



*Connecting Oceans
Academy*

New Bedford, Massachusetts

Using Tools of Inquiry to Explore Student-Selected Research Issues

Grades 6-8

Contributing Authors

Ronald Adams
Wende Allen
Margaret Russell Ciardi

Editor

Jewel Gilbert

Biographical information on ECHO staff members is available at:
<http://newbedfordecho.org/newbedford-echo-project-curricula.htm>

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Introduction

Using Tools of Inquiry to Explore Student-Selected Research Issues

This curriculum is made possible by the Education through Cultural and Historical Organizations (ECHO) Act, a federally mandated educational and cultural enrichment initiative annually serving hundreds of thousands of children and adult learners in Alaska, Hawai`i, Massachusetts, and Mississippi. Established by Congress, as part of the No Child Left Behind Act of 2001, ECHO brings innovative programs to culturally diverse audiences.

The communities served by ECHO programs are culturally, geographically, and economically diverse, touching on the farthest corners of the United States. First brought into contact through commerce and settlement, today's partner regions share threads of common history. This shared heritage serves as the basis for initiating new contacts and conversations, facilitated by today's digital communication tools. Through this dialogue, communities become better equipped to engage in the global marketplace, bridging divides of geography, culture, and generation, while maintaining better awareness of local culture and identity. Through ECHO, the vistas of individuals and communities are broadened and new views toward brighter futures are achieved.

The ECHO partners include: the Alaska Native Heritage Center, the North Slope Borough ECHO Project in Alaska; the Bishop Museum in Hawaii; the New Bedford ECHO Project (New Bedford Oceanarium and the New Bedford Whaling Museum) the Peabody Essex Museum in Massachusetts and the Mississippi Band of Choctaw Indians. Each of these partners has its own distinct mission, but all are stewards of the arts and knowledge of their regions. They collect drawings, paintings, sculpture, artifacts, music, poetry, and literature. They gather historical and scientific facts, figures, and documents. Their collections reflect the unique cultures of each area as well as the connections that bring them together.

An Introduction to Scientific Inquiry

In this unit, we explore the research processes and methods of scientific inquiry that will enable students to:

- Generate research questions and issues about which they care deeply
- Evaluate and refine the research questions
- Identify and gather sources of information
- Assess the reliability and efficacy (breadth and depth) of the information and gather additional information if necessary

- Extract relevant information from the various sources
- Identify information gaps and/or inconsistencies in the data and conduct additional research
- Synthesize data and identify findings consistent with the data
- Plan and share findings and conclusions for the target audience

Human beings are inherently curious. They want to understand why and how things are as they are. Over time and across civilizations, humans have sought to make sense of their social and physical environments. Their meaning-making has been immersed in and shaped by the cultures in which they live. Each group has constructed its own reality, truth, right, and wrong. Some have used narrative to understand. Others have turned to research and scientific inquiry to make sense of complex phenomena. This curriculum focuses on the latter. At the same time, it encourages teachers and students to discover the connections between the natural environment and social systems, and understand their potential roles as stewards of the environment and agents of social change.

This curriculum is intended for use in middle school content area classrooms. It aims to provide knowledge, skills, and strategies that students can use throughout their lives to explore and answer questions that are personally meaningful and can inspire social action. Specifically, students learn a process for posing, refining, and answering questions they may have about culture, science, math, language arts, history, or art. They acquire critical thinking skills, such as analyzing, drawing inferences, and synthesizing. Finally, they apply their learning and create and share a presentation that captures their learning.

Desired Results

The development of the unit and learning experiences in this curriculum unit was guided by the following *Understanding by Design* (UbD) principles:

- **W** The students know **where** they are going and **why**. They also know **what** is expected and required and how they will be evaluated.
- **H** Students are **hooked** or engaged in working with the enduring understandings and essential questions.
- **E** Students have opportunities to **explore** enduring understandings and essential questions and receive instruction they need for the required assessments.
- **R** Students have opportunities to **rethink**, **revise**, and **refine** their work based on feedback.
- **E** Students have opportunities to **evaluate** their own work and set learning goals.
- **T** Instruction is **tailored** to the needs of individual students using:
 - Differentiated instruction
 - Content area literacy strategies

- Cooperative learning
- Opportunities for oral language
- **O Organized** and sequenced

Enduring Understandings

Students will understand that acquiring knowledge on issues and interests involves:

- generating ideas and questions, and posing problems;
- gathering, evaluating, analyzing and synthesizing data from a variety of sources (e.g., print and non-print texts, artifacts, people, conducting experiments using scientific processes);
- using scientific inquiry as a means to reach a new understanding through questioning, hands-on investigation, rethinking data, and asking more questions; and
- communicating their discoveries in ways that suit their purpose and audience.

Essential Questions

- What are reliable sources of information that are available for exploring and making sense of complex issues and problems?
- How does the use of multiple and varied sources help us understand the complex issues and problems we investigate?
- What are the limitations of relying upon a limited number and range of sources of information?
- How and when can I use strategies to comprehend, interpret, evaluate, and appreciate various sources of information?
- How is my research shaped by my cultural beliefs, assumptions, prior knowledge, experiences?
- What is the evidence for the findings of research? Is the evidence reliable and sufficient?
- How can I best communicate the outcome of my research to my particular audience and for a particular purpose?

Specific Knowledge and Skills

During recent decades, content standards have been developed to guide teaching and learning. This curriculum unit focuses on both Massachusetts and national standards for research and inquiry. These are included in the Appendix. Standards for your state are available on the Internet at <http://www.education-world.com/standards/state/index.shtm>

Acceptable Evidence of Learning

Students will choose to demonstrate their learning through one or more of the following performances or a student/teacher developed performance:

- Research Paper
- Oral Presentation
- Demonstration of Scientific Inquiry: Students will conduct an experiment and do a written or oral presentation that demonstrates their understanding of scientific inquiry and the content of their investigation.
- Other demonstration of Learning such as a: Public Service Announcement, Power Point, Op-Ed column for newspaper, brochure, or tri-fold table top exhibit

Description of the Module and How to Implement

Components

I. Teacher's Guide containing:

10 *Learning Experiences* (LEs), each including a series of *Activities*
Materials lists for each LE or individual activity
Assessment ideas
Technology tools for researching effectively
Notes to Teachers at the end of each LE (tips/pitfalls/alternatives/resources)
Links to helpful websites
Voices from the Classroom: anecdotes from students and teachers who piloted this curriculum in a grade 7 classroom in 2007
Evaluation rubric for the teacher
Student self-assessment tool

II. A companion module that serves as an example of using inquiry in a science classroom entitled, *Using Tools of Scientific Inquiry to Explore and Understand Environmental Problems*

How to Use this Curriculum

Each classroom will have its own unique experience using this module. The ten Learning Experiences (LEs) provide a sequential guide for helping students move through their research from selecting a suitable question to presenting results. Each LE addresses one or more aspects of the research process that will likely require assistance, such as, how to locate resources, how to know biased information and check for accuracy, how to avoid plagiarism, how to take notes and prepare citations. It is assumed that once students have selected a researchable question, the teacher will provide time for them to conduct their research. The activities within the LEs are to be used throughout the research process to provide tools and guidance.

Sequence of Learning Experiences (LE's)

- LE One: Choosing a Topic and Potential Research Question
- LE Two: Refining the Research Question
- LE Three: Working with Citations and Note Taking
- LE Four: Accessing a Variety of Sources
- LE Five: Refining and Reexamining the Research Question
- LE Six: Determining the Reliability of Sources
- LE Seven: Using Primary Sources
- LE Eight: Conducting a Progress Check
- LE Nine: Putting It All Together
- LE Ten: Sharing Findings and Conclusions

Assessment and Evaluation

Each learning experience has been planned to give students the knowledge and skills necessary to meet the final assessment requirements. The teacher should allow time throughout the unit for students to form groups, plan, and research information for the final performances. A self-assessment tool is provided for students and an evaluation rubric is provided for the teacher. However, the teacher may choose to work with students throughout the unit, to develop criteria and rubrics for successful completion of the final performances, and benchmarks along the way. Models and directions for creating rubrics can be found at:

<http://school.discovery.com/schrockguide/assess.html#rubrics>

Suggested Calendar (based on 21 school days)

The Student Chooses a Question
Data Collection
Analysis and Synthesis of Data
Sharing the Outcome

Week One
Weeks Two and Three
Week Four
Day 21

Learning Experience One

Choosing a Topic and Potential Research Question

Overview

What question should students research? What are the possibilities? This learning experience is designed to expand students' thinking across the curriculum as well as beyond the classroom walls as they search for their most meaningful question for research or inquiry.

In this Learning Experience, the teacher sets the stage and provides “the hook” for engaging students in the research and inquiry process. The goal is to involve students in activities that encourage them to generate research questions that are intriguing and insightful—questions that could lead them to further inquiry, personal discovery, and/or social action. Since the overall goal of the unit is for students to learn the processes involved in scientific inquiry, teachers are encouraged to “set students free” to discover and uncover questions that are important to them.

Two of the activities in this Learning Experience are actually assignments that challenge students to think about big and unanswered questions they might have. Students become observers, thinkers, and questioners. They consider current news and community events and wonder, Is my research question there? They go to their classes and subject-by-subject generate possible research questions. Then, they share their questions with classmates in small groups. From this sharing, students both widen and narrow their thinking about which question to research.

To capture their thinking, students “write to learn” in their “Behind the Scenes: the Making of My Research Project Journal” (BTS) journals. The purpose of these journals is to both reveal students' thinking at each step of the research process and to provide teachers with a tool for assessing student progress throughout the research process. The student writing recorded in the BTS journal also provides teachers with a space for communicating suggestions, clarifications or praise to students during each phase of the research process.

Teacher’s Note: You may have already identified a topic in your content area for students to investigate. By following the suggested activities in this learning experience, you will determine what students already know about the topic and surface the questions that interest them.

Evaluation

- Students select research questions that are personally meaningful.
- Students reflect on the process of choosing their own research question in their “Behind the Scenes: the Making of My Research Project (BTS) Journal.” *
- Students predict what they will learn about their question.

*Students should bring their journals to class every day throughout this unit of study.

Materials

- Colored index cards—equal numbers of various colors (4x6 or 5x8), 1 per student (note: calculate numbers required based on class size with no more than six students having the same color)
- Additional index cards, 5x8; approximately 5/student
- A small notebook for each student, to be used as a journal

Activity One: Introducing the Research Project

- Introduce the unit to students. Begin by brainstorming with students. Ask them about previous research projects they have done. Write their responses on the board or chart paper. Accept all responses as this will be critical in helping you activate and assess students’ prior knowledge and experiences with research, as well as plan your teaching and learning. Discuss students’ responses. Ask them to look for common themes.
- Process and summarize with students. Be prepared for and acknowledge both positive and negative themes that emerge. For example, one theme might be that students don’t like to do research. Discuss this with them. Why? Another example might be that students don’t like doing research on topics that are of no interest to them and/or they don’t like writing research papers.
- Tell students that they are going to do research but will have the chance to select their own question and have a choice in how they present their findings.
- Ask students to brainstorm a list of possible vehicles for sharing their research. Record their responses on the board or on chart paper. This is your chance to highlight the uniqueness of this research project. Students’ responses may include:
 - power point presentation
 - speech

- a letter
- a public service announcement
- an Internet presentation on a class “my space”
- a Blog
- a skit or play
- Tell students that all of these are possibilities.
- Discuss with students the fact that people who do research in classrooms have found that teachers ask about 38 questions for every one question that students ask. Tell them that we are about to begin a new unit in which the student gets to pick a question and search for its answer. This is their chance to ask any and all questions they have and to explore one question that is of particular interest to them.

Activity Two: Thinking about Your Question or, “the hook”

- Distribute notebooks to each student (these are for their written reflections—their BTS journals). Ask students to predict how they’ll be using these notebooks during the unit. Discuss their responses and explain the purpose is to maintain a journal of their activities and reflections on what they are doing throughout this unit of study. Discuss the uses and value of journaling (e.g., have they kept a journal? If so, for what purposes and how was it useful?). Ask students to bring their journals to class every day.
- Distribute the index cards, allowing students to select their own colors. (These differently colored cards will be used throughout the unit as a means of placing students in collaborative groups. Throughout the unit, students will be asked to “get in their color card groups,” or “rainbow groups.”) Remind students to keep these cards.
- You should have the following objective written on chart paper. Post it in a prominent location and discuss with students. ***“The objective is for you to come up with a question that you are deeply interested in learning about.”***
- Ask students to brainstorm questions of interest to them. Place their responses on the board or on chart paper (if you use chart paper you can keep them and thereby assess students’ changing ideas about good questions).
- Allow as much time as possible for students to generate questions. Use “wait time” between questions (wait 5-7 seconds before calling on the next person). This will give students time to think about the questions they’re hearing and to craft their own questions.
- Once students have provided their own questions, place the following categories on the board or chart paper and ask them to generate questions they have in these categories. Record those questions on the board or chart paper, using wait time to allow students’ best thinking:
 - Content areas they study: English, science, mathematics, social studies, art, music, physical education

- Local community: people, places, history, environment
- Global Community: people, places, history, environment
- Allow students to ask any questions. Students may offer topics. Ask them to turn the topics into questions. Example:
 - Science: A student may suggest Pluto, the new “non-planet.” Ask students to turn that into a question. For example, “If Pluto was considered a planet previously, why isn’t it a planet anymore?”
 - Current Events: A student may offer a topic of current social interest: minimum wage, nuclear weapons, health care, immigration, and the like. Ask students to come up with a question (e.g. What would happen if all undocumented immigrants were sent back to their countries of origin?)
 - Social Studies: Students in Massachusetts study ancient history and geography in the middle grades. Ask students to list topics they are studying in those areas (e.g. Egypt or Rome). Guide students to come up with a question, such as, How does the geography of a region shape its history (e.g. water sources and growth of cities)?
- If students are struggling to come up with questions, you might provide some model questions for them as a jumping off point. (This is the least desirable alternative since the goal is for students to come up with questions that are personally meaningful):
 - Present a puzzle or question. (Why does a battleship float? Is Disney’s Pocahontas historically accurate?)
 - Challenge a stereotype or conventional wisdom. (Are girls as good in math or science as boys? Are girls really better at reading and writing than boys?)
 - Present a contradiction. (Can a river catch on fire? [Pollution caused the Cuyahoga River in Ohio to ignite.]
 - Offer an insight or aha. (Did Paul Revere make it to Concord to tell the people that the British were coming?)
 - Promote empathy. (Why would people want to kill Anne Frank because of her faith?)
 - Present a generalization or explanation against which different generalizations or explanations can be compared later. (Is bottled water safer than tap water?)

Voices from the Classroom:

When we did this activity with seventh grade students, they came up with some interesting questions. We were surprised about the concerns and issues that are on their minds. The following are some examples:

- 1. What happens to people who lose everything in a war? Does America help them or does the country they live in help them?*
- 2. Why do professional athletes get paid so much to play a game?*
- 3. Why did the dinosaurs become extinct?*
- 4. How big is the galaxy we live in?*
- 5. Why do people kill each other because of their race?*

Activity Three: Generating More Questions

- Distribute index cards. Ask students to spend two minutes in silence, writing ten questions on their index cards. Don't allow any conversation as this is a chance for students to build on what they've already learned about asking questions.
- After two minutes, encourage students to read their questions aloud.
- Tell students that if they hear questions that sound interesting to them, they should add them to their own lists. It is O.K. to be inspired by classmates.

Voices from the Classroom:

When we tried this with students, their reactions were varied. It was evident that some students weren't as confident as others. Some students began writing questions impulsively such as: Why is the sky blue? What does your house look like? The goal is to provide students with time to think deeply about personally meaningful questions.

