Guided-choice learning in out-of-school environments

by Eleanor A. Miele and Jennifer D. Adams

It is increasingly recognized that much science learning takes place outside of school in museums, zoos, or science centers (Center for Education, Board on Science Education 2009). John Falk (2001) described such informal learning experiences as free-choice learning. Characteristic of free-choice learning is that it is under the complete control of the learner. Students who feel that they have some control over their learning activities have been shown to exhibit higher engagement and achievement (Brookover et al. 1979).

We have observed that positive experiences in informal science contexts can lead students to new and positive connections with school science (Adams and Gupta 2013). Based on our experiences, we suggest a modification of Falk’s free-choice learning model for school-based learning. We define guided-choice learning as informal learning intended to meet specific formal curricular objectives while providing students with a degree of choice. Purposeful informal experiences tied to the curriculum can help students develop an understanding of the enterprise of science as a whole—the wondering, investigating, questioning, data collecting, and analyzing recommended by the NGSS. Informal education resources such as neighborhood streets, buildings, parks, zoos, museums, and gardens provide a wide variety of interesting artifacts for students to select, observe, compare, and contrast.

Teachers can identify a range of objects, organisms, or environments that support learning objectives, which students can then choose from. For example, students of Earth science may choose from a selection of rocks or minerals, whether at a museum or in the school yard, to observe, draw, describe, compare, and contrast; students of life science may choose from a selection of plants or animals.

Field trip planning

In planning for guided-choice informal learning experiences, the teacher should research field trip sites in person and online ahead of time and preview the different exhibits or places that might support particular curriculum learning objectives. Plan to visit only one or two specific places that meet these objectives. Keep in mind that zoos and museums may be crowded with other school groups, so it is important to decide how and where to assemble students. Because these sites may be noisy, students should understand what is expected of them before they enter the main exhibit area.

Trips should be framed as scientific expeditions to observe natural habitats, integrating guided choice to promote a spirit of science learning for personal en-
joyment. If a trip to a zoo or museum is not practical due to distance or lack of resources, allow students to choose from a variety of virtual exhibits. Virtual trips may also be used before actual field trips to scaffold expectations and after trips to expand or clarify learning. Always provide students with options to choose from to maintain the feeling of a free-choice learning experience.

Pre- and postvisit activities should be used to ensure a seamless transition between the field learning experiences and the classroom. Students should have opportunities to practice collaboration, inquiry, observation, and recording skills before their trip into the field. Follow-up activities could include discussions of observations, presentations by students, and developing questions for further inquiry. Students can compare and contrast the information gained from informal science exhibits, videos, and field trips with that gained from reading an informational text on the same topic. Students should be encouraged to continue their inquiry by visiting different parks, museums, zoos, or gardens with their families.

**Safety note:** Before students engage in any informal investigations in the field, the teacher should become familiar with district requirements for field trips. Students should receive direct instruction in expectations for safely moving in the study areas, appropriate shoes and clothing for outdoor work, how to avoid any possible contact with poisonous plants or animals, and safe use of any equipment or chemicals required for the investigations.

To support and document student learning, we recommend scaffolding guided-choice learning using the 5E model of instruction, graphic organizers, and accountable talk.

**The 5E model**

The 5E model organizes science instruction sequentially through learning experiences of increasing sophistication (Bybee 2006). We use the 5E model to help students learn science concepts through informal experiences. The cycle of instruction begins with engagement that identifies what students already know. Students build upon their prior experiences through guided-choice explorations. They then explain their new understanding based on these explorations and direct instruction or reading. Next, they elaborate on their explanations by applying what they have learned to new or more complex situations. Finally, they consider the meaning of their learning through a process of evaluation. We organize our students’ activities to move sequentially through the 5E cycle.

