Science & Technology Committee

Field Studies Council

Evidence to inquiry into practical experiments in school science lessons and science field trips

Introduction

The Field Studies Council (FSC) is delighted that the Science and Technology Committee have chosen to undertake an inquiry into the practical experiments in school science lessons and science field trips. The FSC is the UK’s only education charity that specializes in field studies, working every year with over 3,000 school groups and 125,000 visitors to its national network of 18 Field Centres.

The FSC’s science related provision includes:

- Fieldwork courses for 550 groups and 23,000 students studying mainly secondary science;
- PGCE fieldwork training courses for students from over 30 colleges;
- Hosting bioscience courses for universities;
- Delivering outreach projects such as London Outdoor Science and Schools in the Parks, to support secondary schools in Inner London to carry out fieldwork in local parks and open spaces;
- Providing 240 natural history courses for adult professional and leisure learners in field skills such as habitat assessment, field surveying and identification;
- Employing 140 teaching staff and over 200 Associate Tutors, many with bioscience and environmental science degrees;
- Publishing over 140,000 guides and resources to support fieldwork;
- Campaigning with partners such as Association for Science Education (ASE) to support science fieldwork;
- Being a founder member of the ASE’s Outdoor Science Working Group;
- Managing the Learning outside the Classroom Council’s Quality badge for the fieldwork sector.

The FSC believes that this experience gained over nearly 70 years in the UK gives it a unique insight into trends and influences in science fieldwork and field trips. All of the following evidence is based on FSC’s own experience and data sources. Published references are quoted, but all other observations are supported by FSC unpublished but attributable data.
Are science field trips in decline? If they are, what are the reasons for the decline?

General

1. A review of 13 published surveys – including FSC published data – highlights a decline in fieldwork provision in the UK between 1963 and 2009 (ref. 8)
2. FSC’s view (derived from long-term membership of organizations such as Institute for Outdoor Learning, English Outdoor Council, Association of Field Studies Officers, Association of Heads of Outdoor Education Centres) is that there has been a reduction over 40 years in the capacity in residential centres to offer taught upper secondary science fieldwork, mainly due to a shift in capacity from field centres (with a secondary fieldwork focus) to outdoor education centres (often with a primary adventure focus)
3. Current national capacity to teach high quality science fieldwork (remote residential and local day) is under continuing threat. In 2011, over 72 field and outdoor education centres are either closing or are ‘threatened’ by current funding reviews, 66% being Local Authority Centres. Together, these have a combined visitor base of 310,000 primary and secondary pupils

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Trends in residential fieldwork

4. Science field courses in FSC residential Centres have been in decline for 30 years, both in terms of number and in duration
5. Secondary science groups in have been replaced in FSC Field Centres by geography groups (54% of FSC groups in 1970 were science; 36% in 2003)(ref. 14)
6. Post Curriculum 2000, the ‘modular’ teaching of science A level has sharply constrained the months in which science A level fieldwork is taught, often squeezing fieldwork and field trips into 3 months of the academic year (July, September, October).
7. The average FSC A level science residential field course has halved in length in 15 years, from just under 7 days to 3.4 days (ref. 9). This trend is continuing today.
8. Shortening of courses leads to schools travelling shorter distances to carry out fieldwork, reducing the opportunity to visit contrasting and potentially inspiring locations such as seashore, moorlands and montane habitats. The dramatic decline in opportunities to visit such locations has also been published elsewhere (ref. 7)
9. The decline in FSC residential A level biology courses has accelerated recently, with a fall of 18% recorded between 2008-2010. The reasons given for this decline by FSC Heads of Centres are:
   a) Lost groups (36 lost) not being replaced by new ones (22 gained) in 2008/2009;
   b) New groups staying for shorter periods (3.3 nights compared to 4.5 nights);
   c) Existing groups dropping 1 or 2 nights of their stay
   The reasons given by visiting teachers for these changes (in declining importance) are:
   d) Loss of coursework at A level;
   e) Declining support for science teachers wanting to do fieldwork from school colleagues, including Head of Departments and senior managers – often linked to the demise of coursework and consequent ‘devaluing’ of fieldwork’s importance;
   f) Schools moving fieldwork from remote residential to local day activity OR a total loss of fieldwork (sometimes replaced by laboratory practicals);
   g) Perceived overall cost of fieldwork (particularly increasing transport costs and supply cover costs (see h below));
   h) A narrow interpretation of the ‘rarely covers’ guidance in the teachers workforce agreement which has resulted in increasingly complex timetabling and planning, and increasing cost for supply cover.
10. The decline in UK residential fieldwork, including FSC hosted, is also being replicated in universities, where a general decline in whole-organism biology, modular teaching and the growth of subject content in molecular and cellular biology are often cited as causal factors (ref.13)
**Trends in non-residential fieldwork**