Before asking students to read aloud one of their questions, I assured students that this was a chance to try out asking questions and to know that one question might lead to another. A student said, "I don't have any questions." Other students began writing questions immediately. The following are examples of the range of students' initial questions:

- * Why are there rainbows?*
- * Why does everybody fight or argue and why isn't there peace?*
- * Why do we have to go to school so early?*
- * Why are there things that people are allergic to?*
- * Why is there sound or movement in the world?*
- * Why are there different social classes in the world?*
- * Why do people steal?*
- * Why do people die?*
- * Why do you get like a prune when you're wet for a long time?*
- * Why does everybody look different?*
- * Where do spirits come from?*

Activity Four: Looking for Questions in Other Classrooms and Beyond

- Students have begun to generate questions of interest in class. In this “out of class” activity, they will think of more questions. Explain to students that at this point in the process, anything is possible. The goal is to observe, think about, and consider their communities and schedule of classes as potential sources of meaningful questions. Students must ultimately come up with a research question that will be important and meaningful enough for them to research.
- Explain to students that they have two days to create a list of questions that are meaningful to them.
- Tell students that as they attend their classes for the next two days, they should devote a few minutes to thinking about what they’ve learned or hoped to learn. Explain that this may help them think of new questions that matter to them. They may ask questions that the teacher might not have considered.
- Ask students to extend their inquiry beyond the school day. Tell them that when they leave school, they should think about their friends, family, current events, community, and community members, including elders. Are there questions that this thinking inspires? If so, they should record them. Students may find that commercials and news items or even weather reports inspire questions.
- Tell students that you expect that they may come up with a long list of questions, but they should have at least ten. Then ask them to review the list and circle their five favorites. They’ll need these five questions to participate in the next activity.
- Although students have two days to complete their list, you should check in with them before the class in which they’ll need them. Are they working on their list of questions? If so, do they need any support? If they aren’t writing questions, why aren’t they? Do they understand the assignment? Is the assignment “scary” to them? Keep in mind that it’s usually the teacher who asks the questions. Students may not trust themselves to do this. Whatever the reason, checking in ahead of time will help those who need extra support complete the assignment. Allow one of the questions to come from those generated during class.
- Students can add to their list of questions at any time.

Voices from the Classroom:

Remind students that the homework requires that each student find a minute during each class period to think, listen, and perhaps look back at previous notes to remember what they've studied in that class. This situational observation and reflection might help students to think of big, meaningful, yet unanswered questions for each subject. You might also suggest that students look over the Table of Contents in textbooks. This might help students to think about a big question from an upcoming unit not yet taught.

Interdisciplinary possibilities: if possible, plan ahead with colleagues to create within these two days several minutes of time in each class for the consideration of possible big questions for each subject. A sense of shared inquiry and teamwork can be created among teachers resulting in broader, deeper thinking across the curriculum.

Notes to Teachers

In the past, students were required to write research papers, complete with bibliographies, citations, and footnotes. An article entitled, "From Now On," that appeared in *The Educational Technology Journal* in 2003, notes the "old research paper" put a premium on students collecting big piles of information almost as if big piles of information about a ship captain or a city might enhance understanding. Sadly, the "old research paper" does not equip students with the thinking skills needed for success in the 21st Century and required by most states in their curriculum standards—the ability to ask critical questions, analyze, interpret, infer and synthesize.

In our current society, many of our students, possessing technological knowledge that far exceeds our own, have come to think of research as "googling" a topic on the Internet and using (copying and pasting) whatever resources appear on the screen. When we teach students to do research, we quickly learn that digital resources are rarely sufficient to answer the kinds of questions students are choosing. It takes detailed data from a variety of reliable sources to build the kind of evidence needed to answer the students' question. Students must often turn to printed materials such as biographies, periodicals, primary sources, as well as to interviews with elders and experts to conduct probing research. Students may even need to generate their own data, through experiments or surveys. We need to teach students to make varied and economical choices about the research they gather. Big piles of information can cloud understanding and obscure the truth they seek. Abundance can impoverish, especially if students just copy and paste someone else's words into their own writing. Students must learn to choose questions that are thought provoking and engaging and have no simple

answers. When we change research to focus on essential questions, students learn to collect information that is pertinent and illuminating.

Reference: "From Now On," *The Educational Technology Journal*, Vol.12, No.5, January 2003.

Additional Resources

- For a step by step explanation for teachers about the effectiveness of student-selected research questions, go to:
<http://www.fno.org/jan03/inspiring.html>
- Visit the online Research Guide for Students and Parents of the Springfield Township High School in Pennsylvania at:
<http://www.sdst.org/rguide/>
- For a commercially available kit for teachers interested in incorporating technology into the scientific inquiry method, go to:
<http://www.inspiration.com/productinfo/inspiredata/index.cfm?fuseaction=demo>
InspireData guides students as they discover meaning from their data. Integrated Table and Plot Views work together as students build databases and then visually analyze the data with multiple plot types, such as Venn, stack, pie and axis plot.

Refining the Research Question

Overview

Students work together to help each other in developing and refining a question they wish to research. The activities provide opportunities for students to discuss, reflect, and write about their emerging questions. In the final activity, students begin their research by locating and taking notes from a book.

Evaluation

Students submit a question that is researchable and of personal interest.

Materials

- BTS journals
- Other materials are listed prior to activities in which they are used.

Activity One: Helping with the Homework

- Students have been given the past two days to generate school-related or local/global community-related questions that are of interest to them. Although their assignments are not due yet, this activity will help them with their assignment and provide you with an opportunity to check for understanding.
- Tell students that the purpose of this activity is to help them think about the kinds of questions they should be considering for their homework assignment which they'll need in order to move on to the steps in the inquiry process.
- Ask students to select five questions they have right now that are most interesting to them.
- They should then write responses to the following prompts in their journals.
 - Of the questions you have so far, what are the five that are most interesting to you?
 - For each question, write a sentence or two that captures why it is interesting.
 - Of those five questions, is there ONE that you most want to answer? Why?
 - In addition to the teacher and you, who else might benefit from knowing the answer to your favorite question?

- Following a five-minute revision to the index-card questions, explain to students that the process they are using is going to help them select ONE researchable question.

Activity Two: Determining Where the Best Questions Came From

Note: This activity can be done at any time during the question-generating process. Students will use their “Behind the Scenes” (BTS) journals to think about the questions they have written so far. This journal is intended to reveal student thinking, progress and pitfalls during the research process. The teacher may want students to use a dual entry journal. A dual entry journal works this way. The students write their responses on pages on the right. The teacher comments, responds, guides, and praises on the pages on the left.

- Explain to students that the human brain works 24 hours a day, 7 days a week (24/7), even while they’re sleeping. As a result, they may have discovered good questions popping up at random times and in odd places. At other times, they probably created ideal thinking conditions in the hope that those conditions would lead to great questions. They have been writing questions on their note cards. Their task is to explain in their BTS Journals how they thought of two of their best questions. Provide models for students:
 - One of my best questions came suddenly while I was spacing out in class, wishing I could take a nap, after I was done with a test. This question popped in my mind: “Is it possible for anyone to never sleep, ever, at all?”
- Provide this prompt: *For each of your best two questions, explain in writing in your BTS journal, What was the inspiration for each of your two best questions?*
- Ask for volunteers to read part or all of what they have written in their BTS Journals. When this sharing portion of the activity ends, allow students five minutes to revise/add questions to their index card.

Voices from the Classroom:

The following are actual samples of students’ reflections on where their best questions came from, and the inspiration behind these questions.

"I always wondered about this, but I never asked anyone. This time was just the right time to ask it. 'How do streets get their names?' That's the question I've had in my head for years. I literally think of it every time I walk down the streets. The rest of my questions I got while going through my schedule in my head and trying to think of questions for each subject. I did that and these questions are not that easy to answer. The rest of my questions came from current events. My thoughts become questions." "My questions ...I thought about things that bugged me. I was pretending that I was walking through my classes. I thought about

things that bugged me in each class. Then I thought about things that made me mad outside of school. Mostly I thought of things in school but not curriculum stuff. Anyway, I thought of things that I thought I should change. I felt like I had so many questions. At first, I had too many. So, I had to weed through and get the good ones. I found 10 and put them on my card. They all just came pouring out when I sat down and started writing."

"I want to find out what one family can do to reduce global warming. I'm worried I won't get a straightforward answer from my research. It's so political a topic."

"First, I thought of some questions that I would like to know the answers to. I also made categories like science, current events, math, social studies. That helped me think of questions. It was hard to think of math and social studies (ancient civilizations) questions. It was easy to think of science and current events questions."

"The Blank Stare"

"I tend to have random blank stares sometimes. After the teacher told us about answering a question we really want to answer, I got a blank stare. We get to pick the question! I started thinking of my greatest insecurity...my parents' divorce. So I threw that down on my card immediately. I thought of some other questions my mind has been just dying to know. As I started to write I let my brain take over the page and it let every question out free. By now I had ten and circled my five favorites. I'm thinking of sharing my answer with other kids whose parents divorced. I think my mom and dad will benefit from my research. Maybe they will have a couple of laughs."

"Questions, Questions...and more Questions"

"I got some questions from my class schedule. Some were random. But I got my best question immediately. My research question is the question I had in my mind ever since I was 6 years old (I'm 12 now but Sunday is my 13th birthday yay!) I never really bothered to ask it because I never thought I could actually know the answer... 'Which God is the true God?' I've had regrets just ignoring this question for so many years. Other questions on my card seem simple by comparison. Have you ever had a question just pop into your head at odd times? That's how I got some of mine. One popped up when I was studying my science chapter. Others come from watching TV. My brain is a question maker."

"I filled in my index card with questions by thinking about current events and by thinking about what is going on especially in the Middle East. I always have the war on my mind almost all the time. Some questions just popped into my head. "One concern I have is if I research the current violence in the Middle East, I have a problem. I don't like Bush. I need an open mind to find the truth."

Activity Three: Organizing Questions by Category Using a Carousel Brainstorm

Materials:

- Chart paper, tape
- Large post-it notes or large note cards and tape

Activity

- Explain to students that they will be working together with the information in the BTS journals and in their homework to help each other choose and refine their research questions.
- Ask students to take out the color-coded index cards. Explain that they must locate and team with all the students with their same color card to form “rainbow groups.”
- Challenge each group to categorize by content area (e.g., language arts, science, mathematics, geography, political science, history, health, physical education, music, visual art, dance) the five questions each student has chosen.
- Students discuss the questions they have in each content area. If time allows, students should also discuss possible research questions for categories such as school sports, current events and community concerns.
- Ask each group to select their two best questions for each content area and write them on post-it notes or note cards.
- Tape up large sheets of chart paper. Write the title of one content area on each chart.
- Assign each rainbow group to a content chart. Ask them to post on the chart their two best questions related to that content. The goal is to create a large visual display of meaningful questions for each content area.
- Direct rainbow groups to repeat this process at each of the charts. Signal groups to move in a clockwise direction when they have completed their task. Continue until each group has returned to its original chart.
- Students remain in their groups to read and discuss all questions as they move from chart to chart (signal groups when to move).

Activity Four: Reflecting on All the Questions

- Ask students to write responses to the following prompts in their journals. Select from volunteers to discuss their responses.
 - When you were discussing questions in your rainbow group and when you were touring the chart papers, which posted question surprised you the most and why?
 - What was missing?
 - Did you notice any pattern?

- Has this exercise influenced you with regard to which question you want to research? Why, or why not?

Activity Five: Beginning to Refine Your Favorite Research Questions

- Provide five minutes for students to reread and, if necessary, revise their five favorite questions. Some students may want to replace questions with new ones.
- Ask students to answer the following prompts in their BTS journals:
 - What are the five questions that are **now** most important to you?
 - Did your list of five favorites change? If the list changed, explain how it changed and why.
 - Which of those five questions is now your favorite? Why?
 - In addition to the teacher and you, who else might benefit from knowing the answer to your favorite question?

Activity Six: Checking for Understanding

Materials

- Index cards, 5x8, one/student

Activity

- Ask students to write in their BTS journal their single, favorite research question.
- Distribute index cards. Have students write their name, division, group, etc. in the upper right corner.
- On the top line (or near the top of the card) ask students to write the question they just selected. Collect and review the questions before the next class. This will give you the opportunity to check for understanding and provide feedback as needed.

Activity Seven: Questioning With a Peer to Continue to Refine the Questions

- Ask students to sit in their “rainbow groups” and then to break into “rainbow pairs” (e.g., by birth month) to share with their partner the research question they just chose as their favorite.
- Each student will give and receive guided feedback (following the steps below) about the favorite research question to his or her partner. This activity provides a chance for discussion with a peer. Through discussion, questions will grow and change, becoming clearer, richer and deeper. The following questions, which should be placed on the board or chart paper, will guide the discussion:
 - Is the question too narrow?
 - Does the question lack focus? Is the question too big to answer?

- Is the question “just right?” Will you be able to find an answer to the question?
- Working in pairs, one student will read his or her question to the partner.
- The partner listens, thinks, asks questions, and then offers suggestions about improving the question. The author of the question will ultimately decide whether to reject or accept peer input.
- Next, students swap roles and follow the above procedure.
- Each student now writes his or her “best question” in the BTS Journal on a page titled, *The History of my favorite research question, so far!*
- Writing to Learn: Ask students to write about the latest draft of their favorite question in the BTS Journal on the page titled, *The history of my favorite....* Students will describe the life cycle of their favorite question by answering all of these prompts:
 - My original favorite question was...
 - My new favorite question is ...
 - It changed (or did not change) because...
 - If it changed, explain why you think your new favorite question is better than the original.

Activity Eight: Committing to the Research Question

“A journey of a thousand miles begins with a single step.” *Ancient proverb*

Materials

- Handout One,: My research question is...

Activity

- Tell students that today is decision day. Distribute Handout One and ask students to write their responses.
- Collect students’ work.
- Explain to students that the research question may change over time. This is O.K. It is normal for some students to change or revise their research questions. Ask students to submit a new, dated, “My Question is...” form (Handout One) every time the student changes the research question. (Having a record of the student’s journey is essential to the teacher.)
- Review students’ responses and meet individually with each student whose question still needs refining in order for it to be researchable.

Teachers’ Note: The teacher can punch three holes in the students’ Handout One and insert in a 3-ring notebook. The teacher can then access any student’s question easily. The teacher may also use the form to record notes on each student’s research journey.

Voices from the Classroom:

The following are some of the “favorite questions... at this time” shared by students. Volunteers shared their question with the class and discussed how and why their questions changed.

- *Is pi always 3.14 no matter how big or small the circle is? (Changed from: Why is Pi such a weird number? Why can't it be 3?)*
- *What does it take to be an effective leader? (Changed from What does it take to be a Pharaoh?)*
- *What is the ideal of beauty? How do children, especially girls, learn about the so-called perfection of beauty? (Changed from: Why do some girls starve themselves to look pretty?)*
- *Why is the sky blue on earth; it's black on the moon? (Changed from: Why is the sky blue?)*
- *Are human beings capable of peace? (Changed from: Why do people fight? Is it born in us?)*
- *Is an artificial gill possible for fishing crews and others who go out to sea? (Changed from: Did humans once have gills?)*
- *How will we know if we are winning, losing, won or lost in Iraq? (Unchanged)*

Activity Nine: Reviewing Expectations**Materials**

- Handout Two: Analytic Score Sheet
- Evaluation Rubric (located at the end of the module) made into a large poster or handouts

Activity

- Explain to students that you have created a guide for them so they will know the standards to which you will hold their work throughout this unit of study. Go over the Evaluation Rubric, answering questions as they arise. Explain that students' grades will be determined from this rubric.
- Distribute Handout Two and review. Students will see from the rubric that 13 steps must be completed in order to get an “A.” Reassure students that together, we can complete each step to the standards that are on the score sheet. Students may have already completed the first step: Grade level, meaningful research question chosen by the student. If this is true, check “done” on each student’s rubric. You may want to say, You are now on your way to an “A.”
- Remind students to review the rubric at each stage of their research.

Activity Ten: Beginning the Journey with Advice about Finding the Answer

- Ask students to subdivide into groups of three, each with a different color.
 - Each student folds a sheet of paper twice, the long way until the paper resembles a name sign on a desk. Each student writes her favorite question on one face of the folded paper. Students should write big enough so the two partners can read it.
 - Students take turns, going in alphabetical order by their first names:
 - Read the question to your group.
 - The group then offers suggestions, advice, input in these areas:
 1. Three resources you might want to use are...
 2. Two possible answers to your question are...
- Groups continue until each group member has completed the task.

