

# Informal/museum educator CPD in object based learning to support inquiry learning in informal setting



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## Summary:

Object-based learning is a hands-on approach used in many informal and formal learning environments to promote active learning through discovery. Using carefully selected objects as stimulus material, the approach focuses on the use of carefully formulated prompt questions to stimulate observation, analysis, thinking, questioning and reasoning skills. Objects are used both as tools to enhance student awe and wonder about the world around them and as an evidence-base to promote scientific reasoning.

## Aims:

This activity aims to support museum/informaleducators in:

- Reflecting on existing practice in using inquiry learning models with visitors
- Improve their skills and techniques in using object-based learning as a model for inquiry
- Role-modeling inquiry techniques to help

participantsdevelop teacher CPD in their own informal learning institutions

## Main activities:

seminar reflecting on best practice followed by workshop on object-based learning

## Narrative:

The Horniman Museum and Gardens in London delivers a successful object-based learning programme to 23, 000 students each year. In this case, the University of Cambridge will work with the Horniman Museum to develop and deliver specific teacher training in how object-based learning can be used to promote inquiry learning both within the science classroom and within informal learning environments such as museums, zoos, botanical gardens, science centres and aquariums. An open invite will be given for museum and other informal educators to take part in free on-site training at the Museum.

The training will:

1. Bring informal educators from across the sector together to reflect on exiting good practice in inquiry approaches for teaching visiting students within informal learning settings.
2. Demonstrate how object-based learning can be to build on natural curiosity to explain things in the world around us.
3. Role-model student-directed learning approaches where there may be multiple different outcomes and answers.
4. Allow participants practice inquiry approaches with objects in order to support their development of teacher CPD back in their own institutions

<b>End user:</b> Museum and other informal learning educators, schoolstudents across key stages 2-5 (ages 5-18), experienced and novice teachers (primary and secondary)	all three science subject areas (biology, chemistry and physics) from lower to upper secondary age groups.	participants will also be collected. This model of object-based learning has been developed in response to teachers' evaluations over some years.
<b>Involved actors:</b> Museum educators	<b>Languages available:</b> English	<b>Duration:</b> 2.5 hours
<b>Location:</b> Horniman Museum and Gardens, London	<b>Where to find the application or case:</b> The Horniman Museum and Gardens, 100 London Road, Forest Hill, London SE23 3PQ	<b>Additional information or resources:</b> training will be advertised on the museum website at <a href="http://www.horniman.ac.uk">www.horniman.ac.uk</a> , through the London Environmental Educators Forum and The Group for Education in Museums
<b>Connection with the curriculum:</b> The cross-curricular nature of this training means that it can be used across	<b>Evaluation parameters:</b> Participants complete evaluation forms after the training, and other data from	

## Teachers' Competencies

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

# Mapping best practices with main principles



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

This will be a main thrust of the training. By selecting objects deliberately designed to generate curiosity, awe and wonder about the world, participants will see first-hand how engagement with scientific inquiry is sparked by personal interest and a desire to find out more. By using objects which may be unfamiliar to the participants, they will be placed in the position of the learner and will experience a student-directed, discovery learning approach.

## 2. Building up informed citizens:

Students understanding the nature of Science @ Science in society:

The sessions will be themed around global citizenship. In the object-based learning workshop, the participants will be introduced to an existing teaching session which uses diverse objects from natural history and world cultures collections to draw out ethical thinking about species decline, sustainable resource management and climate change. Here, participants will reflect on how exploration of objects can be used to facilitate open-ended questioning techniques to spark issue-based dialogue and debate.

## 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

Each training session will look at how museum educators can use objects to support the students they work with in developing skills for analysing and evaluating evidence. The objects themselves form an evidence base from which students can be encouraged to make inferences, propose hypotheses and weigh up different ideas or possible explanations. The training will model dialogue approaches for questioning and critiquing claims and proposed explanations.

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

Object-based inquiry can be particularly useful to help students to build bigger ideas from smaller ones and to make connections across subject domains and areas. The training will emphasise the importance of getting students actively engaged in investigating their own questions. The idea here is to demonstrate that students are more motivated if they can become absorbed in a study stemming from their own interest and that their understanding will be deeper when they arrive at answers themselves.

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

A key focus is on using objects to spark dialogue and debate in current scientific issues.

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

By using real objects as evidence for the inquiry process, emphasis is on the use and analysis of empirical evidence as a means of developing knowledge and understanding. Museums and other informal learning environments have unique access to objects that can be used to demonstrate changes in scientific thinking based on emerging evidence and new data.

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

Participants will reflect on the difference between engagement, entertainment and learning in relation to existing activities in their institutions. The focus is on using object based learning as means to acquire and develop knowledge in a self-directed learning process. Participants will explore how this model can be used to develop existing activities and resource which better facilitate learning through an inquiry approach.

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

In a teacher-as-learner model, the participants will take part in object-based inquiries which build on own prior knowledge and deepen understanding as they develop hypothesis and evaluate these based on the evidence in front of them.

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

The process of object-based inquiry learning can be summarised as a process of formative assessment. The approach places the museum educator in a role of facilitator and sessions are student-directed thus freeing the museum educator to observe students as they work and interact with others. Through these observations the teacher is able to determine which students are developing understanding of central concepts or ideas and which students might need further guidance or support.

## 10. Cooperation among teachers and with experts:

Museum educators will work with fellow professionals with varying degrees of experience to share and develop their own understanding. The training will aim to equip the participating museum educators with skills to develop CPD best practice for teachers in their own institutions.