
Mapping the Earth Sciences Learning and Teaching agenda for 2007-2011

Dr Neil Thomas.

From the GEES SC Team

Our great thanks go to Neil as we bid farewell to him as the GEES Subject Centre's first Earth Science Senior Advisor (2000-2007). We would also like to welcome our new Earth Science Senior Advisory Team, Helen King and Jim Andrews. This paper gives a brief overview of the work Neil has been doing for the GEES Subject Centre, and where Helen and Jim are taking it from here. We wish Neil all the best in his other endeavours and look forward to working with Helen and Jim.

Introduction and Background

Since the inception of the Subject Centre for Geography, Earth and Environmental Sciences (GEES) in 2000, the Earth Sciences landscape in the UK has changed dramatically, with several former Geology departments being amalgamated with other discipline areas, chiefly Geography and Environmental Sciences, and others closing completely. Even in departments where little structural change has occurred, there has been an evolution of learning cultures, priorities and bureaucracy and, in some people's views, this has been a necessary and thoroughly appropriate change. This has inevitably meant that the student learning experience has changed substantially during the past few years and is likely to continue changing for the next five and beyond.

For this reason the Subject Centre decided to convene a residential planning event, bringing together a critical mass of Heads of Learning and Teaching (L&T) (or delegated key staff), from Earth Science departments across the UK HE sector, to discuss current issues affecting the discipline, and its future. The aim was to map out an action plan for Subject Centre support of Earth Sciences during the 2007-2011 period. This event (commonly known as the Arden meeting) took place from 12-13 September 2006 at the Forest of Aden Golf and Country Club in Warwickshire, and brought together twenty six representatives from sixteen University departments, the Geological Society (GS), the Committee of Heads of Geoscience Departments (CHUGD), the British Geophysical Association (BGA), the Earth Science Teachers Association

(ESTA), the Earth Science Education Unit (ESEU), the Earth Science Education Forum (ESEF) and the GEES Subject Centre (SC).

This article, written 18 months or so after Arden, summarises the issues, discussions and outcomes of the meeting, and the progress made since.

Aims of the Arden meeting

Delegates split into working groups, with the aim of answering the following questions:

1. What is the future of Earth Sciences, and what will the discipline territory be like in 2011?
2. What will be the key issues to affect and shape the discipline in the period 2007-2011? What are the priority issues for the UK discipline community?
3. What activities (long & short term) can be undertaken to support the profile of the discipline and L&T issues within these priority areas? How can the Subject Centre help?

Summary of the meeting discussions

The future of the discipline

Delegates discussed this in groups and open plenary, aided by presentations from Subject Centre staff (Dr Helen King & Dr Neil Thomas) and the Geological Society (Prof. Dave Sanderson, Chair Education Sub-Committee), and contributions from the Committee of Heads of University Geoscience Departments (CHUGD) (Prof Andy Rankin, Chair CHUGD), the British Geophysical Association (Dr Tine Thomas) and The Earth Science Education Unit (Prof Chris King). The main points to arise from these discussions were that, by 2011:

- There will probably be no University departments with the name 'Geology' or 'Geological Sciences', reflecting the shift in emphasis to multi- and inter-disciplinary 'mega-departments' in the broad areas covered by the Subject Centre disciplines.
- There will be an increase in the number of interdisciplinary academic staff, at the expense of single-subject staff (i.e. specialist to generalist) and a resulting change in the emphasis of degree programmes and of research.



Left to right: Jim Andrews, Neil Thomas and Helen King

- There will be an increased emphasis on the applications of Earth Sciences to the 'real world'. Degree programme names and structures are more likely to reflect this. There was a feeling that the discipline currently clings on to the "traditional view" of Geology, although this approach is changing as a result of the gradual retirement of the existing staff generation. However, all delegates recognised the need to retain core skills and elements of the "traditional" subject, even in an evolving discipline.