11. Surveys carried out during the FSC’s *London Outdoor Science* and *Schools In The Parks* projects, which aimed to develop use of inner London parks and open spaces by science teachers in local secondary schools, show that a minority of secondary science departments in inner London schools use local parks and open spaces for science fieldwork, with fewer than 20% of schools carrying out GCSE science fieldwork locally (ref.4).

12. The main barriers and issues raised by 47 secondary teachers in the FSC’s *London Outdoor Science* and *Schools In The Parks* projects were (in diminishing order): 1) Disruption to classes and other teachers; 2) Staff cover; 3) Health and Safety; 4) Lack of access to suitable site; 5) Perceived lack of usefulness re. curriculum (refs. 4 & 5).

13. An FSC survey of 36 Secondary Science PGCE students from two leading university initial teacher education courses (working with the FSC *Schools In The Parks* project) have also cited similar barriers, as shown in the table below. Nearly a third cited ‘School Systems’ as being the main prevention to completing outdoor activities with their classes in the future. This included lack of support from mentors, administration, bureaucracy, permissions, and attitudes of the school to outdoor learning.

<table>
<thead>
<tr>
<th>Response</th>
<th>Total number of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>School systems *</td>
<td>22</td>
</tr>
<tr>
<td>Pupil behaviour</td>
<td>14</td>
</tr>
<tr>
<td>Timetable issues</td>
<td>8</td>
</tr>
<tr>
<td>Location of park near to school</td>
<td>7</td>
</tr>
<tr>
<td>Health and Safety**</td>
<td>7</td>
</tr>
<tr>
<td>Weather</td>
<td>6</td>
</tr>
<tr>
<td>Confidence</td>
<td>6</td>
</tr>
<tr>
<td>Other***</td>
<td>2</td>
</tr>
</tbody>
</table>

14. FSC’s work in urban areas throughout the UK has consistently shown that primary schools are much more likely to use local parks, open spaces and resource centres for fieldwork compared to secondary schools. There is a precipitous decline between upper primary (KS2) and lower secondary (KS3). Inflexible timetabling is often cited as a major barrier to secondary provision (see paragraph 13 and 14).

**The role of teacher training**

15. FSC work with partners, including through the ASE’s Outdoor Science Working Group (ASE OSWG), has consistently identified that there is a shortage of secondary science teachers with the confidence, competence and commitment to lead fieldwork. In response, the ASE OSWG has released two reports which have made recommendations to remedy this shortage (refs 10 & 11).

16. Any reversal in the decline in science fieldwork will have to be led by teachers. The capacity and enthusiasm to teach science in the field will need to be increased and ensuring a high status for fieldwork in Initial Teacher Training and the standards which underpin it will be the most effective way of equipping future teachers of science with the skills to take their students into the ‘outdoor classroom’.
How important are field trips in science education?

17. A review of Outdoor Learning commissioned by the FSC shows that science fieldwork which is well planned and effectively delivered will have positive impacts on cognitive development, personal/social skills and physical development (ref. 12).