Voices from the Classroom:

Today was decision day. Students had to decide today on one research question. Various activities helped students draft and get peer and teacher feedback on possible research questions of their choosing.

*One boy's form reads: "My inquiry will search for information which will tell me if it is possible to build an artificial gill for a human. Who will benefit? Fishermen will benefit. Remember those names of fishermen on the walls of the Seamen's Bethel in New Bedford? They all drowned at sea. If fishermen had a GPS life jacket with an attached artificial gill, there might not be any more fishermen lost at sea and no more names added to those walls."
(When this boy read the above to the class during sharing time, a classmate blurted out, "Dang, that's good." I so agree! I ignored the inappropriate language. I was thinking the same thing. I'm thrilled with the seriousness of the inquiry.*

“My Question is...”

Name: _____

Date _____

My chosen research question is: _____

Knowing and sharing the answer to this question will benefit who? _____

Final Assessment: Analytic Score Sheet Inquiry Project

Name _____ Group _____ Due _____

Focus Correction Areas (FCA's)	@ 0.0 none	@4 some	@7.1 done
1. Grade level, <u>meaningful</u> research question chosen by you	___	___	___
2. 10+ numbered note cards (mostly in your own words)	___	___	___
3. Source cards (with required fields)	___	___	___
4. Variety of 3+ reliable media sources	___	___	___
5. Behind the Scenes reflective journal	___	___	___
6. Rough draft of product with changes visible	___	___	___
7-11 Final draft of product—must include:	___	___	___
7. citations	___	___	___
8. ANSWER	___	___	___
9. <u>explained clearly</u>	___	___	___
10. explained completely	___	___	___
11. Works Cited page	___	___	___
12. Plan for sharing of answer (final product) Includes WHO will benefit from your answer	___	___	___
13. Virtual sharing (actual sharing is optional)	___	___	___

Scoring Key: each of 13 FCA's is worth 7.7 points
Maximum score = 101 points

Your score _____

Notes to Teachers

Resource on Inquiry

The following website offers a guide to research designed by Springfield Township High School. You may find helpful tools and ideas to supplement this module:

<http://www.sdst.org/rguide/>

Considerations on Pacing

By the end of LE One, some students may already have found an important question to research and will be anxious to get started with the research. You need to decide if those students should be given permission to begin researching. If they do begin before the rest of the class is ready, problems may result. For a student to begin researching at this point is to assume that those students have already mastered citations, note taking, determination of the reliability of sources, and verification of key information. It is recommended that overanxious students be given a copy of the rubric used for grading the research process and the research product, which can be found in Handout Two.

The purpose of this curriculum unit is not to turn research into a race. The purpose is to teach students a step-by-step process for uncovering the answer to their own question. The process, once learned, empowers students to become independent, skillful researchers who can apply this research process in any class, for any question, in any year.

Staying together allows for understanding through activities designed to maximize social learning, teamwork, tutoring and shared inquiry. Finding the question is essential, but it is only the first step.

When to discuss grading

It is recommended that the score sheet be given out no earlier than Day 4 or 5. On Days 1-3, the excitement should be on student motivation to choose a meaningful question. On the first days of this unit, the goal is to create positive student interest and energy in the exploration of student choice and in the unlimited possibilities of student directed inquiry. Distributing the detailed score sheet too early might turn the student interest away from choosing the most meaningful question to choosing a safe question to get the highest possible grade. Introducing the details of the grading too early may crush fragile student questions or interests. The early days of this unit should be about inspiring students to decide for themselves, after much thought and discussion, which meaningful question they should chose to research.

Tips on Building Opportunities for Oral Language

The activities in this Learning Experience include many opportunities for student discussion. A great deal of research is available to support the benefits of building opportunities for oral language into curriculum for all students including striving readers and English Language Learners. Information is available in textbooks and on the Internet. For example:

Internet:

<http://apps.reading.org/search/svc/submitquery>

<http://www.reading.org/publications/journals/rrq/v37/i1/abstracts/RRQ-37-1-Maloch.htm>

<http://www.cdtl.nus.edu.sg/brief/V7n2/sec3.htm>

Textbooks:

Brookfield, Stephen and Preskill, Stephen: *Discussion as a Way of Teaching: Tools and Techniques for Democratic Classrooms* (Jossey Bass).

You will find a variety of literature on this topic at <http://apps.reading.org/search>

The benefits of discussion are evident as students work on their questions together. The following examples provide support for how student discussion scaffolds thinking.

Example One:

Student J: My first favorite question is, "Can a spaceship travel beyond Pluto?"

Student M: Do you mean a manned spaceship?

Student J: Yes, I guess.

Student M: It would be more interesting if I could imagine myself on that. spaceship. It's more dangerous.

Student J: Yeah, it could find out if humans can go that far.

Student M: And return.

Student J: Yeah. So my question is, Can a manned spaceship travel beyond Pluto and return? What are the limits of human space travel?

Example Two:

Student C: Why can't men have babies?

Student G: African bullfrogs change from male to female I think.

Student C: They do?

Student G: I think so, and seahorses get an egg from the female and carry the baby.

Student C: Hmmmm.

Student G: You could stretch your question out to all animals. I think clams are like that, too.

Student C: Yeah, not just men. So my question is, "Is it possible for males to have a baby?"

Tips on Use of the Media Center

- Several weeks in advance, the teacher could reserve the school library or Media Center for each class. Consider arranging to have the Media Specialist or school librarian, aides, adult volunteers or older students available as advisors for these classes.
- Explain to students that the section of the library we will now use will be non-fiction and reference.
- Provide a very quick overview of the non-fiction section: 300's are...; 400's are...; 500's are, etc. Students can search the data base for titles of related books, can browse or can ask adults for guidance to the appropriate section of non-fiction books.
- Ask students to re-read their question, and when ready, students begin their inquiry by finding at least one book from their entry.
- If a topic is current, periodicals should be sought not just books.

Voices from the Classroom:

During the piloting of this curriculum, 17 of 20 students found a book within 15 minutes. One student chose a question about immigration laws. She found three issues of Time magazine which were helpful. Two students left frustrated. One student had a very narrow topic which caused the fruitless searching. The teacher did conference with that student to expand the student's research question into something more researchable. The second student wanted adults to do her work for her. The adults gave guidance, made encouraging suggestions, but resisted doing it all for the student.

Learning Experience Three

Working with Citations and Note Taking

Overview

Students learn a system for note taking and making citations, including sample Modern Library Association (MLA) Works Cited, in-text citations, and an overview of a numbered note-taking system. Students then work in pairs in an activity designed to stretch their thinking toward using a variety of sources, including people they might want to interview. Students review Internet site suffixes such as: .gov, .edu., .org., .com as a prelude to using the internet for research. Working in pairs or triads, students begin searching for information on the Internet, taking notes and Works Cited information for sources used. In the final activity, students learn how to identify and avoid plagiarism.

Advance Preparation for this Learning Experience: Prior to beginning this LE, if possible, the teacher should reserve the school library or Media Center for each class for Activities One through Four. Consider arranging to have the Media Specialist or school librarian, aides, adult volunteers or older students available as advisors in helping students find appropriate resources. As an alternative, take students on a field trip to a community library to borrow the resources they need. This would be a perfect time for students who don't have library cards to get them. If you worry that students will lose the books, work with your community library. You can sign out books and other resources related to students' research questions (you'll have their questions on the index cards and forms they submit). Require that students leave these resources in the classroom "on reserve" so they don't lose them. You'll have to arrange this with the community librarian in advance.

Evaluation

Each student submits at least one source card and note cards for that source, correctly prepared using the MLA (or other recognized) style.

Activity One: Beginning the Research—Finding the First Source

Materials

- Handout One: Having Trouble Finding a Book?
- Index cards, 3x5 and 5x8, several/student (keep a supply of each in the

- classroom for students to access throughout this unit of study)*
- Large envelopes, 1/student, for students to store note and source cards*

* From this point forward, students should always bring their envelope with their note cards to class.

Before this class session, reserve the Media Center.

Activity

- Explain to students that that they will now begin their research by locating one source of information to help them answer their research question. The first source will be a book. However, if the question is very current, a periodical should be sought.
- Remind students that using only Internet sources is not acceptable. Using a variety of sources is required. Explain to students that the nationally respected John F. Kennedy Profiles in Courage Essay Contest, in which students write well researched essays on courageous politicians, actually disqualifies students if they use only Internet resources. The contest wants “a variety of sources” including interviews if possible. Ask students for reasons why using exclusively Internet sources for research is inadequate.
- Distribute large envelopes and some index cards, both 3x5 and 5x8, to students. Advise students that they will be accumulating information from a variety of sources and will record information from each resource they locate. The envelopes are for storing all their information. Tell students that they must prove their work is based on accurate facts and evidence. Explain that in addition to the information itself, they will need to keep track of **where** they obtained their information. They will be developing a list of all the resources used. This list is called the Works Cited or Bibliography page. Set the expectation that students will keep a record of every source they use. They will be learning one way that researchers list the sources they find and use. It is called the MLA (Modern Library Association) citation method.
- Announce: It is time to begin our searches for the answers to our questions!
- Pause to allow students to ask questions about the Data Collection stage of the research process. Students may ask questions that you can discuss with them such as:
 - What kinds of sources?
 - What does “a variety of sources” mean?
 - What facts about the source do I need to write down?
 - How do I take notes?
 - Should I keep everything in my big envelope?This is an opportunity to “foreshadow” upcoming Learning Experiences.
- Ask students where they might find resources, other than on the Internet. They will probably mention the school Media Center or local library.
- Advise students that factual information can be found in a variety of

resources including books, photos, artwork, websites, periodicals, newspapers, primary sources, and the like. This first search will be for a book.

- Explain to students that they will be exploring the “non-fiction” section of the library.
- Provide a very quick overview of the non-fiction section:
 - 000 Generalities
 - 100 Philosophy & psychology
 - 200 Religion
 - 300 Social sciences
 - 400 Language
 - 500 Natural sciences & mathematics
 - 600 Technology (Applied sciences)
 - 700 The arts
 - 800 Literature & rhetoric
 - 900 Geography & history
- If your library uses the Library of Congress Classification System, the following website will be helpful:
http://www.usq.edu/galileo/skills/unit03/libraries03_04.phtml
- If a topic is current, recommend that students look for journals or periodicals not just books. (When you are in the Media Center, assist students looking for periodicals as necessary.)
- Tell students that they can search the data base for titles of related books, can browse, or can ask adults for guidance to the appropriate section of non-fiction books.
- Before going to the Media Center, distribute and discuss Handout One, Having Trouble Finding a Book?
- Take students to the Media Center to locate and check out one relevant and reliable piece of printed text, either a book or a periodical. The text should begin to help them answer their question or uncover problems with their question.

Activity Two: Beginning the Documentation—Taking the First Notes

- Ask students to write their name on one side of a large (5x8) index card and the title and author of the book (or name of periodical, title of article, and author's name). On the other side, ask them to write two or three sentences indicating why they chose the book. Collect the cards to “check for understanding” and collect. (Reading the index cards allows the teacher a way to assess students' current level of knowledge about how to locate books that contain the information they need.)
- Assess the students' knowledge about how to take notes (Note taking and citations will be taught over the next two days.): If time is not available in class, the following can be completed as a homework assignment:
 - Use the large index cards for notes. Write the number 1 at the top of each note card you use, indicating this is your first source.
 - Take notes from your first source, mainly in your own words. Record the page number(s) where you found the information. If you decide you want to keep the author's language for some of your notes, put quotation marks around what is copied and record the page number(s) where that copied information is found at the end of each quotation.
 - Use a small index card to record information about your source. Write the number 1 at the top of this card. Include the title, author, copyright date, publisher, and pages used. Tell students that they will soon learn the MLA system for a formal method of documenting their sources.

Activity Three: Writing to Learn by Keeping a Journal

- Ask students to document their search and results in their BTS Journals by responding to the following prompts:
 - When you looked for a book (or periodical), what did you expect to find?
 - What did you find?
 - How did you feel after your search?
 - What helpful advice did you give or get?

Activity Four: An Optional Activity for Students Struggling with their Searches

- The purpose of this activity is to help students become more effective in their search for a book, useful website, or other resources.
- Create a flow chart (a series of blank connected boxes) on the board or on chart paper.
- Write a narrow topic or question in the first box.
- Ask students to suggest progressively larger and larger questions or topics for each of the boxes in the flow chart.
- Direct students to search for books with titles that might be a resource for each progressively larger question or topic. Suggest to students than an

encyclopedia might be last box in the string of boxes. Ask them why they think you suggested that placement. Note: The activity could also be done in reverse, going from broad to narrow.

Examples on Expanding a Question to Progressively Larger and Broader Questions

If the question is, "How does aspirin know where to go, where the pain is?" search for books titled or in the Index or Table of Contents containing:

- How does aspirin work? (most specific)
- What is aspirin?
- Pain relievers
- Pain (most general)

If the question is, "How harmful to astronauts is space radiation?" search for books titled or headings in the Index or Table of Contents such as:

- Space Radiation and Humans
- Hazards of space travel on humans
- Manned space travel
- Space travel

Activity Five: Finding out What Students Already Know about Citations and Note Taking

(See "Voices from the Classroom" at the end of LE 3 for an online, interactive, alternative to teaching this activity.)

- Tell students that they will be using a variety of sources during their research and that there are some strategies that will save them time and help make their research and reporting more efficient. The first strategies apply to how they keep track of their sources, and how they take good notes from these sources.
- Explain to students that researchers use a system for keeping track of their sources. (The MLA citation source is used in this module; any other method can be used by adjusting the handouts accordingly.) Explain that they will learn one of these systems for documenting, or *citing*, every source they use to answer their research questions. Emphasize that using a system for their citations is required, not optional.
- Ask students for reasons why it would be important to them, and to others who learn about their research findings, if the students use a good system for keeping track of all their sources. List their reasons on the board. Discuss. If students don't have reasons, offer prompts, such as: "What if you find in a couple of weeks that you need to go back to a source to check something you wrote in your notes and now don't understand?"

- “What if you realize you didn’t take complete notes and need to return to the source?” “What if someone tells you that your information is incorrect—how could you prove to them that you had obtained the information from a reliable source?”
- Assess and activate prior knowledge about citing sources using a K-W-L. (<http://www.ncrel.org/sdrs/areas/issues/students/learning/lr2kwl.htm>) In using a K-W-L the teacher activates and assesses students’ prior knowledge by asking them what they already **K**now. Next, students work together to identify what they **W**ant to learn. (The teacher will add what he or she wants them to learn to the list.) Finally, after instruction, students discuss or summarize what they have **L**earned. The K-W-L can be done individually, in small groups, or with the entire class. A K-W-L is suggested for this activity with the entire class as a quick pre-assessment on citations to guide your instruction.
 - Place a three-column K-W-L chart on the board or on chart paper.
 - Ask students what they know about how to write citations. Write their comments in the first column (‘K’).
 - Ask students what they want to know? Write their questions in the second column (‘W’). Add information as necessary to this column.
 - Leave the final column empty until students have completed Activity Six. Adjust this activity based on what students already know.
 - Now ask students why they should take most of their notes in their own words. Record their reasons. Again, offer prompts, if necessary. (Note: students may not yet realize that it is more efficient to just take notes on the information they need, in anticipation of having to re-read many notes when they begin to prepare their final product. Thus, you may want to revisit this question, as a reflective journal activity at the end of this module. Further, by paraphrasing, students can check to determine if they understand the text. Also, it’s easy to forget quotation marks and page citations when note-taking, and to include verbatim text as their own in their final product would be plagiarism.) Emphasize that they are not permitted to just copy and paste excerpts from books, the Internet, or any other source.