- There will be a move towards engaging with, and analysing, global datasets as a standard and, associated with this, will be the need for realignment of staff skills.
- Earth Sciences will be heavily concerned with the concept of "perturbed systems" and the anticipation and modelling of future events.
- The UN-designated Year of Planet Earth in 2008 has a significant part to play in shaping the discipline and the public perception of Earth Sciences.

These observations and predictions will have a significant impact on the style and nature of education and training that discipline practitioners are able to provide for the next generation of undergraduates. There will also be significant staff development needs.

Key issues to affect teaching & learning in the discipline between 2007 and 2011

A range of issues was identified by the four delegate groups, with a significant amount of overlap but also different emphases. The five priority issues, identified by cross-discussions between the groups were:

- Fieldwork teaching & learning
- Basic skills in Earth Science

Institution	Programme(s) used	Innovation(s) summary	Comments
University of Glasgow	Earth Science	GESInfo web site for prospective students (with Blogs, student essays, student testimonials, resources for teachers and students, Synoptic verbal field reports)	Innovative marketing and generates motivation; develops independent learning and employability skills
Keele University	Geology, Earth System Science	Web-based support for honours year projects and field mapping	Paces student project work.
Kingston University, London	Geology, Applied & Environmental Geology; Environmental Hazards & Disaster Management	Scenario-based exercises (problem-based learning); widespread use of interpretive exam questions	Develops critical thinking and problem solving skills; career development and promotes self-directed, reflective learning.
University of Manchester	Geology; Environmental & Resource Geology; Earth Sciences	Level 1 skills module (personal journey approach); baseline skills analysis	Enhances student motivation and reflective learning.
University of Portsmouth	Geology; Earth Sciences; Geological Hazards	Geological toolkit unit; Student Ambassadors Scheme; Terrasaur outreach work	Emphasis on marketing and recruitment changed recently; innovative approach to basic skills teaching.
University of Southampton	Geology; Geophysical Sciences	Undergraduate Mentor Scheme; Academic Integrity programme; Student Ambassador Scheme	Using students to support student learning; innovative approach to basic skills teaching.

Table 1: Summary of results for particularly innovative practice.

- Curriculum issues (inc. employability)
- Recruitment & marketing the discipline
- Motivation & scholarship of students

Examples of existing good practice

There are many innovative learning and teaching developments taking place in Earth Science departments around the country. Part of the Subject Centre's work is to conduct research in departments to highlight good practice and disseminate it via its database, website or Planet articles. A snapshot analysis of ten Earth Science departments was undertaken during 2007, using a variety of mechanisms including telephone conversations, requests for update information, website analysis and, in some cases, departmental visits. The latter, unsurprisingly, proved to be the most productive in identifying examples of good practice. As a result, a range of innovative and highly effective approaches have been identified (See Table 1).

Some notable innovations encountered were those which provided students with the opportunity to explore and reflect on their own learning. These initiatives take time to bed down in most student communities but can be greatly helped by careful planning and support on behalf of the staff team. Examples include the 'personal journey' approach to development of basic mathematical and science skills in the First Year (Level 4) programme at Manchester which has resulted in excellent student feedback and enhanced results in a previously poor-performance module. The Undergraduate Mentor Scheme at the University of Southampton is in its infancy but offers an exciting model where 3rd and 4th year undergraduates apply, with justification, to become mentors to Level 1 and 2 students. The mentors are trained by postgraduate students which makes the chain even more innovative.

At Keele, students in their honours year are supported through their project work by a week-by-week guide as to 'where they should be' in terms of their planning, progress and targets. This support is provided by a detailed and dedicated VLE and reflects what many departments do on a much more time-consuming basis. A similar resource is provided to help first years through their mapping skills module.

Discussion

Several mechanisms could be employed to satisfy action points, including open bidding for projects in the defined key themes; identifying key practitioners with experience in key theme

areas and providing a bursary for them to complete key work towards achieving a target, or organising consortia from the interested parties to undertake the work against an agreed budget. In reality, some combinations involving all of these mechanisms may prove to be the best approach. Certainly, the activities should be undertaken in collaboration with relevant organisations including the Geological Society, Earth Science Teachers' Association (ESTA) and the Earth Science Education Unit (ESEU).

