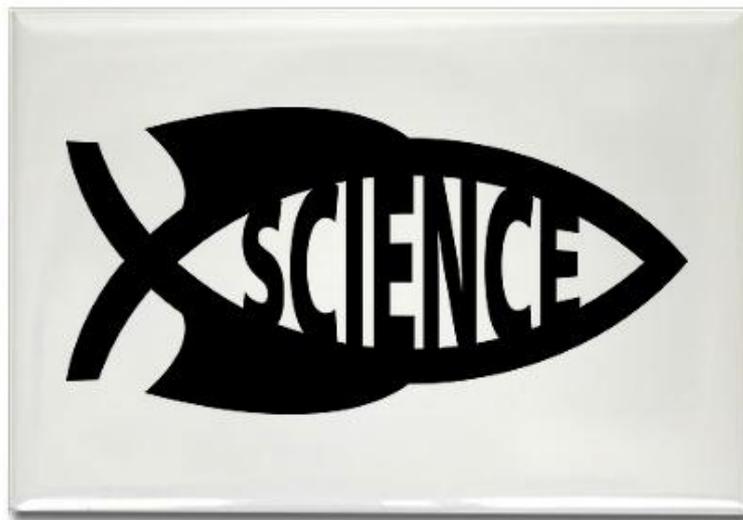




PISCES

**Promoting Inquiry Skills for a
Curriculum for Excellence in Science**

Pilot module



The Scottish Context

Curriculum for Excellence (CfE) promotes the use of inquiry-based learning in the Sciences. Learning and Teaching Scotland's companion guide, *Curriculum for Excellence: Sciences, Principles and Practice* states that:

experiences and outcomes in science provide opportunities for children and young people to develop and practise a range of inquiry and investigative skills, scientific analytical thinking skills, and develop attitudes and attributes of a scientifically literate citizen.

Science: A portrait of current practice by HMIe (2008) reviews the extent to which contemporary practice in science teaching is successfully promoting the four capacities of *Curriculum for Excellence*, and it too is clear that practical, inquiry or investigative learning activities are 'key to developing successful learners in science'. However, drawing on the evidence of the inspection of primary and secondary schools between 2004 and 2008, the portrait is reserved about the depth or breadth of the provision of practical inquiry work in Scottish schools, conceding that in 'secondary schools, too often, young people were not sufficiently active in their learning' and that children's 'skills of scientific investigation were too limited' in primary schools also.

The Role of S-TEAM

In evaluating the state of the art of inquiry-based science teaching and education in teacher education institutions and schools across Europe, the Science Teacher Education Advanced Methods (S-TEAM) project has found that many science teachers may use investigative methods in their practice, at least sometimes, but they also experience many obstacles. These include time, the structure of the curriculum, forms of assessment that focus on content and, perhaps, their own lack of experience of investigations, either in their own learning or through not having worked themselves in science. There may even be resistance at times from pupils or their parents. Even for those teachers who wish to use a more investigative or inquiry-based approach in their practice, there are often formidable problems to overcome.

Proposal

The S-TEAM project now requires your assistance. This pilot programme is designed to help teachers to work through the particular problems that they encounter in their own settings. The focus and format has arisen through discussion with a collective of East Lothian Science Teachers. In running it for this first time, we anticipate that further development to the programme will likely be required to better respond to participants' individual circumstances. There may be unforeseen challenges along the way that will compel nimble adaptation. However, we hope that this will not feel incommensurate with a programme, which, instead of being prescriptive, attempts to be empowering to both teachers and, through them, their pupils. The programme will, therefore, be evaluated against the following question.

How does this programme further the empowerment of teachers (or student teachers) to themselves further the empowerment of their pupils to engage effectively in inquiry-based learning?

Although the programme does not attempt to be prescriptive as to what teachers do in their practice – it does not say, “Do inquiry this way” – it does however present a *structure for empowerment* based on a number of learning outcomes.

Outcomes

As a result of taking part in and contributing to the development of this pilot programme it is anticipated that participants will have begun to develop and apply collaborative understandings of inquiry-based learning in science through interventions to classroom practice, by working towards:

- theoretical and critical understandings of inquiry through reading, discussion and analysis;
- an applied understanding of inquiry through the design and implementation of a practical, hands-on intervention in the science classroom;
- the foundation or enhancement of the classroom environment to accommodate inquiry;
- a shared capacity for supporting teachers in developing their understandings of inquiry-based learning in science (leading, in time, to the reproduction of programme outcomes with colleagues in school and teacher education institutions).

Seminar Schedule

Between October and December 2010, six twilight seminars will be offered, lasting from 4.30 pm to 6 pm, alternating between Tuesday and Thursday evenings, and taking place in the Food Court Classroom, Knox Academy, Haddington.

Participants will be required to complete a modest activity ahead of the first meeting. The activity is designed to explore the levels of inquiry that might exist in an example from participants’ current practice, as well as introduce an approach to analysis and reflection that will prove useful during the course as well as beyond.

Oct 5 Introduction: referring to the statement of scientific literacy that underpins *A Curriculum for Excellence in Science*, a lively discussion and analysis of participants’ pre-module activity findings will kick-start the metacognition of processes and practices in inquiry-based teaching and learning in science.

