Transforming a Field Trip Into an Expedition

Supporting Active Research and Science Content Through a Museum Visit

by Rebecca Morris

Students love field trips, and why shouldn't they? Field trips provide a break from the routine of the school day and an opportunity to learn from the world outside the classroom. Science and natural history museums are popular field-trip destinations, filled with a dizzying array of displays, demonstrations, and hands-on learning opportunities.

After several years of taking students to museums and turning them loose to learn on their own or through a scavenger-hunt activity, I was looking for a new model for a museum field trip. My students often raced through the museum, more interested in catching up with a friend than reading explanatory text, and more anxious to jump to the next question on a scavenger hunt than to reflect on a display or artifact. Students sometimes picked up an interesting fact or tidbit here and there, but there was little opportunity for meaningful classroom follow-up because their experiences were so varied. Overall, their learning experience was superficial and unfocused, and it was difficult to justify taking students away from nonscience classes for the day. Rather than a day engaged with an impressive outside resource, these museum field trips sometimes seemed like a day off from learning.

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A focused and productive learning experience

I was looking for a museum field-trip activity that would support the curriculum of my sixth-grade Earth science course. I wanted my students' museum visit to be a focused, directed, and authentic learning experience, one that would encourage them to engage with the immense resources the museum has to offer. From these concerns and goals, I developed the museum field trip into a short-term, active research project assignment. My students now spend about a week and a half on the assignment, which includes developing a self-generated research question, investigating answers at the museum and online, and reporting their learning to classmates. This approach has transformed the field trip from a casual museum visit into a focused and productive learning experience that students have eagerly embraced.

At its best, active research allows and encourages students to explore an area of personal interest, to make meaning from a variety of sources, and to contribute their learning to that of their peers. Active research is a goal across the curriculum, with national standards in science, mathematics, language arts, and social studies all emphasizing the development of students' skills with research and inquiry (Zorfass and Copel 1998). Young adolescents are developmentally primed for active research because of their innate desire to learn both independently and collaboratively and to share their learning in creative ways. Since beginning this museum research project, I have been impressed with my students' enthusiasm for their challenging tasks. As true active researchers, they are "self-motivated inquirers, investigators, and seekers of knowledge. Each active researcher has a thirst for knowledge, a need to know, [and] a desire to learn" (Zorfass and Copel 1998, p. 2).

Because my school has a tradition of visiting museums in Washington, DC, I chose to focus this research project assignment on the Sant Ocean Hall at the Smithsonian's National Museum of Natural History. This exhibit complements the hydrology unit of my program, and the assignment is a good introduction to the ocean science component of the curriculum. While this article describes my experience with this particular exhibit, the process of encouraging active research can be applied to any museum, exhibit, or gallery in your area.

The Smithsonian has a high-quality, online educators guide about the Sant Ocean Hall (Smithsonian National Museum of Natural History 2011). In planning this assignment, I combined ideas and resources from the museum's curriculum with my own materials to guide students through the research process. Before beginning, I toured the exhibit to get a sense of the museum's content and layout. This enabled me to guide students as they developed their research questions because I could advise them about exhibit content and where to look for answers.

To prepare students for success, I spend the three days before the field trip articulating the goals of the project, providing an introduction to ocean science and the museum exhibit, and guiding students to generate individual research questions. First, I explain that the class will be going on a scientific expedition. Students share ideas about what the term *expedition* means, and they develop a working definition of an expedition as travel for the purpose of learning something new. I can't think of a better description of the goals of a school field trip; at its best, a field trip is truly an expedition. Students' enthusiasm for the project builds as they discuss lofty ideas of voyages, discovery, and groups engaged in the pursuit of knowledge. In the end, they become genuinely excited for their upcoming trip and project. I then explain the following goals and timeline of the assignment:

Tips for a successful field trip

- When planning the trip, be sure to follow all school and district guidelines for field trips.
- If possible, preview the museum exhibit before beginning the project. This will enable you to better guide students' research interests.
- Provide students with feedback and guidance as they develop their research question. Developing an answerable question is key to student success.
- Provide students with a map of the exhibit and a sense of where to find answers to their questions. This will help to focus students during their visit.
- If individual students have difficulty finding answers to their original question, encourage them to develop a new question during the trip.

- Before the field trip, students develop an individual research question. This could also be done as a group project, with students working in pairs or small groups to develop a group research question.
- At the museum, they investigate their question and record observations and evidence from the exhibit.
- After the trip, they report their learning to classmates.

