

# IBSE for Initial Teacher Trainees



## Summary:

Integrating IBSE practices into Initial Teacher Training

## Aims:

To learn about inquiry-based science education in taught sessions/ workshops and then to develop these and views about their implementation during teaching practice over the course of the training year

## Main activities:

Development of an understanding of IBSE in faculty based sessions and then trial approaches, where appropriate, in their own classes.

## Narrative:

During their training to qualify as teachers in England on the PGCE course, trainees undertake a program that lasts approximately 1 year. This is a combination of University faculty based work

and school based placements in 11-16 and 11-18 schools in East Anglia. The faculty based assignment and reflective work is assessed at M level. As part of the faculty based work, they are introduced to various pedagogies as well as having opportunities to explore, interrogate and develop materials that exemplify these approaches. During their Faculty workshops, trainee teachers will be introduced to IBSE and provided with examples of what this may look like in the types of classrooms that they will be working and training in, both using ICT and without ICT, both within the laboratory environment and outside it. They will have an opportunity to provide feedback and reflection upon these in the faculty sessions with an aim to collate the strongest ideas to be shared across the whole cohort via the course VLE and Wikis.

These materials will act as a reference point and foundation for them to develop appropriate IBSE based lessons and activities to trial during their teaching practice. They will have opportunities to reflect and share on how effective these have been

with faculty staff, staff in the placement schools and other trainees, and this can also feed into developing the content on the VLE and Wikis. There will be opportunity for reflection on the wider

issues before, during and after the training and teaching via a combination of approaches, including questionnaire, interview, lesson evaluation and trainee self evaluations.

<b>Methods of learning/training:</b> Participants draw on the content of faculty sessions and evidence from the research literature to support development of their own use of IBSE practices in school.	people) <b>Location:</b> At schools in the faculty. <b>Languages available:</b> English	possibly interviews or focus groups. The PGCE course as a whole is regulated and evaluated by internal Faculty of Education procedures. <b>Duration:</b> The course runs from September – June and so realistically activity will be in an approx. 6 month window.
<b>End user:</b> Trainee teachers on a PGCE course working in the Faculty of Education and in 11-18 comprehensive schools as part of the faculty training partnership..	<b>Where to find the application:</b> University of Cambridge, mediated through the VLE	<b>Optimum number of participants:</b> Potentially up to 50 (current course capacity) although with varying levels of participation.
<b>Involved actors:</b> Teacher trainers and University researchers (who are generally the same	<b>Evaluation parameters:</b> Teachers will provide feedback on the sessions and reflect on their own experiences in reflective writing and formal/semi-formal questionnaires and	

## Teachers' Competencies

1	subject matter/content knowledge	
2	nature of science	x
3	Multidisciplinary	x
4	knowledge of contemporary science	
5	variety of (especially student-centred) instructional strategies	x
6	lifelong learning	x
7	self-reflection	x
8	teaching/ learning processes within the domain	x
9	using laboratories, experiments, projects	x
10	common sense knowledge and learning difficulties	x
11	use of ICTs	x
12	knowledge, planning and use of curricular materials	x
13	Information and Communication Technologies with Technological Pedagogical Content Knowledge	x



# Mapping best practices with main principles

## 1. Building interest in natural science phenomena and explanations:

Undertaking inquiry into and reflection on their own practice enhances their curiosity about science education, and where appropriate, planning an intervention or lesson to support inquiry in the classroom enhances pupils' curiosity and ability to question the world around them. By incorporating IBSE into their teaching, this will enable pupils to find out and make connections between observations and theory and also the trainee teachers develop and enrich their own practice.

## 2. Building up informed citizens: Students understanding the nature of Science & Science in society:

By reflecting upon the IBSE sessions in the faculty and then developing lessons designed to support inquiry, teachers are supported in helping students to collect, interpret and make conclusions from evidence. Within the wider context of the UK curricula, this work happens in the context of the How Science Works initiative, which itself provides a formal structure to educate students in examining claims on the basis of the evidence presented.

## 3. Develop multiple goals:

- understanding big ideas in science including ideas of science, and ideas about science
- scientific capabilities concerned with gathering and using evidence
- scientific attitudes

Teachers' interventions invariably involve practical work, and focus on students' understanding of the nature of science, and of developing students' capabilities in data collection. Depending on the teacher's interest, their projects also examine students' understanding of the process of science, and ideas about science in more detail, frequently in response to students being demotivated by classical science practical work.

## 4. Understanding students' concepts and learning style about of science phenomena:

Within the training process, the design and development of lessons and the associated materials are expected to take into account the differences between individuals and so the existing structures of the PGCE course encourage, support and expect this.

## 5. Relevance of the content to daily life of students:

Because teachers' lessons are planned in response to a perceived deficit in the teaching and learning that takes place in their lessons, teachers invariably plan an intervention part of whose purpose is to contextualize science against students' daily life, developing relevance for them in learning about science. Since 2006, the curriculum has made more explicit reference to this and so contextualized lessons relating to the everyday life of students are considered to be common, and often best, practice which they would aim to emulate.

## 6. Understanding science as a process not as stable facts. Using up to date information of science and education:

As part of their own education on the PGCE (of which the assignments are assessed at Masters level) the trainee teachers learn about different perspectives on knowledge building, constructing their own realization of the positivist approach to knowledge construction. It is hoped and expected that interventions in the classroom structure activities so students can experience such knowledge construction, and we try to support teachers in making such a process explicit to their students.

## 7. Activities for gaining knowledge, not for entertainment, nor for simple imitating of results:

As part of the training, all teachers are supported to develop an understanding of practical work and its value within science education. It is most likely that many of their lessons and IBSE styled activities will involve practical work for students in some fashion. It would be hoped that their aspiration in lesson planning to develop activities which enable pupils to gain knowledge in the ways described above. Equally the process of developing that professional competence in this regard will be a beneficial learning process for the trainee teacher

## 8. Doing science: experimenting, analyzing, interpreting, redefining explanations:

Principal 8 forms the basis for the kind of activities which the trainee teachers will regularly be focusing on in their lessons. It also forms the basis of the context and examples that will be provided in the faculty session(s).

## 9. Assessment: formative ~ of students' learning and the summative ~ of their progress:

Within the course, lessons are evaluated both in advance of teaching as well as through the feedback and professional development cycle that exists as an integral part of the course. Teachers will be given feedback on the successes and further challenges with respect to their lessons and so form a teaching perspective this feedback loop is built in. With regards to the work done in the faculty sessions, the collaborate nature of the sessions and the subsequent sharing of good practice will hopefully promote reflection on the trainee teachers own professional development.

## 10. Cooperation among teachers and with experts:

Trainee teachers work in school with a dedicated mentor who is an experience teachers as well as with other trainee teachers, staff and university teaching staff. All of these relationships are focused on the trainee teacher's professional development, looking for opportunities to develop and improve. Where appropriate, a focus on developing IBSE confidence and competence may form part of existing professional target setting and evaluation.