
Inquiry Learning: Students As Ecological Researchers

Activity Overview

Students identify a research question based on their schoolyard restoration or other local issue. They design and conduct research and present their results orally and with other media.

Objectives

Students will:

- Identify an environmental issue
- Develop a plan to organize research data
- Collect data and conduct research
- Analyze/Interpret research data
- Communicate findings

Subjects Covered

Science, Language Arts, and Environmental Science

Grades: 6 through 12

Research Time

Determined by students and teacher

Presentation Time

10 – 15 minutes

Materials

See Additional Resources

State Standards

Language Arts:

Read to acquire information (A.8.4)

Orally communicate (C.8.1, C.12.1)

Participate in discussion (C.12.3)

Science:

Collect scientific evidence (A.8.4)

Use models to predict actions and events (A.8.6)

Design investigations to test models (A.8.7)

Identify questions using available resources (C.8.1)

Identify data and sources to answer questions (C.8.2)

Design and conduct investigations (C.8.3)

Background

Restoration ecology is a young field in which research of all kinds can be pursued and shared with a broader audience. With more questions than answers, students can share in the excitement of investigating the unknown. First, students need to identify an issue to investigate in their restoration and find out how that fits into the larger world of ecological research. What do we need to know about ecological restoration? What are both the large and small questions which would help us learn from our schoolyard restoration? By completing an ecological research project and presenting it to others, students will have an opportunity to ask questions meaningful to them and ones that may contribute to the field of restoration ecology.

Activity Description

Here are some tips for students and teachers to help them develop an exciting research project:

Research Reminders for Students

- Select a topic you're interested in studying
- Keep the scope of your research specific
- Use a variety of credible sources
- Follow the scientific method of research: Problem Statement, Hypothesis, Observation, Evaluation and Conclusion
- Develop a consistent system for collecting data
- Keep a bibliography so that you can quote, or give credit to a source

Questions to Address in Your Presentation

- Why is this subject important or interesting?
- What did you investigate?
- What were your predictions?
- How did you collect your data?
- What did you find out?
- Were your findings consistent with your prediction?
- What problems did you encounter?
- Did any factors influence your results?
- Have any other studies been done related to your topic?
- What impact could your study have on your community?
- How could you improve the study?
- Knowing what you know now, what would be an interesting question to research?

Inquiry Learning: Students As Ecological Researchers cont.

Use inferences and observations (C.8.4)
State learning from investigations (C.8.6)
Explain data & conclusions (C.8.7)
Evaluate questions, hypotheses, conclusions (C.8.9)
Discuss results (C.8.10)
Identify issues, questions, research; design & conduct investigations (C.12.2)
Evaluate data (C.12.3)
Use explanations & models to describe results (C.12.5)
Present results (C.12.6)

Environmental Education:

Identify questions using resources and equipment available (A.8.1)
Collect information, conduct experiments, develop solutions (A.8.2)
Use techniques to organize information (A.8.3)
Use critical thinking strategies (A.8.4)
Develop answers, draw conclusions, revise understanding (A.8.5)
Communicate results & defend answers (A.8.6)
Evaluate credibility of information (C.8.4)

Suggestions for Presentations

- Make sure that you have a full understanding of your topic
- Select words carefully to present the most accurate picture possible
- Include an introduction that draws the attention of your audience and gives a preview of your research
- Focus the body of your speech on the research project
- Transition smoothly from point to point
- Identify connections between your research and your environment
- Include all major points
- Leave the audience with a final thought
- Practice your presentation while focusing on body language
- Be creative and use visual aids effectively
- Share your findings with your school and community

Extensions

- Visit other classrooms or schools and present your research project.
- Repeat the process with new questions or variations

Additional Resources

- Exploratorium Institute for Inquiry Resources: Inquiry Education: www.exploratorium.edu/IFI/resources/classroom.html, www.exploratorium.edu/IFI/resources/research.html
- Chapter 3 of Science in Elementary Education by Peter Gega. 7th edition. New York: Maxwell Macmillan ... "Inquiry Based Science: What Does It Look Like?"
- Bonnstetter, Ronald J. "Inquiry: Learning from the Past with an Eye on the Future" EJSE (Electronic Journal of Science Education); v3 n1, Sept 1998. ...
- Earth Partnership for Schools: <http://arboretum.org/eps>
- Section 6 in the EPS Resource Binder: Inquiry Learning
- BadgerLink: www.dpi.state.wi.us/badgerlink/
- Search tools:
 - AskJeeves: www.ask.com;
 - KidsClick!: <http://sunsite.berkeley.edu/KidsClick!/>

Assessment

- Evaluate your presentation using the Rubric for an Ecological Research Presentation.

Inquiry Learning: Students As Ecological Researchers

Rubric for an ecological research presentation.