In addition, participants will be invited to attend the S-TEAM mid-project conference on **Friday 15th October** at the University of Strathclyde, and join the discussion of the future of science education with teachers and policymakers across Europe (funding available for travel and cover).

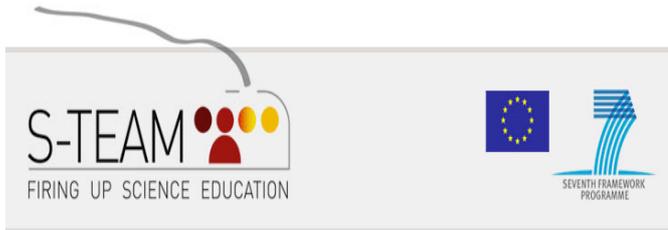
- Oct 28 Scientific Thinking: participants will be introduced to the S-TEAM project's five dimensional model of scientific inquiry.
- Task: following this session, participants will be asked to complete a record of a classroom lesson or topic that took place. The aim will be to consider to what extent this activity supports scientific thinking, and any other issues that the model of investigation suggests.
- Nov 11 Designing an Intervention: participants will discuss and begin the work of designing an intervention using inquiry (or alternatively advanced) methods for use in their own practice. This will be informed by the analysis of the examples from participants' current classroom practice, using the Scientific Thinking Tool (based on the fifth dimension of the investigative model).
- Nov 23 Supporting an Intervention: in support of putting into effect participants' individual interventions, the group will provide collaborative critical friendship.
- Dec 7 Conclusion I: presentation of the preliminary results of participants' interventions to the cohort.
- Dec 9 Conclusion II: continuation of presentations.
- Feb/Mar 2011 Participants may elect to attend a proposed S-TEAM/ University of Strathclyde national workshop to present, as a group, the results and experiences of the programme and resulting interventions.

The twilight sessions represent 9 hours of participants' CPD. The tasks required for completion of the programme may denote additional CPD hours.

Criteria for Completion

- The development of an inquiry-based, hands-on intervention for the science classroom.
- Submission of an artefact demonstrating the impact of the intervention on learners, colleagues, or the participant's own experience. The artefact may be of flexible format: video evidence for example, or more simply a brief written report.
- The delivery of a brief, individual presentation of the (early) impact of the intervention on you, your pupils, or colleagues to the programme group.
- Elective involvement in a group presentation to be delivered at the S-TEAM/University of Strathclyde national workshop proposed to take place in February or March 2011.

Upon completion of the programme participants will receive a certificate in recognition of their work. It is anticipated that the programme will be submitted to the University of Strathclyde's Board of Study to be approved as an award-bearing course. Subsequent to approval, the first group may then become eligible for accreditation of prior learning.



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Questionnaire: Dissemination Activities of S-TEAM

WP 9: Indicators, Instruments and Measurement for Innovative Methods in Science Education

Dear workshop participant,

The following questionnaire is part of the formative assessment activities of S-TEAM. We developed it to gain information about your ways of disseminating S-TEAM ideas across Europe.

Answering the questionnaire will take approximately five minutes. For further information about our work package please contact Dr. Jana Heinz or Katrin Lipowski (mail: jana.heinz@tum.de, fon: +49 (0)89 289 25 124; katrin.lipowski@tum.de, fon: + 49 (0)89 289 25 123.)

Thank you very much.

Yours, sincerely

Work package leader WP9

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1. What kind of S-TEAM activity did you participate in?

workshop training package others, namely:

Please tell us the title:

PISCES: Promoting Inquiry Skills for a Curriculum for Excellence in Science (University of Strathclyde & East Lothian Council)

2. Please tell us how you have benefited from this course.

1. _____
2. _____
3. _____

3. Please mention aspects of this course which you would like to see improved.

1. _____
2. _____
3. _____

4. Please tell us why you attended the course. (Multiple answers are possible.)

- | | |
|--|-----------------------|
| 1) To get to know about approaches for improving science teaching in my country/institution etc. | <input type="radio"/> |
| 2) To initiate professional contacts. | <input type="radio"/> |
| 3) To get to know about new approaches/new research results within professional development in science. | <input type="radio"/> |
| 4) To become familiar with the concept of inquiry based science teaching (IBST) and inquiry science teacher education. | <input type="radio"/> |
| 5) It is part of my professional duties. | <input type="radio"/> |
| 6) To get some ideas to improve my own professional activities. | <input type="radio"/> |

5. To which of the following persons/person groups would you like to pass on the contents of this course? (Multiple answers are possible.)

- | | |
|--------------------------|-----------------------|
| 1) policymakers | <input type="radio"/> |
| 2) colleagues | <input type="radio"/> |
| 3) university educators | <input type="radio"/> |
| 4) school leaders | <input type="radio"/> |
| 5) school administration | <input type="radio"/> |
| 6) teacher union | <input type="radio"/> |
| 7) others, namely: _____ | <input type="radio"/> |

Thank you for filling in the questionnaire. We appreciate your support very much.