Then we discuss the theme for our research project, which is taken from an overarching theme of the exhibit, that "the ocean is vast, varied, and vital." Through this articulated theme, students develop a sense of where their individual research question fits into the overall project, and where they can contribute to the larger body of knowledge that the class will work to develop.

Because students have varying levels of background knowledge about the ocean, we spend time discussing what they already know. They create individual webs or mind maps of their ideas by responding to these general questions: When you think of the ocean, what comes to mind? What facts do you know about the ocean? What do you hear about the ocean in the news? Why do you think it is important to care about the ocean? What would you like to learn about the ocean? Students share their ideas in small groups.

To give students an idea of the content they can expect to find in the exhibit, I project the museum's website and explain in detail the different sections of the exhibit. Students receive a handout that includes an exhibit map and make notes on topics that interest them. If your local museum does not have online resources about the exhibit, prepare a brief presentation to provide students with a preview of the topics they can expect to find in the exhibit.

After this introduction, students begin the process of generating their research question. They select a topic that captures their interest and identify what they would like to learn more about. Because the museum has a comprehensive ocean exhibit, students can choose from a variety of topics, such as coral reefs,

FIGURE 1 Handout for developing your research question

Now that you've seen some examples, it's time to develop your own scientific research question. Think of a question you want to answer during your expedition to the Sant Ocean Hall.

Keep in mind:

- It should be a "why" or "how" question (not a "yes" or "no" question).
- It should be a broad question, not a detailed question.
- It should be a question that has several possible answers.

My topic is____.

My question is____

____.

I care about this question because________________________________

____

____.

Some things I already know about this question are__________________________

____

____.

In the exhibit, I plan to begin my expedition in the area called ________________________

____.

I think this is a good place to begin because ____________________________.

ocean zones, paleontology, museum collections, and marine anthropology. Students often find it helpful to review the museum website while working through this process, and they are invariably able to identify a topic of interest.

To model good research questioning, I use an activity from the museum educators guide that lists sample research questions from contemporary ocean scientists. Questions include "How do plate tectonics shape the ocean floor?" "Why did trilobites go extinct?" and "Why is the ocean more salty in some areas?" (Smithsonian National Museum of Natural History 2011, p. 44.) By examining this list, students develop a sense of the characteristics of a good research question and a sense of the diversity of current ocean science research. We discuss key features of a good research question:

- It should be a "why" or "how" question (not a "yes" or "no" question).
- It should be a broad question (not a detailed question).
- It should be a question with several possible answers.

Through the handout in Figure 1, students engage in metacognition about their research question. They articulate their interest, what they already know about the topic, and where they plan to investigate within the exhibit. Students share their question ideas with classmates in small groups, which provides an opportunity to collaborate with peers.

Developing a good research question can be challenging for students; I talk with them individually and collect their written work to provide feedback about their ideas. Because all students must be able to answer their question through the exhibit, it is important to closely advise them during this process. I often guide students to move away from a topic that is not addressed in the exhibit, or to narrow or broaden the scope of their question. I want them to feel successful, not stuck, when they tour the exhibit. Whether students are concrete or more abstract thinkers, they can ask meaningful questions and meet with success. Developing the research question allows students the opportunity for natural differentiation within the assignment.

On the day before the trip, students share their final research questions with classmates. They write their question on sentence strips, which are displayed on a bulletin board to show the diversity of topics that will be investigated at the museum. The board displays the overall project theme, and students arrange the questions to show connections among them. This day is also important for discussing trip logistics and ensuring that each student knows where to look for answers within the exhibit.

The field trip

On the day of the trip, students are excited to get to work. They are prepared for and focused on investigation. They have been instructed to bring a clipboard for note taking and to wear a watch to keep track of time. Before arriving at the museum, I pair students with similar research interests. They are required to work with these partners in the museum, which serves two purposes: It encourages students to collaborate while gathering information, and it provides an important measure of safety as students navigate the exhibit on their own. They have about an hour and a half in the exhibit and are required to check in with me at assigned times throughout the visit. Again, this

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FIGURE 2 Museum field-trip research project rubric