Activity Six: Working with Citations and Note Taking

Materials

- Handouts Two - Six

Activity

- Distribute Handouts Two, Three, Four and Six, which explain the required method of note taking and citing of resources.
- Review the information with students, checking for understanding as you proceed.
- Ask students to compare the system they have just learned to the way

- they documented their first source and took notes. Ask students to revise their first source cards and note cards. Circulate, offering advice. Collect student work, if necessary, to determine if additional assistance is required by individuals.
- Place students in pairs. Using the two sources from Handout Three and each of their own sources, each pair of students will create a “Works Cited” page that contains four sources. Remind them to follow the directions on the Handouts.
 - Distribute and review Handout Five as further reinforcement for the need to accurately and thoroughly document all their research. When students are ready to create their final product, this handout will be a useful guide.

Activity Seven: Avoiding Plagiarism

Materials

- Handout Seven: Plagiarism: What is it?
- Handout Eight: Test Your Knowledge

Activity

- Ask the students to silently answer the question, Which of the following is *plagiarism* if you do not “give credit” to the source?
 - Paraphrasing
 - Summarizing someone else’s ideas or data in your own words
 - Copying and pasting
- Do not discuss the students’ responses. Tell students that this activity will enable them to check their answer.
- Distribute Handout Seven. Ask students to read silently. Allow time to discuss any questions students may have.
- Place students in pairs. Distribute Handout Eight.
- Each pair completes the exercise.
- Discuss students’ answers. *Notes: #1 - #4 are all examples of plagiarism (it does not matter if you copy or paraphrase the information of others. If it’s not your idea or words, you must cite it.) Example #5 is not plagiarism because the student has generated her own information, has reached her own conclusion from the sources researched. You do not cite yourself. You do not cite your own ideas. You always cite the information of others.*
- Optional: Refer to “Notes to Teachers” for an example of plagiarism that can be read by students and discussed.

Having trouble finding a book? Try this.

Finding a helpful book requires creative thinking.

Do not be discouraged if no book title exactly matches your search question. Perhaps the information you are searching for is in a chapter in a book. Use the Index and Table of Contents of books to determine if helpful information is in that book. What are the possible titles which might contain chapters you need?

To find a helpful book, look at related categories. Complete this activity to help you discover words related to your research question.

<u>Sample Question</u>	<u>Broad Category</u>	<u>Broad Category</u>	<u>Narrow Category</u>
1. Why do cruise ships float?	<u>Cruise ships</u>	<u>Ships float</u>	<u>Why do ships float?</u>
2. Do dogs see in black & white?	_____	How _____ work.	_____
	(answer: dogs)	(answer: eyes)	(answer: how dogs' eyes work)

Now, write your question in the line below & fill out the other lines.

Help with Online Searches

A similar activity is helpful for online searching. This strategy will help you narrow your search through more and more specific search words, using a search engine, such as *Google* or *Yahoo*.

Searching by huge category yields millions of sites, most of which will not relate to your specific research question.

Strategy: Turn the stem of the research question into the stem of an answer.

For example:

<u>Too General</u>	<u>Good</u>	<u>Better</u>	<u>Best</u>
ships float	Cruise ships + float	Why do ships float?	Ships float because
dogs	How eyes work	How dogs eyes work	Dogs see in black and white because

The Numbered Note Taking and Citations System

Why do you need to learn a system for note taking and citations?

As researchers, you must be able to prove where you found all of the information you used. You also need a way to organize and document the large amount of information you will be collecting.

Your sources will probably be located in random order. For example, you started with a book or periodical, but later you will be using reliable websites. Who knows what other reliable sources you will choose to use as your third or fourth sources? Soon you will have a dozen note cards or more, and three or four sources. How will you keep track of which facts came from which pages on which sources? If you do not have a system, you might have to look up your sources all over again to find out what came from where. Let's avoid these problems by following a proven and reliable system for taking notes and making citations.

Making citations

To keep track of the sources, you will fill out a separate small index card, called a "**source card**," for each source you use. On the "source card" you will write the important information about that source. For example, if your first source is a book, write 1.0 in the upper right hand corner of the card. Then, using the MLA samples, copy down all the field information required. For example, if the source is a book, you will write the title, author, copyright date, call number, publisher and place published. You will be given a guide for how to write these citations.

Keep your source cards together. At the end of your research, you will alphabetize them to create a **Works Cited page** or bibliography page. This will be the last page in your product.

Taking notes

Use the large index cards for taking notes. These are called "**note cards**." Only write a single fact, idea or opinion on each card. For example, assume the first useful fact you find in your first (1.0) source is on page 37. Write the information in your own words on an index card. Number this card 1.37, which means source number one, page 37. A note card numbered 3.112 would be a card containing important information from your third source, page 112.

Using this system, you can quickly tell the source and page(s) you found any given fact, idea or opinion. Placing only one fact on a card allows you to sort your cards in a logical order for preparing your final product.

LE 3 Handout Three

Sample Note Cards and Source Cards

First source card

1.0
http://www.usaid.gov/odw/2005_project_reports.html
Operation: Day's Work-USA visited this web site on January 15, 2007

3 note cards

1.65
<p>The Heifer-ODW-Vietnam project is designed to increase the incomes and education of the very low income girls through a combination of education, protection as well as animal and crop production.</p> <p>It will help to increase the family income and reduce the need for girls to leave their homes and toil as child laborers in Cambodia.</p>

1.24
<p>The Heifer-ODW-Vietnam project goals include: increasing the incomes of participating families by 50% over three years; increasing the number of girls attending school by 50%</p>

1.40
<p>That local Women's Union plays an important role in assisting local women with economic development activities, including a micro-enterprise (small loans so they can start up their own small business lending program</p>

Second source card

2.0

King, Coretta Scott. *My Life with Martin Luther King, Jr.*
H. Holt, 1993.

(This is his widow's perspective on her husband's work in the
civil rights movement of the 20th century.)

3 note cards

2.109

“The bombing of our home did not frighten us. Luckily, none of the children were home when the bomb exploded. Martin and I were at a church meeting. Only our things were destroyed. They did not even scratch our hearts. The bombers may come back, but we will not stop believing and acting in peace to end racism.”

Coretta Scott King

2.212

MLK., Jr. studied in Boston as a college age man. He graduated from Boston University. The papers he wrote for his professors are still there in the B.U. library

2.36

MLK., Jr. wrote his famous “I have a dream” speech in the Willard Hotel in Washington, DC.

How to Use the MLA System for Citing Sources

- *This system helps you document your search*
- *This system helps you create a Works Cited page at the end of your research*

MLA Sample Citations (from a variety of sources)

Confused about citations and source card “fields”? When it comes time to make the final page of your product, the “Works Cited” page, you must list all of the sources you used in your researching, with “fields” like copyright date, URL address, author, title and more. This handout will help you do the citations correctly the first time.

How to use this handout.

On the following page are samples of all the kinds of media you might have used as sources.

For each citation card you make:

1. Copy the “fields” needed for the type of media you used (book, website, magazine, interview, newspaper article) as shown below. *You will see that there are different “fields” for different media: books, web sites, magazines, interviews, etc. All have their own required fields.*
2. Write beside each field the information from your source.
3. Be sure you place a number on the top of the card to indicate which of your sources it is.

If you need more help, samples of citations and Works Cited pages can be viewed at:

<http://mciu.org/~spjvweb/mla.html>

Media Source**Fields****Book**

Author's name (last name, first name)
Year published
Title of book
Place published (New York, for example)
Publisher (Scholastic, Inc. for example)
Page(s)

Magazine article

Author's name (last name, first name)
Date the magazine was published
"Title of article used"
Title of the magazine
Page(s)

Web Site

Author's name (last name, first name)
Date published on that site (or last updated)
"Title of article"
Name of the organization that made the site
web address (URL or www electronic address)
Date you visited and accessed this site

Newspaper article

Author's name (last name, first name) if given
"Title of newspaper story"
Date the story was in the newspaper
Name of the Newspaper
Place published
Page(s)

Interview or email exchange

Writer's name (your last name, first name)
Subject (interview with a scientist, for example)
Document description (transcript of interview
or email exchange)
Date of document or interview

How to Give Proper Credit in the MLA Style

When do I have to give credit in my writing to the author of a source I used?

No matter which type of product you are planning to create at the end of your research, credit must be given along the way to each person who wrote the information you found useful.

Giving credit to a person, or telling where you found important facts is called “citing.”

When it is within a written product, it is called, “in-text citing.”

Why do I have to cite my sources?

The purpose of citing is to give immediate information about the location of facts used without interrupting the flow of the paper.

Failure to cite is a serious omission. It is called plagiarism. It means that you have stolen the “intellectual property” or work of another.

What should “citing” look like in my final product?

Whether you are planning to create a Power Point, poster, brochure, report, or the like, you must use a citation in parenthesis at the end of every sentence that has facts you took from a source. You must use a citation in parenthesis every time you:

1. Use an original idea from one of your sources, whether you “quote it” or paraphrase (summarize it in your own words).
2. Quote directly from a source.
3. Use a date or fact that might be disputed.

What goes inside the parenthesis?

Usually you include only the author's last name and the page number. In the absence of an author, the title and the page number are given. Do not use the word "page" or any abbreviations. Page numbers may be left out if the article is only one page long or when you are citing websites, which do not normally provide page numbers.

In most cases you will be citing one or two pages, leading your reader to a specific piece of information.

Allow one space before the parentheses but none after it if a period follows.

Usually citations are placed at the end of a sentence.

The real world takes in-text citing seriously. Inaccurate citations are as serious a problem as having no documentation at all.

Example: (Pretend this is a sentence in a student's research report, or pretend this is a slide in a Power Point.)

Mark Twain's *Life on the Mississippi* is an example of real life experience as inspiration for fiction (McCarthy 89).

*Notice the period is placed after the citation.
Notice there are no commas inside the parenthesis.*

To view an entire research paper which uses the MLA citation style, go to:
http://www.dianahacker.com/resdoc/p04_c08_s5.html
Works Cited Guidelines (MLA 6th edition)

How to Create Your Works Cited Page

The **Works Cited** page is a separate page at the very end of your project. The Works Cited page is a list in alphabetical of the sources you used in your research project. The Works Cited page lists all the sources you used in your research. This includes

- books
- magazine articles
- interviews
- websites
- databases
- media sources
- primary sources

The page should be titled, "Works Cited."

Entries should not be numbered.

Each entry must end with a period.

Entries should be double-spaced within a source and between sources.

Entries should be listed in alphabetical order by the author's last name. If a source does not name an author, alphabetize by the first major word of the title (not "A," "An," or "The")

The Works Cited page should be numbered in sequence. If your report is 8 pages long, then the Works Cited page is page number 9. In the upper right hand corner of the Works Cited page, type your last name and the page number.

What follows is a **sample** Works Cited page by a student whose last name is McDonagh

McDonagh

Works Cited

- Barry, L. Patrick. *Earth's Fidgeting Climate*. NASA.><http://science.nasa.gov/headlines/y2000/ast20oct%5F1.htm><. January 17th 2007.
- Feinstein, Dianne. "Transcript of speech as recorded in the Congressional Record. June 21, 2005."
- *Edmunds Automobile*. 1995-2007. ><http://www.edmunds.com/hummer/index.html><. January 23, 24, and 29, 2007.
- EPA. Feb. 5th, 2007. ><http://www.epa.gov/><. Jan.23rd, 30th, Feb. 5th.
- Gutsch, Jochen-Martin. Jan.18, 2007. *A Small Fish Becomes an Indicator of Global Warming*. Spiegel Online International. ><http://www.spiegel.de/international/spiegel/0,1518,459995,00.html><. Jan.18, 2007.
- Johnson, L. Rebecca. 1990. *The Greenhouse Effect*. Minneapolis, MN. Lerner Publications Company. 43- 47, 16.
- Global Warming. >http://www.mililanins.K12.hi.us/depts/science/global_warming/politics.htm<. January 16, 2007.
- MSNBC. January 30, 2007. *Bush pressure seen on Climate Experts*. ><http://www.msnbc.msn.com/id/16886008/><.
- Steitz, E. David. July 20, 2000. NASA. ><http://ftp.hq.nasa.gov/pub/pao/pressrel/2000/00-112.txt><.
- *Sen. Inhof: Climate 'Hysteria' Targeting Kids*. January 30, 2007. ><http://www.newsmax.com><.

Plagiarism: what is it? How do you avoid it?

Plagiarism is stealing someone else's ideas or words. You cannot copy or even paraphrase someone else's writing or data without giving credit to the source. ("Paraphrase" is another way of saying "summarize in your own words.")

To give the original writer credit, put the writer's last name in parenthesis at the end of every sentence of yours in which their ideas are found. The page number goes inside the parenthesis also. Giving credit can also be called "citing." You must cite your sources in your writing. It is not enough to simply construct a Works Cited list of sources used at the end of your paper.

Examples of giving credit to your source:

"The purpose of research is not simply to retrieve data, but to analyze it, make sense of it, and share what you now know" (Ackerman 109).

Plagiarism is "kidnapping," stealing the use of someone else's words as if they were your own (Gibaldi 6).

The Scholastic, Inc. website offers this advice about plagiarism in an online article entitled, "When Your Writing Isn't Your Own: Get the lowdown with answers to commonly asked questions about plagiarism," by Cara Pitterman. Cara grants permission for researchers to copy her article, but she requires that you please cite her if you use her article as reference. Otherwise, that is plagiarism.

The purpose of research is to create and share new knowledge, new truths. The student researcher will discover or uncover a new answer. When you do, you do not have to cite yourself. Whenever you are explaining the new knowledge or new understanding you have invented, you do not have to put your name in parenthesis, although that may be fun to do. However, if someone else decides to use your new idea or knowledge in their writing, they must cite you by putting your last name in parenthesis. They could copy your writing word for word, or they could summarize or paraphrase what you wrote. It doesn't matter. Either way they have to give you credit. They have to cite you whether they copy you or paraphrase you. They also must put in the parenthesis the number of the page of yours on which you wrote that information. <http://content.scholastic.com/browse/article.jsp?id=1604>

Test Your Knowledge of Plagiarism

Instructions: Circle any that are examples of plagiarism.

1. You copy a classmate's homework.
2. After *Googling* a topic, you copy a chart from a website and paste it in your report. You don't cite the website where you found the chart.
3. After *Googling* a topic, you copy paragraphs from a website and paste them into your report. You don't place the paragraphs in quotations. You don't cite the website where you found the information.
4. You summarize in your own words the President's three-step plan for reducing greenhouse gases. You do not cite where you found this plan.
5. You are researching why dinosaurs became extinct. After analyzing your note cards, you decide that there is no single cause for the extinction. You write this conclusion, and do not cite yourself.

Notes to Teachers

Ongoing assessment

Ongoing assessment gives the teacher opportunities to guide or help students during the process. Grading students solely on the product after the deadline is assessing when it's too late. Assessment or grading the process and the product rewards all of the work being done by the student. The teacher needs visible evidence of the progress or lack of progress being made by the student during the research and inquiry process. Assessment tools include:

- * the BTS journal,
- * note cards,
- * in-class observation,
- * conferences, and
- * the activities

With such observable data and the Analytic Score Guide, teachers can then guide a student so the student is involved in getting himself unstuck, refocused and re-energized into the search for an answer to a question he cares about deeply. The goal is to help students learn how to independently conduct research.

The teacher should check the notes of students every day. Look for copying and pasting, incomplete documentation on source cards, missing or incorrect numbering on note cards. Check “done” on the note-taking line of the rubric when you have evidence of successful note taking. Use checks (and praise) during each measurable stage of the data collection process. Waiting until the product is turned in to grade everything (all 13 steps) just adds to the amount of correcting you will have to do later. Plus, if you discover at the end that a student has not correctly documented a source or copied instead of summarizing in her/his own words, it is too late. The student can learn from mistakes if assessment is ongoing. The student will make mistakes. Detecting mistakes is an ongoing challenge for teachers

Hopefully, multiple methods of taking research notes are not being taught vertically in your building or in your school system. Ideally, one method of taking notes has been learned or will be learned by students and applied effectively in any subject area in any year. An interdisciplinary approach to research skills can be highly effective because different teachers can emphasize in their respective classrooms different elements of the research process. For example, the school media specialist or Reading Teacher could teach or review note taking skills with incoming students in the building. As students progress through the grades in that building, all of their teachers will expect students to take notes in the agreed upon manner presented/reviewed by the Media Specialist/School Librarian or Reading Teacher. There are several effective note taking systems, but students need one that works. In this way, a science teacher or a language arts teacher

interested in an inquiry or research project does not feel overwhelmed by the prospect of thinking he will have to teach it all in isolation.

