes developed over the past 3 years since she came into her role have been related to earth science, in both the science and geography curriculums as well as geology.

Slides 7-14: provide some examples of the variety and styles of programmes we are offering that support and extend the needs of the national curriculum through exploring collections, objects and displays in each museum. These are all inquiry-based, and most also have a strong emphasis on problem-solving and help to build understanding of different earth science careers.

Slide 7: Palaeoart at Peterborough Museum uses the Jurassic Sea gallery displays to explore evidence of past life through fossils, and to gain understanding of and put into practise the scientific processes such as comparative anatomy that enable us to

“bring fossils to life”. The development of this workshop was supported by palaeoartist Bob Nicholls who created the interpretive art that fills the gallery.

Slide 8: Rocks the House at the NHM is a science show that covers most of the key curriculum content for KS3, and is also run as an adapted session for KS2. Big models and participatory demonstrations are at the heart of these programmes. At NHM our numbers are huge, and much of the schools’ programme is now delivered in the form of shows, unlike most of our partners who tend to work with smaller groups of students, often in a more bespoke manner. Oxford, Manchester and Stoke also have the materials for this show and use them in different ways within their programmes based on what works best in their spaces and for their local audiences.

Slide 9: Ideas and Evidence is a practical dinosaur-science based activity day at OUMNH that covers a range of curriculum content linked to Working Scientifically. There are lots of opportunities for students to work with primary and secondary evidence, and to gain understanding of how ideas change for palaeontologists with the input of new evidence. The pictures shown are an activity called “Bag of Bones”*; the students are given a selection of paper cut-out bones and are asked to make a skeleton. When they have finished each group compares what they have made and they reflect on the process they used and how this is basic comparative anatomy. The other photographs show students taking this to the next level and using skeletons to identify real bones.

*In her talk Annette promised to circulate a link to the Bag of Bones resource which she developed in her previous role! It’s currently here- click on the link on this menu page: <http://www.sedgwickmuseum.org/index.php?page=information-sheets>

Slide 10: Leeds Museums have worked with Stoke-on-Trent Museums and Wollaton Hall, Nottingham on an industrial process themed set of workshops that reflect the local industrial heritage, the original use of some of the museum buildings and the local geology collections. The practical activities include rock milling and experiments investigating hydraulic fracturing for shale gas. In Leeds these activities have been used to establish STEM clubs in local secondary schools; the museums have only recently begun through the support of the Real World Science partnership to develop and offer science learning programmes for schools so they are using outreach to begin to change schools’ assumptions that museums are only for arts and history.

Slide 11: At Great North Museum Hancock in Newcastle one of the bread and butter workshops covers rocks for KS3, with a focus on the local geology collections and helping students to look and describe what they see.

Slide 12: Archaeological Science at Flag Fen in Peterborough (part of Peterborough Museums) is a geochemistry investigation. Students collect water samples (and have access to a sediment core taken by the research team) to investigate the properties of different water bodies on the site and to decide based on the picture they build up of the site groundwater and surface water chemistry whether the buried

wooden archaeology is at risk. Both this programme and the STEM club activities in Leeds (slide 10) enable students to use equipment that they would not normally have access to in school, in the case of this activity water meters to assess pH, temperature and dissolved solids plus indicators for pollutant ions that a field researcher would use.

Slide 13: Working Scientifically is a programme for KS4 and KS5 at NHM that takes the students through the full process of extracting, picking and identifying microfossils from a clay sample then using the fossils to identify the age of the rock using stratigraphic indicators.

Slide 14: Manchester Museum and OUMNH both offer A-level study day programmes to support Geology; these are closely curriculum linked to content and enable the students to access fossils and rocks, and to meet researchers who are able to take them through relevant case studies to support understanding.

If you have any questions about any of these programmes please get in touch!!

Slide 15 & 16: Some quotes from teachers about some of our new earth-science learning programmes to demonstrate the impact of our approach.

Slide 17: Some quotes from museum education practitioners within the partnership that evidence the value of collaborative working in the sector!

Slide 18: These bullet points summarise proposed next-steps for the Real World Science programme; we wish to expand our partnership and also become much more research-active and gain understanding of the impact that informal science learning through a museum education visit can have on young people.

For ESEF: within this programme we have been asked by NHM to offer teacher CPD which has not previously been part of the project. As and when this goes ahead we would welcome support in particular for identifying areas of teacher need in earth science- be they national or regional- that we could support, and also help in spreading awareness when these offers are available (this will likely be started in the next year or so.)

If you have any questions about the project, as this summary doesn't cover all of the excellent, probing questions asked at the meeting or any of the extended discussion, please do get in touch:

Annette Shelford

a.shelford@nhm.ac.uk

0207 942 6272



Real World Science

Museums working in partnership to unlock the learning potential of their natural history collections.

Annette Shelford
Real World Science National Programme Developer
Natural History Museum



Real World Science

The Real World Science (RWS) programme is partnership of museums with natural history collections and galleries who are committed to developing secondary science learning programmes.