Criterion	Excellent	Good	Fair	Poor
Statement of research question	Question is stated clearly and makes a strong connection to overall project theme.	Question is stated clearly and makes a vague connection to overall project theme	Question is poorly stated and makes a weak connection to overall project theme.	Question is not stated; no connection to overall project theme is made.
Description of personal interest	Detailed explanation of personal interest is provided.	Some explanation of personal interest is provided.	Explanation of personal interest is unclear.	No explanation of personal interest is provided.
Description of starting point/ background information	Detailed description of starting point/ background information is provided.	Some description of starting point/background information is provided.	Unclear description of starting point/background information is provided.	No description of starting point/background information of provided.
Answers/learning from museum and other resources	Clearly presents all answers in a well-organized format with supporting information and details.	Presents key answers in a logical way with supporting details.	Presents few answers, which are not well organized and with few supporting details.	Does not present answers.
Conclusion/ questions for future study	Presents thoughtful questions for future study and provides a clear explanation of interest.	Presents questions for future study and provides a brief explanation of interest.	Briefly presents questions for future study; no explanation or elaboration provided.	Presents no questions for future study.
Citations	All sources are cited using the correct format.	Some sources are cited using the correct format.	Sources are cited using an incorrect format.	No sources are cited.
Mechanics	Project report is free from errors in spelling, grammar, punctuation, and format.	Project report contains few errors in spelling, grammar, punctuation, or format.	Project report contains many errors in spelling, grammar, punctuation, or format.	Project report contains significant errors in spelling, grammar, punctuation, or format.
Presentation format	Presentation format is well organized; supporting materials (images, props, etc.) contribute clear and meaningful explanations.	Presentation is formatted in a logical way; supporting materials contribute to the project.	Presentation format is not well organized; supporting materials contribute to the project.	Presentation format is difficult to follow; supporting materials do not contribute to the project.
Supporting worksheets	Supporting worksheets are completed thoroughly and thoughtfully.	Supporting worksheets are completed.	Supporting worksheets are incomplete.	No supporting worksheets are provided.

is a measure to ensure student safety. Each student records notes on a handout that includes a map of the exhibit. Students record observations, examples, and sketches, and they take special note of methods that scientists use to study their topic, including equipment, study techniques, and technologies.

As students explore the exhibit, some have difficulty answering their original question, and some find a different question that captures their interest. When this happens, I encourage students to revise their original question or develop a new one. Because they have already gone through the process of formulating an effective research question, they are equipped to make this change on the spot and keep moving forward. I find this flexibility keeps students motivated throughout the project.

While investigating their question, students are pleased to find that they have time to explore other areas of the exhibit. Having a research question provides focus to their museum visit and allows them to be more informed consumers of the material on display. Students feel proud of their independence and sense of purpose as they navigate the exhibit and take charge of their learning.

Back in the classroom

After the field trip, students have a genuine desire to share their learning and to begin work on reporting their findings. They can choose the format of their final project, and they enjoy the self-directed nature of this assignment. Successful projects have included written reports, PowerPoint presentations, posters, podcasts/audio recordings, skits, and other types of creative presentations.

In addition to the exhibit, students are required to consider at least one additional source of information about their topic. I provide a list of trusted online resources, and most students consult one of the museum's informative websites. An additional requirement is that students use NoodleTools, a free, online research tool and citation generator, to compile their bibliography (see Resources).

Students have three class periods and three nights of homework to assemble their final report. The final class period of the project is dedicated to student presentations. In addition to presenting, students submit their notes from the museum visit and their handout about developing their research question. Figure 2 shows a rubric for assessing the project that is based on rubric samples from *Teaching Middle School Students to Be Active Researchers* (Zorfass and Copel 1998, p. 110–15). As students share their individual reports on the final day, I'm always impressed with their ownership of their topic and dedication to sharing their learning with classmates. Students' work is creative and mature, and they consider insightful questions for future study. I am consistently pleased with the focus of students in the audience and with the engaged, supportive, and thoughtful questions they pose. They respect the work of their classmates and recognize that each student is contributing to our body of knowledge about the mysteries of the ocean.

Conclusion

This transformation from field trip to expedition has exceeded my initial goals. Rather than a day off from learning, the time spent at the museum is now a meaningful opportunity to engage students in an active research project while delivering valuable science content. Beyond the science classroom, the project has become an important assignment in the school's curriculum as preparation for a semester-long interdisciplinary research project for students in seventh grade.

The museum research project has confirmed for me that young adolescents can develop focused research questions, make meaning from a variety of sources, and contribute their learning in a collaborative classroom. As students prepare for their trip and synthesize their learning afterward, they are doing some of their most impressive and sophisticated work. ■

References

Smithsonian National Museum of Natural History. 2011. The Sant Ocean Hall educators' guide. *www.mnh.si.edu/exhibits/ocean_hall/OH_Educators_Guide.pdf.*

Zorfass, J.M., and H. Copel. 1998. *Teaching middle school students to be active researchers*. Alexandria, VA: Association for Supervision and Curriculum Development.

Resources

NoodleTools—*http://noodletools.com*

Ocean Portal—*http://ocean.si.edu*

Sant Ocean Hall—*www.mnh.si.edu/exhibits/ocean_hall*

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