	Not so hot	Getting warmer	Hot!
Introduction	People may be unclear about what I researched because my introduction is weak.	My introduction is to the point, but it doesn't flow into the rest of the presentation.	My introduction grabs the audience's attention and gives a good idea of what I will talk about.
Research	My research question is vague and my methods are unclear. I still don't understand the topic.	I show a good understanding of the topic, but some steps in the study are incomplete.	I obviously followed research methods and have a full understanding of the topic.
Relevance	I present my data, but I don't explain why it should matter to anyone.	I make a connection between my research and the real world.	It is obvious to others why my research matters.
Organization	My presentation lacks a natural flow. It's unclear how I went about conducting my research.	My work has a beginning, middle, and an end. The investigative work is included, but a bit unorganized.	My presentation has an interesting opening, an informative middle, and a convincing conclusion.
Word Choice	I use some of the same words over and over. Some words may be too confusing for others.	The words I use are bland or sound as if I am trying too hard to impress. I have a few noticeable pauses.	The words that I use are natural, yet distinct. I use similes or metaphors to describe my work.
Voice/Tone	My presentation is too formal or informal. I use a monotone voice, like I don't like the topic.	My tone is okay, but my presentation doesn't sound like me. I need to include personal thoughts.	I sound excited about my research. I tell how I think and feel about it. I project my personality.
Visual Aid	My visuals are difficult to read and aren't related to my research. I'm reading directly from the visual.	My visuals help explain my research, but I include too many points. I need to be less flashy.	My visuals help make my research clear to the audience. I maintain eye contact with the listeners.
Conclusion	Listeners weren't sure when I was done. I didn't give a summary statement.	It was clear that I was ending the presentation. The general statement I use ties it all together.	The summary I use is unique and pulls all the parts together. I leave the audience with a final thought.

Inquiry Learning: Students As Ecological Researchers

Activity Overview

Students identify a research question based on their schoolyard restoration or other local issue. They design and conduct research and present their results orally and with other media.

Objectives

Students will:

- Identify an environmental issue
- Develop a plan to organize research data
- Collect data and conduct research
- Analyze/Interpret research data
- Communicate findings

Subjects Covered

Science, Math, Language Arts, Environmental Science

Grades: 6 through 12

Research Time

Determined by students and teacher

Presentation Time

10 – 15 minutes

Materials

See Additional Resources

State Standards

Language Arts: A.8.4, C.8.1, C.12.1, C.12.3;

Science: A.8.4, A.8.6, A.8.7, C.8.1, C.8.2, C.8.3, C.8.4, C.8.6, C.8.7, C.8.9, C.8.10, C.12.3, C.12.6;

Environmental Ed: A.8.1, A.8.2, A.8.3, A.8.4, A.8.5, A.8.6, C.8.4

Background

Restoration ecology is a young field in which research of all kinds can be pursued and shared with a broader audience. With more questions than answers, students can share in the excitement of investigating the unknown. First, students need to identify an issue to investigate in their restoration and find out how that fits into the larger world of ecological research. What do we need to know about ecological restoration? What are both the large and small questions which would help us learn from our schoolyard restoration? By completing an ecological research project and presenting it to others, students will have an opportunity to ask questions meaningful to them and ones that may contribute to the field of restoration ecology.

Activity Description

Here are some tips for students and teachers to help them develop an exciting research project:

Research Reminders for Students

- Select a topic you're interested in studying
- Keep the scope of your research specific
- Use a variety of credible sources
- Follow the scientific method of research: Problem Statement, Hypothesis, Observation, Evaluation and Conclusion
- Develop a consistent system for collecting data
- Keep a bibliography so that you can quote, or give credit to a source

Questions to Address in Your Presentation

- Why is this subject important or interesting?
- What did you investigate?
- What were your predictions?
- How did you collect your data?
- What did you find out?
- Were your findings consistent with your prediction?
- What problems did you encounter?
- Did any factors influence your results?
- Have any other studies been done related to your topic?
- What impact could your study have on your community?
- How could you improve the study?
- Knowing what you know now, what would be an interesting question to research?

Inquiry Learning: Students As Ecological Researchers cont.

Suggestions for Presentations

- Make sure that you have a full understanding of your topic
- Select words carefully to present the most accurate picture possible
- Include an introduction that draws the attention of your audience and gives a preview of your research
- Focus the body of your speech on the research project
- Transition smoothly from point to point
- Identify connections between your research and your environment
- Include all major points
- Leave the audience with a final thought
- Practice your presentation while focusing on body language
- Be creative and use visual aids effectively
- Share your findings with your school and community

Extensions

- Visit other classrooms or schools and present your research project.
- Repeat the process with new questions or variations

Additional Resources

- Exploratorium Institute for Inquiry Resources: Inquiry Education: www.exploratorium.edu/IFI/resources/classroom.html, www.exploratorium.edu/IFI/resources/research.html
- Chapter 3 of Science in Elementary Education by Peter Gega. 7th edition. New York: Maxwell Macmillan ... “Inquiry Based Science: What Does It Look Like?”
- Bonnsetter, Ronald J. “Inquiry: Learning from the Past with an Eye on the Future” EJSE (Electronic Journal of Science Education); v3 n1, Sept 1998. ...
- Earth Partnership for Schools: <http://arboretum.org/eps>
- Section 6 in the EPS Resource Binder: Inquiry Learning
- BadgerLink: www.dpi.state.wi.us/badgerlink/
- Search tools:
 - AskJeeves: www.ask.com;
 - KidsClick!: <http://sunsite.berkeley.edu/KidsClick!/>

Assessment

- Evaluate your presentation using the Rubric for an Ecological Research Presentation.