- The Natural History Museum (2004)
- Oxford University Museum of Natural History (2004)
- The Great North Museum: Hancock (2004)
- Manchester Museum (2005)
- Stoke-on-Trent Museums (2010)
- Leeds Museums & Galleries (2012)
- Wollaton Hall, Nottingham City Museums and Galleries (2012)
- Peterborough Museum and Flag Fen (2012)

The RWS partnership was formed in 2004 with the aim of engaging and inspiring school students to further study in science and to pursue science-related careers through access to world-class natural science collections combined with scientific and educational expertise.

Over **176,393** students have participated in the lifetime of the programme and in 2014/15 **27,962** students participated across the partnership.



Real World Science strands of activity

Knowledge Exchange Programme

- Sharing expertise
- CPD for practitioners
- Experience practise in new contexts
- Learning from each other to support R&D or other RWS-related work activities.
- Building a stronger partnership

Research and Development programme

- Collaborative development of new learning programmes
- Enabling innovation and risk-taking
- Address aims and guiding principles of RWS
- Respond to opportunities and audience needs
- Supportive working for museum educators



Real World Science - Aims



- To unlock the potential of natural science collections to enhance secondary science teaching and learning
- To develop learning opportunities, inspiring further study and building scientific literacy
- To nurture and grow the partnership, building a community of practice
- To share acquired knowledge within the museum education community
- To increase the number of students and teachers using museums with natural history collections to support science teaching and learning



Real World Science – Guiding Principles

1. *Learning experiences must meet audience, organisational and strategic needs*
2. *Authenticity enhances engagement*
3. *Inspiration and aspiration leads to change*
4. *Multiple approaches to delivery for a diverse range of learners*
5. *Partnership fosters professional practice*



Real World Science programmes

- RWS currently offers 80 different natural science programmes across the partnership for top primary, secondary and A-level students.
- 20 of these are based on earth science curriculum content, based on collections and research.
- Specialist museum educators work closely with geological and natural history curators and collections staff when developing learning programmes.
- Programmes, resources, experience and expertise are shared across the partnership and more widely within the sector.





KS2 and KS3 Palaeo Art at Peterborough Museum
Vivacity Peterborough



KS3 Rocks the House Science Show
Natural History Museum



KS3 Ideas and Evidence- OUMNH

"The sessions were very hands-on and gave the students access to materials and equipment not available in schools"

rastricksience retweeted
Rastrick STEM @rastrickstem · Apr 23
Students have been making soap and using micro chemistry kits to carry out fractional distillation



KS3 Geology STEM Club- Leeds City Museums



**KS3 This World Rocks!
Great North Museum: Hancock**

"I was surprised... testing the peat. It was 3000 years old!"



"I learnt...how to find pH in water and sediment samples"



**KS3 Archaeological Science: Water Chemistry at Flag Fen
Vivacity Peterborough**



KS4 and KS5 Working Scientifically



**KS5 Geology Study Days
Manchester Museum and OUMNH**

"The most successful sessions were those that made use of the collections... they offered a dimension to learning that is not available to students on a day to day basis."
 KS3 teacher, Oakwood Academy, Nottingham

"As a teacher it's all too easy to forget the excitement and value of real world investigations in science- so much of what we do in school is artificial. The students are really buzzing and motivated... their families are getting interested in the work they are doing, other children in school want to know what they are working on. It's amazing that this is available locally, and has reminded us why it's so important to get out of the classroom for science."

Robert Duddridge, STEM Director, Thomas Deacon Academy, Peterborough



"It would be great to be able to spend time just going through a collection of rocks with a specialist and bolstering my knowledge and confidence to identify specimens to support my A-level students."

Geology teacher attending OCR training day



"Collaborative working was good for morale. In museum services which are shrinking we are increasingly lone workers. This project enabled me to share ideas and solve problems with a team"

Programme Developer – Stoke on Trent Museums

"When I started making contact with researchers I soon discovered that I needed to approach them in different ways. Despite the geological content in the A-level Geography curriculum, geologists were much less likely to respond to a request to support a Geography day than a Geology study day. Geographers on the other hand are much more likely to be willing to support both. In future I will approach geologists by emphasising the earth science content to demonstrate that the curriculum does reflect their area of research."

Programme Developer- OUMNH

"It was the first time we had shared evaluation data in this way, and it was fascinating to look at which elements had worked, completely objectively according to the feedback, and compare that to what we already offer at Manchester. Although our programmes run on such different scales, the same desirable elements- expert talks, practical activities, time in the gallery- are all in common. It was good to get this confirmation that we have both been pitching it right. This will help me to plan not only our geography study day, but other A-level programmes, with confidence."

Programme Developer – Manchester Museum



Future vision

- Establish a 5-year programme with increased funding to cover posts
- Increase no. of partners to 12
- Expand the reach of the programme
- Provide teacher and trainee teachers with CPD and subject enrichment
- Build a research-to-practice culture giving Museum Educators space to undertake research (practice-based and longitudinal)
- Provide capacity to cross-over with other national programmes such as citizen science



Annette Shelford: a.shelford@nhm.ac.uk