18. Another review by the Institute of Education of residential fieldwork courses (combined with adventure activity) at FSC centres undertaken by inner-London secondary schools showed that pupils had increased positive impacts in the following developmental areas: cognitive; interpersonal and social; physical and behavioural (ref. 1)

19. Teachers working with the FSC also note that the experience of using ‘messy’ primary data outside the classroom (ie. less easily sanitised, managed and orderly than its indoor or virtual equivalent ) is very powerful in demonstrating the real strength of scientific methodology (How Science Works).

What part do health and safety concerns play in preventing school pupils from going on field trips? What rules and regulations apply to field trips and how are they being interpreted?

20. Health and safety concerns are cited as important by science teachers and PGCE students, but often less important than other barriers such as inflexible timetabling, lack of cover, lack of training etc. (see paragraphs 12 & 13)

21. Not surprisingly, there is a contrast between importance attributed to health and safety between teachers who are leading their own fieldwork and those who are using ‘external’ experts such as FSC. Over half of teachers using FSC Centres report that Health and Safety has no negative influence on their decision to offer fieldwork (ref. 14)

22. The ways in which rules and regulations are applied vary considerably between Local Authorities, between schools in the same Local Authority, and even between departments in the same school. Science departments in London secondary schools will cite H&S as a barrier even when history and geography teachers are content to lead residential trips, even overseas

23. The FSC welcomes many of the findings of Lord Young’s Review and his proposals to simplify the process that schools and other organisations undertake before taking children on outdoor learning experiences

Do examination boards adequately recognise science field trips?

24. The status and nature of field trips in secondary schools are very much determined by national curricula and specifications: this affects the views of teachers, examiners and inspectors

The influence on teachers

Levels of fieldwork

25. Fieldwork has not been compulsory in the national curriculum for science, unlike geography. As a result, geography numbers have grown within the FSC over 20 years, replacing science as the major contributing subject to FSC visitor numbers (ref. 14)

26. Geography teachers are twice as likely to do residential fieldwork at Key Stage 3, and ten times more likely at GCSE level; they were also twice as likely to do local fieldwork at both levels (ref. 14)

27. In some years FSC sells more plant and animal identification charts to geography teachers than to science teachers – probably because geographers are doing more habitat related (environmental geography) fieldwork than their science counterparts

28. The heightened profile in specifications such as Edexcel SNAB A level biology can increase the take up of fieldwork by biologists. In a 2001 telephone survey carried out by FSC of
secondary teachers in 75 state schools who did not use FSC centres the proportion doing A level biology fieldwork ranged from 62.5% in one specification to 100% using the Edexcel specification (ref.14)

29. Another recent FSC example of curriculum having an immediate impact on levels of fieldwork provision is provided by GCSE Geography where the introduction of Controlled Assessments has led to a sharp rise in GCSE Geography groups

30. However, compulsion is not the only reason for differences in level of fieldwork provision across subjects. Fieldwork seems to be embedded more strongly in the culture of some subjects. For example, the Key Stage 3 history curriculum does not include compulsory fieldwork and yet a 2004 FSC survey of London secondary schools showed that 3 times as many history groups embark on residential fieldwork compared to science groups from the same schools.

Nature of fieldwork

31. Whereas secondary geography teachers see fieldwork as being integral to the whole course (the most important reason they cite for continuing to do fieldwork), many science teachers have a much narrower view of its purpose – seeing it as an activity which delivers a discrete part of the curriculum (usually ecology related, and often with a very tight focus on data collecting, handling and analysis, and associated skills and techniques) (ref. 14)

32. These differences in perception result largely from curriculum design which assigns fieldwork to a particular unit in the science curriculum (particularly when it became very closely linked to A level coursework after Curriculum 2000) whereas it reoccurs throughout the whole geography curriculum.

