beyond the BLACKBOARD

L'alliance des mondes de l'éducation formelle et informelle.
Bridging the gap between formal and informal learning.

Bridging the Gap Between Field Trips and the Classroom

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Josée Lebel

This workshop's purpose is to demystify the types of resources teachers are looking for when bringing their students to a science centre. The ideal resources permit the teacher to seamlessly connect the content being taught in the classroom to what the students will be experiencing on their field trip.

Find out the teacher's perspective

A teacher always has a reason for taking the time and effort to organize a field trip. Find out (in an evaluation) why the teacher chose to come to your science centre today – what topic were they trying to cover?

Choose the most popular curriculum connection and cover it completely (pre-, during, and post-).

It's not necessary to do an overhaul of all of your worksheets at once. Start with the grade levels that your organization targets very well.

How much to give teachers

1. One complete pre-visit lesson

   - backgrounder
   - hook
   - leading questions
   - PowerPoint presentation (if possible) rich in media
   - hands-on activity
   - evaluation rubric
   - connection to field trip (what are they going to learn at your centre?)
   - PLO-related challenge to be investigated on field trip

2. One post-visit lesson

   - debriefs what they learned in the science centre
   - provides thought-provoking questions
   - applies of the information gleaned from field trip to the challenge assignment

3. Student-centred orientation

   One of the best ways to decrease behavioural issues at the beginning of a field trip is to reduce the novelty effect. Preparing students ahead of time will help them stay focused on the day of the field trip.

   - Prepare a PowerPoint presentation that includes a physical map/website of the galleries/layout. (option: teacher may ask students to choose areas they would like to explore and why).
   - Itinerary: Meeting places and times. Pickup and dropoff (or bus schedule, estimated travel time, and route) information.
   - Discuss food options, what they can buy, where the washrooms are, role of the science interpreters.

- Find out who has been to the field trip destination in the past – if they are members, make them de facto leaders.
- Send map, website, and/or itinerary to the students by email (they'll be able to retrieve it via their smartphone).
- Go over etiquette and behavioural expectations.

4. Chaperone information package

- itinerary
- expectations of the students
- student information (medical, parent contact info, your cell phone number)
- expectation of the them: examples of guiding questions (What happens if…? Have you ever seen anything like that before? What does it remind you of? What have you been learning in class? What do you think that's for? How does this work? How could we test that?).

All of these documents should be included in the confirmation email to the teacher.

Challenge Design

Create a challenge that will be completed post-field trip but that will use the information gathered from the field trip. Keep the content focused – do not try to cover too much. Give the challenge/topic ahead of time. Give students the perception of free-choice learning (choose 3-4 exhibits/activities among a larger thematic exhibition).

Hand out "question books" or "expedition booklets" to record further questions and/or to guide inquiry. Hand out cameras or ask students to use their smartphones.

a) Photographic exhibition with labels

Topics can be chosen ahead of time based on questions. Limit the number of pictures to be taken by giving the task to the chaperone. Students must justify their choices among their peers. Take a picture of the team. Individual team members pose with the exhibition content. Limit the amount of text for labels (encourages them to be concise). Can be a physical exhibition or an online version.

b) Expedition model (see Liberty Science Center Discovery Challenges)

- use information gained on field trip to solve a challenge
- students choose 3-4 stations out of a larger set (jigsaw)
- each station invites student to reflect on how the information applies to the challenge

• debate	• build	• create
• propose	• solve	• invent

c) Exhibition model (see Vancouver Aquarium lesson plans)

- based on students' interests throughout the unit
- collect information to support their exhibits
- rubric scaffolds the exploration while giving students choices

newsletter going out to parents and school • video • self-guided tour • narrative

presentation • role-playing • performance • interview

wanted poster • create • apply to a new situation • science careers

build your own exhibit • interview your science facilitator • photojournalism • argue

Worksheets

A well-designed worksheet allows students to discuss and compare. It asks students to use observation, inference, prediction skills based on prior knowledge and new connections.

If using a worksheet, make it *concept*-focused rather than *content*-focused. Use open-ended questions (Which organisms – plant or animal – are best suited to their environment? What could be some advantages and disadvantages of being such a bright-coloured fish?). Invite inquiry, investigation, exploration, connection, hypothesis, generalization.

Processes of Science Skills

If the field trip is loosely tied to the curriculum, highlight the use of processes of science (approach each exhibit using the scientific method – what did you do? what was your control? how many times did you repeat the experiment?).