Reference

Boyle, A.P., Maguire, S., Martin, A., Milsom, C., Nash, R., Rowlinson, S., Turner, A., Wurthmann, S. and Conchie, S., 2007. *Fieldwork is good: the student perception and the affective domain.* *Journal of Geography in Higher Education*, 31, 2990317.

Earth Science Senior Advisor Team Activities May 2008 – July 2009

Dr Jim Andrews (School of Ocean and Earth Sciences, University of Southampton) and Dr Helen King (higher education consultant, previously GEES Subject Centre Assistant Director) have been appointed as the Earth Science Senior Advisor Team from 1st May 2008 to 31st July 2009. They have developed an operational plan for this period based on the original and comprehensive Earth Science Action Plan devised by Neil Thomas in September 2006. This plan also takes account of themes raised by the Geological Society Education Committee and the Committee of Heads of University Geoscience Departments (CHUGD), and identifies areas of work that have already been undertaken elsewhere. A number of key activities have been prioritised for action over the next 15 months as listed below (see the Earth Science pages on the GEES Subject Centre website for more detailed information – <http://www.gees.ac.uk/home/disciplines.htm>):

Fieldwork organisation, teaching and learning

- Run (in collaboration with the British Geological Survey) a residential field skills course aimed at academic staff with little previous experience of geological fieldwork to enable them to support basic field teaching, including geological mapping (23rd – 27th March 2009).
- Publish, on the GEES wiki, information on field course locations and their uses (<http://gees.pbwiki.com/>).

Basic skills in Earth sciences

- Collect information on current resources and make this available on GEES and Geological Society websites.

Curriculum issues

- Conduct a state of play/baseline audit into the role of employer engagement within the Earth sciences in the UK HE.

Recruitment and marketing of Earth Sciences

- Conduct a review of outreach/recruitment activities to identify and promote effective models (in conjunction with the audit of employer engagement activities above);

- Evaluate the impact of university 'ambassador' schemes;
- Attend the Earth Science Teachers' Association (ESTA) conference in September 08 which includes an HE day on liaison with schools (<http://www.esta-uk.org/liverpool.html>).

Other activity

- Identification of department contacts and learning & teaching champions;
- Development of up-to-date content for the GEES Subject Centre and Geological Society websites;
- Dissemination of a regular newsletter to contacts, champions and heads of department (to include information on specific Earth Science and relevant GEES and broader HE issues, resources and activities).

Looking for some learning and teaching support?

The GEES Subject Centre continues to publish resources FREE, for educational purposes, and are available for download or in hard copy. The following are just a few of these:

- **GEES Learning and Teaching Guides:**

- o Teaching Geoscience through Fieldwork
<http://www.gees.ac.uk/pubs/guides/eesguides.htm>
- o Practical Laboratory Work in Earth and Environmental Sciences: guide to good practice and helpful resources
<http://www.gees.ac.uk/pubs/guides/labspracs/geeslabsnpracs.pdf>
- o Employability within Geography, Earth and Environmental Science
<http://www.gees.ac.uk/projtheme/emp/empguide.htm>
- o Assessment in the Earth Sciences, Environmental Sciences and Environmental Studies
<http://www.gees.ac.uk/pubs/guides/assess/gees%20assessment.pdf>
- o Enterprise, Skills and Entrepreneurship Resource Pack
<http://www.gees.ac.uk/projtheme/entrep/entrepres.htm>
- o GEES Employability Profiles Resource Pack
<http://www.gees.ac.uk/projtheme/emp/empprofs.htm>

- **Them & Us - A publication for Geography, Earth and Environmental Science Staff and Students**

<http://www.gees.ac.uk/pubs/student/contents.htm>

- **Archive of all previous issues of Planet**

<http://www.gees.ac.uk/pubs/planet/index.htm>

To see the full list of publications available, please see our website: www.gees.ac.uk. To obtain hard copies of publications, or to access any of our GEES Subject Centre support tools, please email info@gees.ac.uk or for electronic copies please see the above links.