Using technology to make citations

To make citations fun and interactive try the interactive, free “Son of Citation Machine,” which guides you as well as prints out a Works Cited page. Go to: <http://citationmachine.net/>. Son of Citation Machine can be used for MLA (used in this unit), APA, Chicago and Turabian. Son of Citation Machine serves students K-12.

Avoiding plagiarism

When students use online sources, it will be tempting for them to copy and paste. Do not allow this, except in special circumstances, when you agree with a student that the information should be retained in its original and quoted.

The following story may be shared and discussed with the students.

Sportswriter Suspended for Plagiarism

On March 6, 2007, the Boston Herald newspaper published a sports story detailing the suspension of a Boston Globe sportswriter, Ron Borges, for plagiarism. The story alleges that Ron Borges “lifted” or stole multiple passages and facts from Mike Sando’s writing. Mike writes for the News Tribune in Tacoma, Washington. Mike’s story, published on February 5, 2007, is compared to Ron Borges’ story. There are numerous examples of copying, paraphrasing, and summarizing without Ron giving credit to (without citing) Mike’s writing. This article lists the evidence behind the accusation that Ron Borges committed plagiarism.

The article is titled, “That looks mighty familiar.” It has been archived, and is available for a fee at:

<http://news.bostonherald.com/localRegional/view.bg?articleid=186598>

It should be noted that the Boston Herald and The Boston Globe are rival newspapers in Boston, MA. The potential for bias exists.

What is interesting in the Boston Herald article is that aside from one sentence that explains who Mike Sando and Ron Borges are and states that there are passages in Ron’s article that are suspected of being plagiarized, there is no explanation, editorializing, speculation or accusation. The “suspect passages” are listed thereafter. There is no conclusion. There is only a comparison of Mike’s February passages and Ron’s March passages.

Here is an excerpt from the March 6, 2007 Boston Herald story entitled, "That looks mighty familiar."

"Mike Sando (Feb. 25): When Ruskell became Seahawks president in February 2005, one of his first moves was to issue a letter to players outlining his expectations. He urged full participation in the team's offseason program, including minicamps, but Jackson let it be known he would honor his contract, but nothing more. Jackson subsequently skipped the voluntary portions of minicamps."

"Ron Borges (March 5): When Ruskell became Seahawks president in February 2005, one of his first moves was to issue a letter to players outlining his expectations. He urged full participation in the team's offseason program, including minicamps, but Jackson let it be known he would honor his contract, but nothing more. Jackson subsequently skipped the voluntary portions of minicamps."

"Sando (Feb. 25): He wondered if the team was trying to rush him back."

"Borges (Mar. 5): That led Jackson to wonder whether the Seahawks had rushed him back."

Questions for discussion:

1. Do you think there is evidence of plagiarism? Why or why not?
2. Do you think the Boston Herald article is biased against the Boston Globe's journalist? Why or why not?

Use of an Emergency Box

Students suggested that BTS Journals could be dropped in an Emergency Box at any time. The student writes on the next page what the research emergency is.

Voices from the Classroom:

* **“Son of Citation Machine”** <http://citationmachine.net/> **is the easiest according to the students who piloted this curriculum.** “Son of Citation Machine” can be used to be sure you have recorded all of the field information required. Why not use existing online technology to make citations easy to use for your students.

I passed out the sample note cards found in this LE. In 5 minutes, kids could see the usefulness and were able to understand the need and the method of a numbered note taking system. Within minutes, students were off searching web sites, **taking notes, filling in Works Cited cards for each site. Some students had learned a similar note taking system and were able to adapt to the required one being used in this unit.*

**Equity and Equipment: About a third of the students in the pilot classes are dependent on class time, therefore I have scheduled as much in-school, online research time as possible. Assuming that every student can do research at home is an equity issue. Under the teacher's guidance during class, students are becoming independent learners and skilled researchers. Under the teacher's guidance, students' are learning how to conduct research by samples, group teaching, peers and pairs, trial and error. The teacher also can discover student successes and frustrations by reading the BTS journal entries, through conferences, and checking note cards.*

** “The piloting is a blast! Seeing students pumping their fists as they uncover facts is thrilling! Who knew letting students choose the research questions would be the key?”*

** The journal entries revealed interesting insights about students' thinking. Many students expected to find a book devoted to their specific question, only to be discouraged by the reality that their questions were too narrow for an entire book. One student's question was, “Why do cruise ships float?” The student actually expected to find a book with that title. However there were three books which had a chapter or at least a page or a helpful illustration about why ships float. The titles of three related books are: Shipbuilding; Building Great Ships of the World; How Things Work and Why; and Physical Science.*

** The power of this inquiry unit is that it teaches students that they can answer any question independently. I found that the frustrated students could be pulled together, paired up with skillful student researchers or myself to talk about how specific information is sometimes hidden in books with broader titles.*

1. For example, a student trying to learn whether dogs only see in black and white was told by a classmate to look in books about animals and in particular in chapters about animal vision, eyes or sight.

2. Another student recommended to a classmate that she use the alphabetical index and table of contents in books. She said, "You have to search. That's why they call this research."

3. Finally, another student recommended, "Ask yourself what the bigger and bigger categories are under which your small question is buried or hidden."

**Typing the stem of the "answer" in the Google or Yahoo search window proved very fruitful to EVERY student who tried it. Jackpots of information were hit every time.*

Learning Experience Four

Accessing a Variety of Sources

Overview

During this Learning Experience, students learn how to find a variety of reliable sources, broadening the search beyond books, to other sources such as websites and to people, including experts and elders.

The teacher continues to check for evidence that students are taking notes in their own words while accurately documenting all the sources they have used to acquire reliable data and facts. The teacher also continues to check for evidence that students are creating source cards which later will be used to create the required last page of the project, the Works Cited page. The teacher continues to read and respond to student entries in their BTS journal.

Evaluation

Each student prepares a list of at least ten possible sources of information on her research question.

Activity One: Helping each other find sources

Materials

- Students' research question card, and first source and note cards
- Handout One: KWH chart

Activity

- Each student is given Handout One, a blank KWH chart. Similar to the KWL chart used in a previous activity, the column, H, is for listing how the information will be found.
- Students write their research question onto Handout One.
- Ask students to work with another student from their "topic group."
- Partners help each other complete their KWH charts. The discussions should be guided by the following questions:
 - What questions do you have about my topic?
 - What do we both know about my topic? (record in the K column)
 - What do we both think I should know to answer my question?
 - What resources can we think of that I can use or need for my research? (record in the H column)

- Who do we think I might talk to who might know a lot about this topic? (record in the H column)
- Students switch partners. Students should be certain that their new partner is not from their topic group.
- Repeat the questioning above:
 - What questions do you have about my topic?
 - What do you know about my topic? (add or revise K column)
 - What resources can you think of that I can use or need for my research? (record in the H column)
 - Who do you think I might talk to who might know a lot about this topic? (record in the H column)

Activity Two: Identifying more sources of information

Materials

- Large post-its

Activity

- Ask for 2-3 volunteers to each name a general or specific source of information they plan to use to help answer their research question. Record examples on chart paper or white board.

Teacher's Notes

* Invite students to refer to the preliminary research they have already conducted. Ask where in that research they could find some additional sources of information (the right-hand column of their KWH charts).

* Help students distinguish between a resource and a strategy. For example, a survey or questionnaire is a strategy, while the resource for the information is the individuals who are being surveyed. The individuals can be described by the group they represent, such as local citizens, people who say they are environmentalists. Similarly, a computer search is a strategy, while a website is a source of information.

* Some examples of sources are: reference books, organization websites, government websites, experts, individuals in the community.

- Ask students to each make a list of up to ten possible sources of information they think they will want to investigate to help them answer their research question.
- Group students as in the prior lesson by research topic. Instruct each group to consolidate the members' individual sources, writing in large print on post-its up to 15 sources, each on a separate post-it. Invite groups to

- add more sources.
- Ask two persons from each group to stick their group's post-its to the white board or chalk board. They should look at what others have posted, checking to see if any are exactly the same as theirs (e.g., magazine). If so, they should stick their post-its on top of the existing ones that are the same.
 - Allow time for all students to look at what has been posted, making a mental note of questions.
 - Facilitate a class discussion to respond to students' questions.
 - Create categories: If no one has observed that there are categories for grouping the sources, raise the question of how all the sources may be organized into groups or categories. Invite four volunteers to come to the board and move the post-its into categories. As the class observes the process, invite students to join the group if they want to offer input, and then return to their seats. Only one student at a time should join the group. Then ask the volunteers to explain the reasoning for their groupings. Allow time for discussion among the class. Then place names for the categories—some may already have been named as sources of information.
 - If experiment isn't on the list, ask the students what a scientist would do if there were no already existing sources of information. If no one suggests that a scientist could conduct experiments to answer the question, provide this option to the class and ensure that students understand the role that experiments play in generating new knowledge to answer research questions.
 - If the idea of interviewing or surveying individuals isn't on the list, ask students how they would answer a question about how the public feels about a problem, or to learn how much the public knows about a problem.
 - An example of a completed categorization of sources is provided below, using the topic, human uses of energy.

Teacher's Notes

* The specific examples that are generated will depend on the research questions that have been selected. It's not important at this time to have identified an exhaustive list. The objective is for students to be aware of the range of sources, from information available in print (e.g., books, periodicals, and websites) to information that is not available and must be generated by the students through surveys or experiments or interview.

Sources of Information on Human Uses of Energy

Written Material		Gov't Agency	Individuals in Commun.	Expert, e.g. at Univ., retired	Experiment	Organization	Website
Book	Periodical, Newspaper						
<i>Fuel and Energy – Seldenberg</i>	<i>Time</i>	NOAA	voters	geologist	What materials absorb oil?	Alternative Energy Inst.	www.eere.energy.gov/states
<i>Protecting Our Planet – Parker</i>	<i>Newsweek</i>	U.S. Dept of Energy	adults	biologist		Am. Society for Renewable Energy	OilSpill.cfm
Environmental Experiments about Renewal Energy - Rybolt	<i>National Geographic</i>	EPA	youth	chemist		Center for Resource Solutions	www.epa.gov/
	<i>EERE News</i>	U.S. Dept of Agricult.	car drivers	environmentalist		Energy Star	www.energy.wsu.edu/library
	<i>Solar Energy</i>		owners of hybrid cars	ecologist		E&Co	Energyquest.ca.gov
	<i>Boston Globe</i>			public works employee			www.Ecokidson-line.com
							Wikipedia.com

- Transfer the headings to chart paper, making a list:

List of General Resources

Written material: books, magazines/journals, newsletters,

newspapers

Experiments

Experts

Government Agencies

Individuals living in the community (interview and/or survey)

Organizations

Documentaries available as Videos, DVDs, or Film

Websites

- Discuss where overlaps occur (e.g., websites often contain periodicals, organizations and agencies also have websites; experts can be interviewed, but they can also write books and articles and appear in documentaries).
- Ask students to discuss the following questions:
 1. How will you decide whether to contact an expert directly or rely on written or visual materials? Students may recognize that after reading material written by an expert or watching an interview, there could be value in contacting that person to obtain more specific information, more ideas, or suggestions on where the student may find additional information.
 2. How will you decide whether to access written material on a website or in hard copy? If necessary, tell students that not all information on the Internet is free, and not all information is available online.
 3. When would you need to gather information from individuals who live in our community? Examples: Research questions that seek to determine the level of awareness of the community about a problem or on where the community stands on an issue; questions that compare the opinions or extent of knowledge about a problem between different groups of individuals, such as different age groups or gender. Briefly talk about methods for collecting data from large numbers of people (paper surveys vs. interviews; going where large numbers of individuals gather, such as at school, church, shopping malls).

Activity Three: *Completing a “3-2-1 summarizer” activity for homework*

- Students write responses to the following prompts in their BTS journals. This may be a homework assignment.
- **3-2-1 Summarizer Prompt:**
 - *Three different kinds of resources I will use soon are...*
 - *Two new ideas I have about my topic and/or my research question*

are ...

- One worry, concern, or problem I have right now is...
- The teacher collects the journals, reviews them, and provides input and feedback to students. The purpose is to extend students' awareness of the range of available, useful resources; to help students refine their research questions; and to help them identify potential resources to address concerns.

Voices from the Classroom:

The pitfalls over the past three days: The school lost its Internet service every day intermittently. We had two fire drills. The printers let us down a few times for random reasons. Yet, we are making solid progress as researchers. Our school has just enough online resources to conduct research. We have 4 computers in the Tech Ed room which we can sign up to reserve. I signed them up for 3 weeks. Also, I have 5 online computers in my classroom. The Media Center (which is under-staffed) has 8, but that's on another floor. Those are the technology resources for 350 children. The students themselves and their families have less. In a school survey, about 60 % stated they have online computers at home. Equity is an issue when students are assigned projects. Students do not enjoy equal access at home to computers and online connectivity. If a teacher assigns a research report, then the teacher must secure the in-class time and the in-class resources (computers). As a result of the pilot experience, this research/inquiry curriculum is being written so it can be implemented entirely during class time. Teachers with computer labs can adapt the calendar.

LE 4 Handout One

My research question:

What do I Know?	What do I Want to Know?	How Will I Find Out?

Notes to Teachers

Search tools

Another useful tool for students to put in their researcher toolbox is access to a 24-hour-a-day online service provided by the Online Computer Library Center and Question Point, which gives students direct access to a librarian:

Question Point (known in Massachusetts as www.MassAnswers.org) is a national network of libraries and librarians who contribute their time to helping students conduct research “live” through interactive, online, split screen “chats” between student researchers and participating public library research librarians.

You need a library card to access this free service. Go to <http://www.massanswers.org> OR <http://www.questionpoint.org/>

Reliable Online Sources recommended by MassAnswers.Org are:

Databases:

<http://thomascranelibrary.org/reference/data/generalreference.shtml>

Librarian selected directories:

www.lii.org and www.einet.net

General:

www.google.com/Top/Reference/

For kids by librarians:

<http://www.kidsclick.org/>

Learning Experience Five

Refining and Reexamining the Research Question

Overview

Through student discussions and the creation of a “concept diagram,” students conduct a more complete search. Each student maps out and categorizes important questions prior to collecting data. Subsequent research findings can be stored in a cluster diagram. The concept diagram, sometimes known as a bubble chart, can serve as an ongoing, visual outline-at-a-glance of what kinds of data have been located, what additional data is missing, and what still needs to be located or collected. As another aid to conducting their research, students break their area of study into several smaller areas so they have multiple entry points into sources of information.

Evaluation

Each student completes a concept diagram and inquiry template that demonstrates that he understands the range of information that he will need to collect, and knows who will benefit from his findings.

Activity One: Creating a Concept Diagram

Guide students in creating a concept (or bubble) diagram by creating one on the white board as a class. Students place their inquiry question in the center bubble with smaller, connected bubbles containing short answers to the following questions: Who, What, When, Where, Why and How. In addition, any related questions or areas of concern should be placed in other bubbles or circles. There is no limit to the number of connected circles.

Teacher's Notes

*An online, interactive **Graphic Organizer generator** is available free by clicking http://www.teach-nology.com/web_tools/graphic_org/. At the site, students or teachers can generate printable, personal timelines; a concept web; or a Venn Diagram.

Activity Two: Conducting a Self Assessment

- Guide students in completing a self-assessment checklist in their journal that will help the teacher differentiate instruction. Students copy each of

the following statements and place a check beside the statements, as appropriate:

I am still very interested in my question.

I think I'll be able to find the resources to answer the question.

My biggest problem or concern won't stop me from getting started.

I need help right now before I can do anything more.

- Collect the BTS journals and scan quickly to determine which students need help right now.
- At this point, the teacher begins to differentiate instruction. The teacher will work directly and immediately with the group of students who can't go on. The other students can go to the next activity and begin to investigate their questions using the resources they've identified.
- To help students who wrote in their journal that they are still having trouble deciding on a topic, consider recommending to the "stuck" students one of the following links. These sites might have something of interest or lead a student to a helpful source(s).