The emphasis on engagement and evaluation are especially important when formally exploring at museums and parks, which are traditionally free-choice environments that help students relate classroom learning to their own personal experiences and perspectives. Engagement may begin with a simple question: “What would you like most to explore?” Evaluation may proceed by asking students, “What was the most interesting thing you observed or learned through this experience? Why is it important to you?”

**Graphic organizers**

Graphic organizers should provide most of the guidance students will need to complete their field assignment. Graphic organizers include charts, tables, concept maps, semantic webs, T-charts, and KWL charts (Jonasson and Grabowski 1993). These tools for organizing information can guide students to focus on specific learning objectives during informal experiences and help them organize and reflect on their learning. They are especially valuable for English-language learners (ELLs) and students with special needs (Marzano et al. 2001). They can also help teachers who are planning cycles of instruction using the 5E model. Scaffolding science drawing, writing, and discussion through the use of graphic organizers also has the added benefit of incorporating the arts and addressing the *Common Core State Standards for English Language Arts* (NGAC and CCSSO 2010) in science teaching.

We recommend that teachers create their own graphic organizers tailored to their topic of study, key learning objectives, and student needs to guide learning activities before, after, and during field trips. For English language learners, graphic organizers can include questions and prompts in both English and the home language or use visual cues. Online translation programs can assist teachers in creating these individually tailored graphic organizers for ELLs. Organizers for students with cognitive or fine motor challenges can include sentence stems or partially completed guiding diagrams. Figure 1 shows examples of graphic organizers scaffolding the Explore and Evaluate phases of the 5E cycle. The hierarchical nature of the 5E model facilitates individualized assessment of student growth from the beginning
to the end of the learning cycle. Graphic organizers provide an embedded assessment of each student's prior knowledge and level of interest at the Engage stage, followed by the sequential, student-generated artifacts of scaffolded observations, inferences, and explanations. A final project, such as writing a position paper, may be used as a summative assessment.

Some ideas for guiding prompts for creating your own graphic organizers structured with the 5E model:

- **Engage** (before a field trip): “What I want to see at the … Why I want to see it …”
- **Explore** (during a field trip): “Choose two objects or creatures related to our unit of study to observe, draw, and describe.”
- **Explain** (while traveling back to the classroom): “In what ways are the two objects you chose the same? How are they different?”

- **Elaborate** (for homework): “On your own, find additional examples and elaborate or expand on how they are similar to the objects, materials, or creatures you examined in the field.”
- **Evaluate**: “How do humans use or impact this object, material, or environment? Why do you think studying this object, material, or creature is important? Show your thinking with words and pictures.”

### Accountable talk

Accountable talk is a form of discussion in which students defend and justify their observations and conclusions through the use of evidence and logic (Michaels, O’Connor, and Resnick 2008). Accountable talk nurtures scientific thinking in students through an emphasis on rigorous thinking and linking claims and evidence in logical ways. The use of accountable talk sentence stems, such as “I agree with ____ be-
cause _____,” facilitates students using and building on each other’s ideas and engaging in respectful, evidence-based discourse in the science classroom. Graphic organizers can help students analyze their evidence from field explorations to support science talk in the classroom.

Providing students with the opportunity for guided-choice learning means that each student may have observed different but related things, providing the class with a wider range of observations to draw upon in class discussion. Conversation stems can help students clarify their presentations. “Could you please repeat that for me?” “Can you tell me more about _____?” and “What’s your evidence?” can guide productive class discussions. Stems such as “I don’t understand _____” and “I am confused about _____” can help clear up confusion. Other stems such as “This makes me think _____” “Now I am wondering _____” and “Can you tell me more about _____?” can help students extend initial ideas. Teachers can post these stems on the classroom wall to help students frame their questions to each other.

Conclusion

Local streets, buildings, parks, gardens, zoos, museums, and videos are rich resources for informal science learning and may increase student engagement with science. Use of guided choice learning, scaffolded with the 5E instructional model, graphic organizers, and accountable talk stems, can focus and clarify students’ informal science experiences and observations and facilitate science learning.

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References


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