Categories of science process skills

(reproduced from Building Science Process Skills (2006))

Acquisitive	Organizational	Creative	Manipulative	Communicative
listening	recording	planning ahead	using instruments	questioning
observing	comparing	designing	demonstrating	discussing
searching	contrasting	inventing	experimenting	explaining
inquiring	classifying	synthesizing	constructing	reporting
investigating	organizing		calibrating	writing
gathering data	outlining			criticizing
researching	reviewing			graphing
	evaluating			teaching
	analyzing			

References and Resources

Connolly, Rachel et al. *Tips from the Field* in The Science Teacher. 73 no1 Ja 2006 pages 42-5.

DeFina, Anthony V. *Building Science Process Skills* in The Science Teacher. 73 no1 Ja 2006 pages 36-41.

Dewitt, Jennifer and Jonathan Osborne. *Supporting Teachers on Science-focused School Trips: Towards an integrated framework of theory and practice* in International Journal of Science Education. Vol. 29, No. 6, 1 May 2007, pp. 685–710.

Kisiel, James F. *Examining Teacher Choices for Science Museum Worksheets* in Journal of Science Teacher Education (2007) 18:29–43.

McLoughlin, Andrea S. *Engineering Active and Effective Field Trips* in The Clearing House, March/April 2004 Vol 77 No 4 p. 160 -163.

Vancouver Aquarium > Learn > Teachers > Lesson Plans (vanaqua.org)

Beyond the Blackboard Educational Consulting (beyondblackboard.ca)

Liberty Science Center > Education > Field Trips > Discovery Challenges (lsc.org)

Essential Features of Inquiry

Make connections

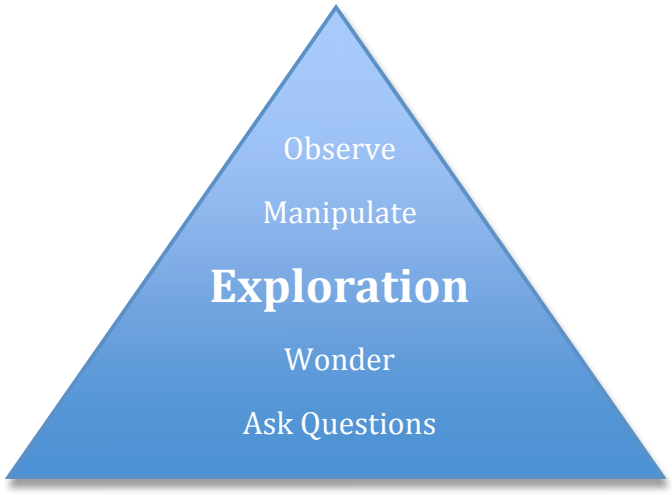
Generalize

Apply

State implications

Transfer to other situations

Generalization



Investigation

Control variables

Collect data

Plan procedure

Gather evidence

Explanation

Draw conclusions

Summarize

Interpret data

Generate hypotheses

State theories

Breakdown of Inquiry Emphases

Formal Settings	Informal Settings
Exploration	Exploration
Investigation	Investigation
Explanation	Explanation
Generalization	Generalization

(reproduced from the *Inquiry-based learning in informal learning environments* workshop at the Vancouver Aquarium on October 22, 2010)

Essential Features of Classroom Inquiry and their Variations

Essential Feature	What it could look like			
Learner engages in scientifically-oriented questions.	Learner asks a question.	Learner selects among questions or asks a new question.	Learner sharpens or clarifies question provided by teacher, materials, or other source.	Learner engages in question provided by teacher, materials, or other source.
Learner gives priority to evidence in responding to questions.	Learner determines what constitutes evidence and collects it.	Learner directed to collect certain data.	Learner given data and asked to analyze.	Learner given data and told how to analyze.
Learner formulates explanations from evidence.	Learner formulates explanation after summarizing evidence	Learner guided in process of formulating explanations from evidence	Learner given possible ways to use evidence to formulate explanation.	Learner provided with evidence.
Learner connects explanations to science knowledge.	Learner independently examines other resources and forms explanations.	Learner directed towards sources of scientific knowledge.	Learner given possible connections.	Learner given connections.
Learner communicates and justifies proposed explanations.	Learner forms reasonable and logical argument to communicate explanations.	Learner coached in development of communication	Learner provided broad guidelines to use and sharpen communication	Learner given steps and procedures for communication.
More	Student self-direction			Less
Less	Direction from teacher/pedagogical materials			More

(reproduced from the *Inquiry-based learning in informal learning environments* workshop at the Vancouver Aquarium on October 22, 2011)