Here are some science sites from the New Mexico State University site:

Teachers might consider the science, history and language arts topics listed at <http://education.nmsu.edu/webquest/wq/internet/science.html> to help students who still need help choosing a topic:

[Frank Potter's Science Gems](http://www-sci.lib.uci.edu/SEP/SEP.html)

<http://www-sci.lib.uci.edu/SEP/SEP.html>

[Lawrence Hall of Science](http://www.lhs.berkeley.edu/)

<http://www.lhs.berkeley.edu/>

[Science Hobbyest](http://www.eskimo.com/~billb/)

<http://www.eskimo.com/~billb/>

[Earth Science Links](http://www.ems.psu.edu/RelatedWebSites.html)

<http://www.ems.psu.edu/RelatedWebSites.html>

[Awesome Library's Science Topics](http://www.awesomelibrary.org/Classroom/Science/Science.html)

<http://www.awesomelibrary.org/Classroom/Science/Science.html>

Activity Three: Getting Started

Materials

- Handout One: Getting Started

Activity

- In this activity students begin to investigate their own questions and organize their thinking. They break the area of study into several smaller areas so they have multiple entry points into sources of information. This strategy also provides a structure for beginning their inquiries.
- Place students in triads.
- Distribute copies of Handout One.
- Ask students to work together in their triad groups, helping each other answer the questions on their handout.
 - Who are people who come to mind when you think about your question?
 - Where does or did this occur?
 - When or under what conditions has it occurred or does it occur?
 - What hypothesis or possible explanation do you have at this time about the answer to your question?
 - How will you test your hypothesis or explanation? Where will you go and what can you do?
 - Who might benefit from this information and how might you share it?
- Collect the handouts and review them to be certain that students have enough information to begin their research.
- Homework Assignment: Give students two nights to gather additional information. Require two community resources. Students can 1) ask an elder, parent, community member or teacher, 2) seek an expert: call or visit the library or a local cultural, historical, scientific organization or government agency, or 3) talk to a peer.

Getting Started: Now the Inquiry Begins

Who are people who come to mind when you think about your question?	
Where does or did this occur?	
When or under what conditions has it occurred or does it occur?	
What hypothesis or possible explanation do you have at this time about the answer to your question?	
How will you test your hypothesis or explanation? Where will you go and what can you do?	
Who might benefit from this information and what might be a good way to share it?	Write this answer on the back for now, but you should copy this answer later into your BTS journal. (after you get this paper and your journal back)

Voices from the Classroom:

It is normal for students to re-think their question once the actual research begins. About half of my students changed their original question in some way. The biggest reason for changing was because the student could not figure out the answer to one of the essential questions in this unit: "Who will benefit from your answer/conclusion?" That single question inspired students to take this project to a higher level. The fact that this research may benefit others caused many students to choose a deep, personally meaningful question instead of just choosing a topic like penguins.

*By working in pairs or triads, students discovered each other's choice of research questions. Several switched because by comparison, their own question seemed to be unlikely to be helpful to anyone beside themselves. Or, students switched their question because they discovered something better or more important to them personally. Allowing students to switch questions or to modify their question resulted in more thinking and more motivated searching for **the** question.*

One of the girls changed her question. What were her reasons for switching? Originally, she wanted to know why people litter. Her entry revealed that she chose that question hurriedly. She found it easy to collect tons of information about littering online. She wrote in her journal that choosing an easy topic was her motivation. She wanted an easy "A". To satisfy the "variety of reliable sources" requirement, she devised a survey to give to students about littering. After a week, she got bored with her own question. Then, she saw a Boston Globe Magazine cover story about cosmetic surgery. That story made her think about "nip/tuck" and why people use surgery and about beauty. Her new question became: "What is the ideal in beauty?" She wanted to find out what noses are most popular, what eyes, what chins. She was amazed to discover that in the U.S. most cutting is done to create white features (Northern European features). She wondered why non-whites would see Northern European features as the perfection in beauty. She wondered: "Who teaches that vision of beauty? How is it learned?" The uncovering of data is taking her to questions about race, visions of perfect beauty, stereotypes, low self esteem, topics she never expected to be discovering. In our conference the next day, she said: "This is actually important. It's about what we teach kids on purpose or by accident."

Notes to the Teacher

Providing guidance that preserves student choice

It's possible to help students who get stuck in the middle of the data collection process by conferencing, by reading their BTS journal, and by building in time during class to discuss with them the reasons they are stuck. With good listening skills such as pauses and some guiding questions from the teacher, students can discover how to revise their question by expanding it or narrowing it or possibly by imagining the end product and imagining who will benefit from the answer to the question.

If this project is to remain one in which the student chooses the research question, then the teacher must exercise patience and self restraint when students are stuck, have lost focus or lost touch with their question. A quick solution, when a student gets stuck or confused, is to tell the student what to research. That may be quick, but telling the student what to research invalidates the power of student-directed research. Sometimes, a student just needs someone to listen to his idea and the problems with that idea. Usually, the listening is enough; the student talks through the barrier and discovers a solution. Sometimes a discussion with the teacher helps the student. Telling the student to abandon his original meaningful question teaches the student that his question was not really all that important. Such a tactic only increases student dependency on the teacher. This inquiry project has the noble goal of helping the student to become an independent learner, capable of answering any question at any time. The "Voices from the Classroom" that follows provides examples of how to guide students without being directive.

Voices from the Classroom: Guiding students, honoring choice

1. Too much information! Two boys are working together researching their question: *Why is basketball so popular?* They love basketball, watching it as well as playing it. Their research however lacks focus. They kept discovering more and more facts about the sport's origin, growth, stars, classic games, rules. They had lost touch with their specific question and found themselves lost in loop of interesting facts about basketball. These two boys love everything about basketball; they found every fact interesting. They had dozens of note cards with no end in sight. Twice before, during class, I tried to refocus them to finding the answer to their question. Nevertheless, the boys were still piling up dozens of note cards about every part of the history of basketball. When I read their blue books and checked their notes, I realized they were taking more notes on basketball's milestones (*Best, Most, First...*) than on the reasons for basketball's popularity. I then consulted with them. I asked them to tell me what their research question is, and asked them to show their best note cards (the ones which answer the question). They couldn't because they had been immersed joyfully in discovering basketball's history. Instead of encouraging them to return to the popularity question, I decided to go with their obvious interest in basketball milestones and its many changes. I asked, *what changes basketball?* They rattled off stories about pioneering African American players and coaches, college and high school desegregation stories, allowing girls and women to play under the "men's rules," and the influx of European and Asian players like Yao Ming. I said, *That's a great answer, but to what question?* After some brainstorming, the three of us crafted a new research question: *"How do new U.S. laws change our daily lives, even the games we play, especially basketball?"* The boys are now culling out note cards that have to do with law-inspired changes in the sport of basketball. Two-thirds of their note cards already were facts, such as: *Bill Russell, first African American NBA head coach; the first college team to start five African American players which one of the boys wrote on the bottom of a note card: "...and they made a movie about this;" Lisa Lesley, first woman player to slam dunk; Candace Parker, U of Tenn. player now dunking; etc.* The boys are so focused they are even planning to interview their grandmothers about the old "girls' rules" of basketball. Holding all these parts together is the new question: *"How do new U.S. laws change our daily lives, even the games we play, especially basketball?"* The boys will probably refine the question to focus only on basketball, but today they progressed from writing a "topic report" on basketball to an inquiry about the effects laws have on our lives, even on the games we play.

2. Finding a Focus. Here is a lesson in knowing how this project is going to end, and what steps must be taken now to get there. An ESL student chose this question: What was daily life like in Ancient China? She was stuck because her question is too broad. After a conference, we decided to choose three dynasties and discover what daily life was like (music, values, family life, laws, marriage, school, food, religion, games). I asked, who will benefit from knowing this? She looked disappointed and replied: "...only me, I guess." She is Chinese-American, having moved to the States only three years ago from China. I asked her what daily life is like for a Chinese-American in 2007? She had that light-bulb-moment-look-on-her-face. I waited. She said: "Could I make a comparison of daily life then and now?" She sketched two overlapping circles (Venn diagram). I asked her to carefully look for Chinese values that were important then and still are important now in the Chinese-American cultures. I asked her to discover the enduring parts of Chinese life, wherever a Chinese lives. Focused, she completed the data collection stage. She also decided to interview family members about "What it means to be Chinese." Surprisingly, she also decided to try to interview someone not family to see if the answers would be the same as her family's. She designed a survey and gave it to Chinese-American classmates. The principal had to give permission for the survey. Also, the student interviewed by telephone an Chinese-American guidance counselor in a nearby school. Primary sources and a focused research question made all the difference. She was unstuck.

3. What do I really want to find out? Another student had created this question: "Why do blue eyes and light skin go with blonde haired people, and dark eyes go with dark haired, dark skinned people?" Her frustration came from too little information available. Also, when I asked her who would benefit from her answer, she said probably no one. I asked her why she picked that question. She thought, then said her mom and sister had blond hair and they get bad sunburns. She had darker skin and tanned easily without burning. She wondered why sisters had such different skin, but what she said next changed her project. She added: "I worry about my sister and mom. They might get skin cancer." I asked her to imagine them benefiting from her project. She said: "You mean if I made a chart of safe sunbathing for blondes?" I asked her if blondes had a higher rate of developing skin cancer? She did not know, but now she would find out. Her new research question is: "Does your skin type, hair and eye color increase or decrease your risk of skin cancer?"

4. Creating a researchable question. She wrote in her journal that she was stuck. I sat with her. She told me her question was: "What is depression?" I did not remember that as her question, so I asked her if she changed her question. She said she did change her question because she really was interested in depression. I asked her to explain what she meant when she wrote she was "stuck." She showed me her computer screen. She was on the Massachusetts General Hospital website staring at a massive list of types of and treatments for dozens of kinds of depression. It was overwhelming for both of us. This project is designed for inquiry into a question which is meaningful to the student. This should not be an exercise in cutting and pasting together a huge pile of facts about a topic. She needed a focus, a narrowing around an essential question she had about depression. I wanted to move her away from the tunnel vision of taking notes on depression from a series of overwhelming websites. I wanted to remind her how the project ends. I asked her: "When you switched to a new research question, who did you hope would benefit from the answer?" She thought for a few seconds, then she said: "Girls, like in 6th or 7th grade." I asked her to explain a little more. She added a few details like peer pressure, rumor spreading, weight issues and parent problems. I asked her to look on the screen to see if there was a depression listed that matched what she just described. She looked at the list starting with A's, B's, then she pointed to "Childhood Depression." I said, that's the topic. What's the question? She thought, and then said, "Why don't schools teach about depression? It's real, and it's all over the school." I ignored her overgeneralization and asked: "Who would benefit from facts about childhood depression?" She answered: "all of us (middle school students)...(pause)...and our parents, too." I asked, who else? She said elementary school students and their parents and their brothers and sisters. I asked her to imagine a way she could teach these audiences about childhood depression. She said she couldn't get up in a class and teach about it. I paused, waiting, giving her time to think. After an awkward 10 or 15 seconds, she said: "I could make a flyer...with things every family should know about it." That was it! She had her product in mind. She would research childhood depression to find the three most important things every parent should know about childhood depression. She is sure that a folding flyer (a tri-fold or bi-fold) would give her enough room to share what she discovers about childhood depression. She is planning now to make copies of a brochure for her health class, Open House, PTO meetings, and the guidance office.

Learning Experience Six

Determining the Reliability of Sources

Overview

Students engage in a variety of activities to explore sources of bias and other inaccuracies, particularly in Internet sources. Students first generate their own list of reasons for inaccuracies in the information they locate. They then experience actual bias on websites. In the final activity, students create a checklist to serve as a guide to obtaining reliable information.

Evaluation

Students create a reliability checklist to guide them in their research.

Activity One: Questioning the Reliability of Sources

Materials

- Chart paper, marker

Activity

- Caution students that they may encounter pitfalls in the sources they use. Inform them that in this activity they will learn how to determine if the information they find is accurate. Inaccuracies may be unintentional, but sometimes sources intentionally omit or misrepresent information. In this case, the source is biased. Tell students that students will learn how to determine if a source is biased, and how to ensure the reliability of all the information they collect.
- Ask students to talk with a partner about what might be some reasons that the information they locate might be inaccurate.
- Students share their ideas with the class. Record on chart paper and discuss their ideas. Tell students you will keep this information posted throughout this LE so that they can refer back to it, adding or revising their ideas.
- Ask students to discuss with a different partner these two questions:
 1. How can you determine whether a source is biased? What might be some clues?
 2. What should you do to check the accuracy of information?
- Students share their ideas with the class. Record and discuss their ideas. Keep their ideas posted as before.

Activity Two: Examining Bias—Was the Moon Landing a Hoax?

Materials

- Handout One, Was the Moon Landing a Hoax?
- Handout Two, A Guide to Website Suffixes
- Computers with Internet capability (numbers will vary depending on how the teacher organizes this Learning Experience)
- Optional: Digital projector, computer

Note: Computers may be located in different areas of the school, however, be mindful that teacher supervision is beneficial; media specialists can help if the teacher briefs the specialist on the nature of the students' research.

Activity

- Tell students that although the Internet is a very convenient resource, they should be particularly suspicious of online sources. It is very easy for anyone to publish information on the internet. There is no editorial board. There are no filters for the quality of information. If you are not careful, you may, in fact, be referencing the work of a sixth grade class! We must be careful consumers of information. Warn students that the risk of finding an unreliable website is a potential pitfall of using the Internet for research. Tell students that they are going to experience for themselves this Internet pitfall.
- Ask students if they know anyone who thinks the Apollo spaceship never landed on the moon, and thinks that no one has ever walked on the moon.
- Optional: Using a digital projector, display the website, <http://users.erols.com/igoddard/moon01.htm> and explain that this site promotes the stand that the landing was a hoax. Scroll to the end of the website to display the section with the links to sites refuting and promoting the hoax claim. Note: The links are provided as web addresses in Handout One.
- Ask students to raise their hands if they agree that the moon landing was a hoax. Briefly discuss students' reasons for and against the hoax assertion. What is their evidence (or proof)? How reliable do they think their evidence is?
- Tell students they are going to work with a partner to investigate a website. Their website will either argue that the moon landing was a hoax, or that it really happened. It will be up to them to determine if they think the website is reliable.
- Divide the class into pairs. Distribute Handout One. Assign each pair one of the sources.
- Each pair reviews the source and decides if they think that it is reliable (accurate) or unreliable.
- Each pair reports its finding to the class and the reasons why the students have decided their assigned source is reliable or unreliable.

- Discuss the reasons students give, referring back to the two charts created in Activity One.
- Whether or not the suffix on the website was mentioned, ask students if the suffix can offer a clue as to the reliability of a source.
- Distribute Handout Two and review. Ask students which suffixes would be the most trustworthy. Why?
- Ask students to discuss with a partner what they have learned from this activity. Volunteers share what they discussed.

Activity Three: Answering the Question, Are all .org sites reliable?