The influence on inspectors

33. The statutory requirement for fieldwork in geography also raises the profile of fieldwork in Ofsted subject inspections in schools. Previous FSC research has shown that geography subject inspections have been eight times more likely to comment on fieldwork than science subject inspections. This will influence the importance attributed to fieldwork by teachers and managers (see paragraph 34 below) (ref.14)

The influence on senior managers

34. At a meeting of A level Biology Chief Examiners hosted by FSC the group strongly supported the view that the profile of fieldwork in schools is driven very strongly by external inspection...“if it’s not inspected, it’s not important” (ref. 3)

35. Teachers who have cancelled FSC field courses have cited the perceived lowering of fieldwork’s importance in the eyes of senior managers and departmental colleagues – the fact that it is no longer essential (because coursework was no longer a requirement for example) – as one of the main reasons to cancel (see paragraph 10e)

Influences on socio-economic accessibility

36. Compulsion also support attendance by a broader socio-economic grouping of students. In some FSC projects, for example working with KS3 and GCSE groups from disadvantaged urban City Challenge schools (2009-2010) up to 80% of the 14-16 year olds had never been on a residential in their school careers (and neither had their parents)

37. The probability that a stronger curriculum requirement can lead to a more inclusive take up of fieldwork is supported by FSC data: 75% of geography groups come from State funded schools, compared to 68% of Science groups
If the quality or number of field trips is declining, what are the consequences for science education and career choices? For example, what effects are there on the performance and achievement of pupils and students in Higher Education.

General

38. Fieldwork trends are being replicated in undergraduate bioscience degrees (see paragraph 11 above (ref. 13)
39. This is reducing the number of bioscience graduates available (to FSC and others – see paragraph 38 below) to pursue professional vocational careers in ecology throughout the UK (ref. 6)
40. The reduction in fieldwork will also lead to a decrease in exposure to a range of data handling scenarios and the development of associated skills which are highly valued by employers (and identified as a current weakness) including the FSC. See also paragraph 15 above
41. The low level of fieldwork training in Initial Teacher Education and CPD is failing to sufficient numbers of science teachers with the confidence, competence and commitment to lead fieldwork. See also paragraphs 12 & 13 above (refs. 10 & 11)

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42. The decline in fieldwork experience is reducing the number of bioscience graduates with practical fieldwork skills, thus reducing the pool of potential tutors recruited by the FSC
43. One area in which the demise of practical fieldwork has had a noticeable effect on A level students and trainee teachers is in field surveying and identification skills (ref 2) (research carried out in FSC centres)

What changes should be made?

44. The FSC recommends that the following changes are needed to ensure that the full potential of fieldwork is developed in the science curriculum:
   a) Fieldwork should be a statutory or strongly stated requirement in the science (particularly upper secondary) curriculum;
   b) School inspections by Ofsted should comment on the level and quality of fieldwork being taught in schools, and it should be a requirement for school science departments to achieve good or outstanding status;
   c) Any reversal in the decline in science fieldwork will have to be led by teachers and we feel that the Qualified Teacher Standards (which are currently the subject of Sally Coates’ Independent review) should include a requirement for all trainee science teachers (including chemists and physicists, as well as biologists and earth scientists) to have prepared and taught at least one fieldwork lesson as part of their training;
   d) Career progression in science teaching should recognize the value of fieldwork experience, including the role of teachers in training colleagues to build school capacity;
   e) Awarding Bodies should adopt assessment methods which are appropriate for fieldwork, rather than formulaic summative tasks which diminish its potential;
   f) Guidance to schools should clearly state that the pupil premium can be used for fieldwork to proved equitable access by all students to the full range of effective science teaching and learning approaches.
Is the experience of schools in England in line with schools in the devolved administrations and other countries?

45. FSC has Field Centres in Northern Ireland (1 centre), Scotland (1 centre) and Wales (4 centres) as well as England (12 centres). Our very strong evidence is that the trends described above are happening throughout the UK. For example, in 2002 FSC took over Kindroган Field Centre in Scotland following many years of continuing decline in school and HE visits.

References


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