Materials

- Computers with Internet capability (numbers will vary depending on how the teacher organizes this Learning Experience)
- Optional: Digital projector/computer

Activity

- If you were researching Martin Luther King, Jr. and located the following website, would you feel pretty confident that it was a reliable source: www.martinlutherking.org? Why, or why not?
- Tell students that they will discover for themselves the answer to that question.
- Assign students to computers, preferably no more than two students at each computer. Note: You may prefer to conduct the activity as a demonstration, using a digital projector.
- Students visit the website, www.martinlutherking.org. Does the information seem to be reliable?
- Provide instructions so that students are working at the same pace. Tell students that they will locate the owner of the Martin Luther King website. It will take some investigative digging using an online search tool known as WHOIS, as in, WHO IS the owner who paid to put this particular information on this particular web site?
 - Go to: <http://www.networksolutions.com/whois/index.jsp>
 - Follow the onscreen prompts.
 1. Enter the domain name: www.martinlutherking.org.
 2. Click search button.
 3. Information about this web site pops up. Scroll down and you will discover:

Registrant Name: Don Black
Registrant Organization: Stormfront Inc
Stormfront.org

Web Site Title: Martin Luther King Jr. - A True Historical Examination
Meta Description: The truth about Martin Luther King: Includes historical trivia, articles and pictures. A valuable resource for teachers and students alike.
Meta Keywords: Martin Luther King Jr, Civil Rights, Black History, Slavery, Reparations, Kwanzaa, Anti-Defamation League, ADL, , anti-Semitism, racism, bigotry, hatred, prejudice, bias, Holocaust, Israel, democracy, terrorism, militia, Jews, Jewish, diversity

- Note that in the description the site promises the truth. How can you determine if you will get facts or unreliable, biased information or worse, racist propaganda? How can you get more evidence that the site is reliable? Who is Stormfront, Inc.? Who is Don Black?
- Repeat the WHOIS search. Go to:
<http://www.networksolutions.com/whois/index.jsp>
- This time, enter www.Stormfront.org
- What do you discover?

Web Site Title: Stormfront White Nationalist Community - Discussion Board for Activists
Meta Description: Racist discussion board for pro-White activists and anyone else interested in White survival.

- Ask students why it's important to know the owner of a website. If the owner is biased or prejudiced, can we trust his posted information?
- Tell students to be investigative researchers: use all their available tools when checking for bias and reliability. When determining the truthfulness and reliability of a web site, ask these two questions:
 - Who created this website?
 - Do the creator(s) of this site have any reason to stretch the truth, exaggerate the facts, or leave out facts?
- Students write the WHOIS web address in their BTS journals.
<http://www.networksolutions.com/whois/index.jsp>

Teachers' Notes:

Depending on a single source for the truth is not recommended no matter what the web suffix is. We should always double check key facts by finding out if the same information can be located on another reliable site or in a reliable book or magazine. The teacher should continue to remind students that checking the accuracy of facts (vetting) is required. Otherwise, we are taking one source's word as the truth. Students know that rumors spread in school. One person can say or write something, and it may turn out to be totally untrue. Yet many students believe it. Investigative news reporters cannot print a fact unless it can be verified (corroborated/double checked) from another source. In a courtroom, a witness' testimony is not admissible evidence unless it can be corroborated. Recall the 17th Century Salem Witch Trials. The only evidence given in the Salem Witch Trials was the word of teenagers. It was learned after nineteen people were convicted and executed because of the word of those teenagers that those teenagers had lied. Courtrooms in Massachusetts changed their rules for testimony and evidence after discovering the lies. Physical evidence and corroboration (double checking facts) are now required before a guilty verdict is decided by a jury.

Activity Four: Creating a Checklist for Determining Reliability**Materials**

- Handout Three: Be Aware of Possible Bias and Inaccuracies on Web Sites

Activity

- Distribute Handout Three. Ask for volunteers to read each item on the handout. Allow time for questions, examples and discussion.
- Tell the class that it might be helpful for them to have a simple checklist they can refer to as they search for information, to be sure the information they are collecting is based on supportable facts and is unbiased—and is therefore reliable. Ask students first to look at the questions they generated in the first activity, and the issues raised by knowing the author and publisher (that you have posted). Now brainstorm a list. An example follows:

Checklist for Determining the Reliability of Information

- Is the author or publisher affiliated with a specific cause that may make the information biased to support the cause?
 - Does the author cite references from sources you would consider expert?
 - Does the information contradict or support other sources?
 - Is the author writing about his or her own research?
 - Is the author a politician or the publisher affiliated with a political stand?
 - Is the information up-to-date?
 - Is the website owned by an industry or business that serves to profit from the information that is on the website?
 - Was the research cited in the source conducted by an individual or group that would benefit from the published results?
- First synthesize the list by combining similar ideas.
 - Discuss each item in the checklist to assess whether it is a useful question, and whether it still may involve some pitfalls. Ask questions that will help students realize that the best research never depends on a single source because even experts can be wrong, or have a bias. Have students justify their answers. Examples of questions:
 - Would information you find published by an environmental organization necessarily be biased?
 - Is an expert always right, always unbiased?
 - Can a politician be a reliable source?
 - Is federal or state government always a reliable source?
 - Is information from a business that seeks to profit necessarily incorrect?
 - How many sources should be consulted to ensure information is reliable?
 - For what kinds of research questions are opinions that are not even supported by facts acceptable sources? (e.g., When the purpose of the research is to survey a group's opinion or level of awareness of an issue)
 - Are you being objective when you do your research, or are you liable to be viewing information through your own biases, favoring some information you find simply because you personally agree with it, rejecting other information because it goes against your beliefs? How can you be sure you are being completely open-minded (i.e., unbiased) as you collect information?
 - Discuss with the students whether a checklist such as the one they have been trying to design is useful. You may want to focus the concern about reliability on the students' research results, rather than focus on the sources they use. That is, work with the students to create a checklist for ensuring that their research contains information that is reliable. An

example follows:

A Checklist for Ensuring My Research is Reliable

I am aware that the information I collect may be unreliable, so:

- I check the facts I include in my research by using multiple sources of information.
- I am particularly wary of sources that might seek to profit from publishing the information they provide; I always know the source.
- I know the date of the information and rely on the most current, reliable information. If the information in a source was obtained from another source (there is a quote and/or a reference provided), I check the date of that original source.
- I know the credentials of the author and am assured that the author is qualified on the subject.
- I keep an open mind until I have collected and studied all the information.
- When I have thoroughly researched my question, if I find that I still have opposing points of view, or more than one possible answer to my question, I will include all reliable points of view or possible answers in my product.

Activity Five: Journaling

Assign students this writing prompt for their BTS Journals: “How is it going? This prompt is particularly open-ended to provide students an opportunity during data collection to tell you what’s wrong or what’s right in their searching.

Was the Moon Landing A Hoax?

Instructions:

- The teacher will assign a website to you and your partner. Circle the number of the website you are assigned.
- Type the web address into the search engine and read the website. You may want to follow links that are included.
- Decide whether you agree or disagree with the information.
- Record the reasons for your decision below.

Websites that argue against the moon landing being a hoax:

1. <http://www.badastronomy.com/bad/tv/foxapollo.html>
2. http://pirlwww.lpl.arizona.edu/~jscotti/NOT_faked/FOX.html
3. http://science.nasa.gov/headlines/y2001/ast23feb_2.htm?list45245
4. http://pirlwww.lpl.arizona.edu/~jscotti/NOT_faked/
5. <http://www.apollo-hoax.me.uk/homepage.html>
6. <http://www.redzero.demon.co.uk/moonhoax/>

Websites that support the assertion that the moon landing was a hoax:

7. <http://batesmotel.8m.com/>
8. <http://web.archive.org/web/20010603120457/http://www.forteantimes.com/artic/94/moon.html>
9. <http://www.moonmovie.com/moonmovie/>
10. <http://www.moonmovie.com/moonmovie/>
11. <http://www.ufos-aliens.co.uk/cosmicapollo.html>
12. <http://www.museumofhoaxes.com/moonhoax.html>

Websites were obtained from: <http://users.erols.com/igoddard/moon01.htm>
(Links to sites refuting and supporting the hoax claim, at the end of the article)

Do you agree with the website or disagree? _____

Write the reason(s) for your decision:

A Guide to Website Suffixes

Web Site Suffix	Descriptor	Examples
.com	a U.S. site selling something for a profit	<i>Amazon.com</i> <i>ebay.com</i>
.edu	a U.S. educational site, a school or college	<i>ucla.edu</i> <i>mit.edu</i>
.gov	a U.S. governmental site	nasa.gov
.mil	a U.S. military site	army.mil
.museum	worldwide museum	
.net	United States Internet administrative site or web services strategy to connect information, people, systems, and devices through software, making it easier for users to share and use their information between multiple web sites, programs, and computers	Verizon.net
.org	a U.S. non-profit organization	RedCross.org
.web	Internet site about the World Wide Web	

Be Aware of Possible Bias and Inaccuracies on Web Sites

How can I tell if a source is “reliable” and not biased?

- Is the writer trying to get elected or convince people to join a cause or religion? Facts are not opinions. Persuasion or opinions are not facts.
- Is the writer a member of or supporter of a special interest group such as Greenpeace or the National Rifle Association? Do such sites promote one side of an issue?
- Are opposing points of view presented? If so, are both sides respectfully presented?
- Does the writer’s language show signs of bias? Does the writer use judgment or opinion words such as best, worst, ultimate, should...?
- Does the writer support statements with factual evidence or with just a few emotional examples?
- Are statistics consistent with those you found in other sources? Does the author explain (cite) where the statistics come from? It is possible to “lie” with statistics by using them selectively or by omitting some statistics that disagree with the point being made by the author.
- Be cautious if the sponsor of a website is not given. Track down who paid for this site by clicking on “About Us” or better, do a WHOIS search.
- What is the writer’s background? Is he/she truly an expert?
- Does the website provide a way for users to make comments or ask questions?
- Sites promoting social biases rather than enlarging the views of the reader should be considered biased sites.

An important clue to bias is the writer's purpose

The purpose should be to educate or share the truth. Suspicious purposes are:

- To sell you something
- To persuade you to do something or to change your thinking
- To entertain you

Note: entertainment does not claim to be the truth. Fiction entertains. Non-fiction (true stories) can entertain, too. Know the difference.

Online Resources on Evaluating Sites for Bias

A checklist and questions to use when checking a site for bias:

<http://www.dianahacker.com/resdoc/tips.html>

New Mexico State University guidelines on evaluating sites for bias or inaccuracies:

<http://education.nmsu.edu/webquest/wq/internet/evaluate.html>

Samples of sites with bias are provided including one on second hand smoking.

<http://www.smokingsection.com/issues1.html#smoke>

Even if I think a site is not biased, how can I still be certain the information is accurate?

- How old is this website? Check for the date of publication or the date the site was last updated. There may be updated information that is out there on other sites. Beware of stale websites.
- Check the site's references. Facts should be referenced!
- Who is the author? What are his credentials?
- Triangulate: Look for the same information in two other sources. But be sure those three sources didn't all get their information from the same place!

What about online encyclopedias? Are they always accurate?

- Any source can have an error in it. Remember, anyone can make a mistake.
- What's wrong with this strategy?
"I'll just 'Wiki' my research question and I'll be done."
- *an actual excerpt from a grade 7 student.*

The following is a true story about a Wikipedia article (now removed) which was untrue:

"Probably the most notorious example of bad information's finding its way into Wikipedia was in the case of a biographical entry for journalist John Seigenthaler. A prankster edited Seigenthaler's life story to link him, falsely, to President Kennedy's assassination. John Seigenthaler was actually one of President Kennedy's closest friends.

From: *Johnson, Tim*, "Middlebury College rethinks Wikipedia", *Burlington Free Press newspaper*, February 13, 2007.

Notes to Teachers

Reinforce the elements of good research every day by posting on the board reminders such as:

Are your sources reliable?

Double check all key facts. (checking of facts is a requirement)

Are you using a variety of reliable media sources, not just internet?

Reliability:

- Be sure the information is up-to-date: Books may take 2-3 (or more) years to be published; professional articles are more current, but may also take a year or longer to be published.
- Expect controversy even among scientists: Even experts don't always agree. Knowledge derived from scientific studies may later be disproved or revised. Methodology and accuracy affect results.
- Surveys: When opinions or level of awareness of a group of individuals on a certain issue are assessed, reliability is determined by the way the questions are asked and the methods used to collect the information. Information derived from surveys should always be checked against other surveys or sources of information.
- For Middle School Guidelines: "Untangling the Web: A Middle School **WebQuest** for Evaluating Web Sites" by Christine Voelker go to: <http://cte.jhu.edu/techacademy/fellows/Voelker/webquest/cwvindex.htm>
- Quoting the American Library Association: *"The Web is a lot like a flea market: there's a vast selection of sites to choose from but not a lot of order to it. Some sites are offered by reputable "dealers" and some from individuals who want to show off their personal favorite items. Sometimes it's hard to tell what's a hidden treasure, what's worth taking a look at, and what's a waste of time."* - American Library Association

To guide student researchers through the Internet "flea market," the American Library Association has written a guide for parents, teachers and children listing the ALA criteria for a reliable, unbiased web site or text. To investigate the ALA Great Web Sites Selection Criteria, go to: <http://www.ala.org/ala/alsc/greatwebsites/greatwebsitesforkids/greatwebsites.htm>.

- Teach students about Wikipedia and Digital Universe

What is Wikipedia?

The Wikipedia Foundation describes itself: "Wikipedia is the ideal place to start your research and get a global picture of a topic; however, it is not an authoritative source." Anyone can access or post Wikipedia entries. Independent evaluators concluded that Wikipedia is as accurate as any mainstream set of encyclopedias in any U.S. library. Both encyclopedias and Wikipedia have a 95% accuracy rate. How do you know if you found the 95% truth or the 5% error? There is no short cut to the truth. All key facts must be verified by finding other reliable sources.

What is Digital Universe?

The Founders describe Digital Universe's mission this way: "The mission of the Digital Universe is ambitious and never ending: to organize and contextualize the sum total of human knowledge and make it available to everyone online. It is a growing network of commercial-free portals mapping the highest-quality Internet destinations, as recommended by experts recognized in their fields. These experts review public contributions, create context and attest to the reliability, integrity, and accuracy of the portals. Professionals at more than 100 universities and institutions in 16 countries are already involved in the initial phase of just one component of the Digital Universe: the Earth Portal's 'Encyclopedia of Earth.'"

From: <http://www.digitaluniverse.net>

How has Wikipedia responded to the creation of Digital Universe?

Wikipedia has created a self check to address concerns about unreliability and bias. As a result, Wikipedia created the "Neutral Point of View (NPOV)." Wikipedia is generating controversy. A February 13, 2007, Burlington Free Press newspaper article written by Tim Johnson chronicles the 2007 decision by the History Department of Middlebury College to ban the use of Wikipedia in student research. In the article (available for purchase at archives at <http://www.burlingtonfreepress.com/apps/pbcs.dll/frontpage> , Wikipedia is described as a starting place not an ending place for research. Contact Tim Johnson at 660-1808 or tjohnson@bfp.burlingtonfreepress.com.

Using Primary Sources

Overview

In this Learning Experience, students are introduced to primary sources of information. The LE begins with an introduction to several different kinds of primary sources. Students learn why they should use primary sources and then learn how to select primary sources that will help them answer their research questions. This LE is based on information available from The Library of Congress' American History Project (<http://memory.loc.gov/learn/lessons/fw.html>) which explains what primary sources are, where they can be found, and what they can add to understanding.

Evaluation

Students incorporate at least one primary source in their research.

Activity One: Understanding Primary Sources

Materials

- Handout One: What are primary sources?
- Handout Two: A True Story about the Importance of Primary Sources

Activity

- Expand students' awareness of primary sources by distributing, reading aloud and discussing Handout One.
- Place students in small groups to discuss the question, "What is the advantage of using primary sources?"
- Discuss groups' responses.
- Distribute Handout Two. Ask students to read silently and then answer these questions in their BTS journal:
 1. When researching, how can cultural misrepresentations of information be avoided?
 2. Has your culture ever been misrepresented in some source or in school? If so, explain what happened.
 3. When a parent or principal is investigating (researching) "Who did it?," what pitfalls or mistakes might that adult make? What successful steps might the adult take to get to the truth?
- Discuss students' responses.

Activity Two: Determining if Primary Sources are Always Reliable

Materials

- Download and make 1 copy/group from 2 websites:
http://www.american.edu/bgriff/dighistprojects/wym/Rodney_3.htm
(first photograph)
<http://www.founders.howard.edu/hucollection/LewisMary1.htm>
Alternative: Use digital projector and computer with Internet access to display photographs to class. Internet access won't be necessary if the photograph has been downloaded.
- 8.5 x 11 Venn Diagram with 2 overlapping circles/group

Activity

- Ask students if they think that primary sources are always reliable. Discuss their responses.
- Tell students that they are going to explore this question.
- Place students in small groups. Explain that their task is to compare and contrast two primary sources; both are photographs of sculptures that honor the end of slavery in America (Emancipation).
- Students begin by examining a photo of the 1876 Lincoln Freedmen Memorial at
http://www.american.edu/bgriff/dighistprojects/wym/Rodney_3.htm
Note: Either distribute a copy to each group or use the digital projector so the class can view the photo online.
- To guide their examination, provide the questions that follow. Students respond in their groups to these questions.
 1. What do you see when you look closely at the Lincoln sculpture?
 2. What feelings did you get looking at the sculpture (subjective)? Why?
 3. What history is represented?
 4. How accurate a depiction is this?

Possible responses to the discussion questions might include:

1. I see a crouched man in broken chains and Lincoln standing proud. Will the slave ever stand as tall, be an equal to Lincoln in America? I see a huge white man, suggesting white supremacy.
2. Anger, confusion, because Lincoln looks like he's walking a dog that he took off the leash. Why couldn't they be standing up and shaking hands?
3. The freeing of the slaves.

Explain to students: The sculpture is inaccurate in that the former slave, Archer Alexander, who posed for the slave sculpture, never met Lincoln. It is accurate in that Lincoln did write and sign the Emancipation Proclamation.

- While students are still in small groups, ask students to discuss the same questions as they examine together a photo of a sculpture called *Forever Free*, created by African American artist Mary Edmonia Lewis in 1867 at <http://wwwFOUNDERS.howard.edu/hucollection/LewisMary1.htm> .

Possible responses to the discussion questions might include:

1. I see two people who are happy. There is a broken chain. Their faces are full of hope. I see humans where slaves once were. I see people looking forward to building a good life.
 2. Happy because the figures look like they are hopeful
 3. The freeing of the slaves.
 4. I don't know—but I assume that freed individuals would be filled with hope. Perhaps they could also be fearful—what might happen to them?
- Distribute a Venn Diagram to each group.
 - Ask students to identify what is similar in both photographs. The similarities should be listed in the overlapping area of the Venn Diagram.
 - Ask students to label the right side of the Venn Diagram, 'photo #1,' the first photo they examined. Label the left side, 'photo #2,' for the second photo. Students list on each side of the diagram the ways the photos are different.
 - Groups present their Venn Diagrams to the class. Ask students why the same event in history could be represented in such different ways? Are both ways accurate representations?
 - Remind students that they already know they should question the author of a source to help determine the reliability of the source. In this case, they would be questioning who the artist is and what purpose the artist might have had in creating the sculpture. Tell them that one was sculpted by an African American artist, and one was sculpted by a white man. Which artist do they think sculpted each? Why?
 - Tell students that these sculptures were commissioned and therefore the artist was paid. So there is actually another individual or an organization behind the artist. Do the students think that others might have told the artist what to carve—or do they think the artist was free to create his/her own interpretation of emancipation? Discuss: How accurate is history if only one side tells the story?
 - Ask students to talk with a partner about this question: Can we rely upon primary sources to be reliable? Why or why not? Have I ever been biased in my telling or writing of a situation? If so, why?
 - Share responses as a class. Review the actions researchers take to confirm information (e.g., checking for bias, using multiple sources).

Activity Three: Using Primary Sources

- Students write in their BTS journal responses to these three prompts: (when the teacher reads these, the teacher will quickly assess which

- students need more teaching regarding primary sources and how primary sources can be a part of their research.)
- Primary sources I've already used in my research are ...
 - A primary source I might use in my research is...
 - What I hope to find is ...
 - 2 things I learned about primary resources are...
 - 1 question that remains for me is...
- After 5 minutes, students form triads or pairs to share their responses.
 - Assignment: Students are given three days to attempt to locate and use at least one primary source to help them answer their research question.
 - Invite students to share with the class a primary source they used, whether or not they think it is reliable, and reason(s) why.

What are primary sources?

Primary Sources are pieces of history. Primary sources provide direct or first-hand information about the past.

What are some examples of primary sources?

Documents: the original text or records that were made either at the very time an event happened, or were found after an event—in the form of a memoir or oral history of the event. It is not a summary of an event as might appear in a textbook.

Some examples are letters; journals; diaries; cookbooks; advertisements; research data; objects, such as tombstones, tools, weapons, inventions, artifacts, clothing

Images: fine art, photographs, film, video

Audio: oral histories, interviews, music, recordings of speeches, radio and television broadcasts

Statistics: census data, maps, ordinances, laws, blueprints, architectural drawings, land surveys

Where can I find primary sources?

Libraries, museums, radio and television stations; the Internet is a good source for locating primary sources; an eye witness

We have primary sources in our local community!

Examples

family photographs, memorabilia, souvenirs, recipes, ancestor's papers or stories, oral histories, local historical societies, artwork, local primary source collections in the student's community, documents, manuscripts

A True Story about the Importance of Primary Sources

An example of inaccuracy can be found in this actual email exchange between a student and a spokesperson for the Mississippi Band of Choctaw Indians.

Student X was researching “Who invented lacrosse?” and discovered information about “Choctaw Stickball” in a classroom magazine. The student took notes, believing that the magazine’s assertion that lacrosse was derived from “Indian Stickball” must be true because the student assumed that a mainstream periodical subscribed to by many classrooms must be reliable. Another reason the student assumed the information was accurate was that the article was the cover story. The student knew that verification (checking facts) was a requirement. The student also knew that, when possible, students were supposed to use primary sources, but was too shy or insecure to attempt contacting an expert on the subject. The teacher intervened and sent the article to a spokesperson for the Mississippi Band of the Choctaw.

<http://www.choctaw.org> The teacher on behalf of his student requested verification of the facts listed.

Here is an excerpt from an email sent back to the student from a spokesperson of the Choctaw Band.



“Hi,

Nellie Steve gave me a copy of the magazine you read. Boy, there is a lesson for students on journalism. The illustration of a stickball game is WRONG! The description “*baggataway*, now known as lacrosse” is WRONG! The Choctaw use two sticks (*kabocca*) with cups just large enough to tightly hold a golf ball size ball (*towa*) that they throw at a single 4”X4”post for the goal (see attached info and visit <http://www.choctaw.org/>). The origin legend concerning Nanih Waiya is misrepresented and incomplete. The magazine delivered misinformation to you.

Tell your classmates they can view accurate information about Choctaw Stickball on the Choctaw website at: <http://www.choctaw.org/culture/stickball.htm> and at http://www.choctaw.org/culture/game_of_stickball.htm.”

Lesson: Verification is essential to solid research. The voice of elders and experts are primary sources which should be sought when possible.

Notes to Teachers

Secondary Sources: Articles written by people who are summarizing what others did or discovered are called **secondary sources**. Whether written by experts or non-experts, the information is being provided by a person who was not there. The written work of reporters, biographers and textbook authors are examples of secondary sources. Researchers struggle to determine the accuracy and reliability of secondary sources. Double checking key facts in two or more different sources is a way to verify the accuracy or inaccuracy of facts.

Primary Sources: There is another category of source information called primary source information. When a researcher obtains information firsthand or directly from the person who did or discovered something, that information is called **primary source information**. Interviews with elders and experts are examples of living primary sources. Underground Railroad letters and Civil War photographs in the National Archives are examples of historical primary sources.

Verifying Sources: In a search for accurate information there are several questions to consider as one assesses the reliability, breadth, and depth of the sources:

- Have you included primary sources or are all your sources secondary?
- Have you presented a balance of opposing viewpoints?
- Whose voice is missing?

How to Use Primary Sources: The following is an example of how one might explore a research question using primary sources.

Example: Using historical primary source information to explore the question, “Who Freed the Slaves?”

What role did slaves play in freeing themselves? Is it as simple as Lincoln freed the slaves?” Imagine that when the student checks his sources, he realizes that only secondary sources (such as encyclopedias, books, chapters in history books written by editors who are summarizing what they know) have been used. Now is the time for that student to examine primary resources, such as:

- Examining Abraham Lincoln’s writing about the slave issue
- Visiting the primary source information preserved in museums and archives

Using primary source documents can deepen the student’s understanding of the influences on Lincoln and the different forces at work that contributed to the end of slavery. To examine the complex issues surrounding the end of slavery in the United States, the student could use primary source materials to investigate:

- President Lincoln's attitudes and actions before and during the Civil War
- The role of the enslaved in attaining their own emancipation.

Internet Resources for Obtaining Primary Sources

- The National Archives site is cross referenced to national standards, and it's free. The following url (plus the "Teaching with Documents" tab on the same page) is the National Archives site for teachers and students working with Primary Sources. The lessons are arranged by era. The sample below is related to primary sources from Fugitive Slaves from the 1850-1877 era:
<http://www.archives.gov/education/lessons/fugitive-cases/>
 The "Teaching" suggestions and supporting materials are found by clicking the "Teaching with Documents" tab on the above page.
 If that doesn't work, go to <http://www.archives.gov/education/lessons/>
- Primary Sources: Workshops in American History, "Concerning Emancipation: Who Freed the Slaves?" (DVD series made available by a PBS / WGBH / Annenberg grant)
<http://www.learner.org/resources/series135.html#>
- American Historical Association, "Primary Sources with a Purpose: Learning from Teaching American History Grants," by Kelly Schrum, Eleanor Greene, and Sarah Whelan
<http://www.historians.org/perspectives/issues/2007/0703/0703tea1.cfm>
- The Library of Congress' American History Project found at <http://memory.loc.gov/learn/lessons/fw.html>. An entire section of this site emphasizes what primary sources are, where they can be found and what they can add to understanding history.
- Interpreting Primary Sources, Teacher's Lounge, University of Michigan
<http://www.si.umich.edu/spies/lounge-sources.html>

Benefits and Cautions Regarding the Use of Primary Sources in the Classroom

Benefits:

Studying primary sources links students with history's diverse cast of characters, not just the powerful and leaders. Students should search for all points of view, all voices. They should ask: Whose voice is missing in my research? Research is incomplete until one locates all the voices that are part of one's topic. That means students should be thinking about not just locating primary sources, but also creating new primary source information through oral history interviews, experimental research, photographs, or surveys.

Studying historic primary sources might encourage students to analyze and interpret contemporary news stories, statistics, and advertising, noticing possible

bias and/or subjective presentation of evidence for a purpose other than to pass on the truth. Perhaps information is being transmitted or shared to persuade or to deceive. Perhaps it is to inform. Students are to consider the reliability of information by using a variety of sources and double or triple checking the accuracy of key facts needed to answer the research question. Textbooks are often summarizing and revealing general patterns in history. Primary sources add to history the personal to the general. Primary sources such as letters and photographs can make history come alive for students.

Everyone, historians or students, applies her own biases to interpretation of history books and primary sources. Students may by now be learning that history books reflect the author's interpretation of the facts of past events. The discovery of new facts (new primary sources) may change how existing history may need to be revised in the future.

Cautions:

When bringing primary source documents into the classroom, students should bring in the letters or photos of all the people involved. Students should ask whose story is missing. Digital technology can deliver primary sources over the Internet and into the classroom.

Primary sources may be misinterpreted, as students learn in this Learning Experience. Even primary sources should be checked for reliability.

Voices from the Classroom:

Some of the BTS journals contained passages which revealed student understanding that interviews with experts might be a powerful addition to their research. The girl with the question “How does skin color affect your chances of getting skin color?” wrote in her journal that she is now planning to ask her mom (who is a nurse) to help her get an interview with a dermatologist nearby. Another student who is seeking to find the answer to her question: “How do cruise ships float? They’re enormous floating nightclub hotels.” is making plans to interview a retired naval architect who volunteers at the shipbuilding museum nearby. Other students have expressed interest in looking for related photos, music, and recorded speeches. **The introduction of primary sources stretched the research focus beyond mere text.*

**A helpful resource turned out to be a packet of the handouts given to all students consisting of the sample numbered note cards and source cards, a sample Works Cited page, and a listing of the variety of media sources to remind students they are searching for a variety of reliable sources of information or data. Often, as students conducted online research or book related research in class, I observed them flipping through the packet to check to see if they were copying all the “fields” needed for the Works Cited page. The visual component is essential in teaching sighted learners. Showing them what note cards should look like, what a Works Cited page looks like, or what must be copied on source cards allows students to figure things out independently. By checking the packet for how to take notes, number or make source cards, students move a step away from teacher dependence and toward becoming more of an independent learner.*

The reality of teaching grade 7 is that many students simply lose materials. The packet is very helpful, but not if a student lost it or left it at home or in the locker. So, I hung copies of the packet at the front and rear of the classroom. I observed many instances in which students were looking up something at the hanging packet of visual resources. I strive to wean students from teacher dependency. Certain dependent learners continuously ask me for help out of habit and not necessarily because a task or direction is too difficult. Some students are accustomed to approaching the teacher first instead of trying to figure something out on their own. Having the hanging packet allows me to listen to such questions, then, if the answer is in the packet, I just point to the hanging packet. It’s wonderful. Students walk away surprised that the teacher only pointed, but they walked away knowing the answer was in the packet and they were going to have to get it themselves.

**One other helpful resource is the student who is being successful and is moving forward faster than most. I ask such students if I can list them as a "Research Master." Being a research master means you are willing to help a classmate who is stuck. I posted 2-3 "Research Masters" on the board. There were usually a half dozen "Masters," and I rotated their services. When a confused, lost or dependent student asked me for help, if I was already helping someone, I pointed to the board. Students helping students, social learning, is very healthy and time saving.*

Caution: *I had an agreement with "Master Researchers" that when they were getting behind because they were helping others, they wrote that in their BTS journal. Since the journals were read daily, students knew that was the place where problems can be expressed without the whole class knowing about it. When I read a "Master" wanted a rest, I erased her/his name and added another.*

****Which Senator should I believe?***

A highly motivated student was already putting her facts into a Power Point. Her question was: "Global Warming-Who can you believe?" By serendipity, the U.S. Senate began conducting hearings on Global Warming the week after this student chose climate change as her research project. Many Senators spoke out. Many scientists did, too. The student wrote yesterday in her BTS journal, "The TV, the newspapers, everybody's talking about Global Warming. I can't get away from it." I checked the student's note cards. The note cards were highlighted in yellow or pink. Pink was for testimony like Senator McCain's which according to this student's note cards, "rapped" President Bush's energy plans. Yellow was for testimony like Senator Inhofe's (R-OK). Senator Inhofe called the hearings "hysteria" according to the student's note cards. While reading the cards, the student spoke up and said, "See, which Senator can you believe?" I refused to insert my own opinion or politics into the student's search for the truth. I advised the student to follow the facts and make up her own mind. Sometimes, two weeks is just not enough time to find an answer. Prepare students for this possibility. Also, the evidence on both sides of a controversy may balance each other out. Some questions may be unanswerable at this time.

Learning Experience Eight

Conducting a Progress Check

Overview

Students use a checklist to examine and assess their research findings to determine if they have all the information required to answer their question, and whether they have conducted a thorough check for accuracy.

Evaluation

Students complete a self assessment.

Activity One: Reviewing and Assessing Note Cards

Materials

- Handout One: Self Assessment of Progress

Activity

- Tell students they will now take stock of where they are in their research. They will conduct a self assessment to determine whether they need to do more searching.
- Distribute Handout One and guide students in how to use this checklist.
- Collect students' work, review their responses, and schedule times to meet with students who require assistance.

Self-Assessment of Progress

Name _____

Fill out both pages and return to the teacher.

Step 1. Analyze your notes and your sources.

Part a. Put a check beside those criteria that you have met.

- (1) ____ I included different opinions, view points, or studies.
- (2) ____ My information is accurate; I checked facts by using multiple sources.
- (3) ____ My sources are bias free.
- (4) ____ I have all the information I need to answer my question.
- (5) ____ I used a variety of reliable resources.

Comments:

Part b. Answer yes or no:

_____ My source cards are complete.

_____ My note cards are numbered to match the source cards.

Step 2. For any criteria you did not meet, explain what you plan to do now.

Step 3. Score yourself using the “Final Assessment Analytic Score Sheet.” (next page)

Instructions: Place a score beside the **first 5** criteria.

Final Assessment: Analytic Score Sheet

Focus Correction Areas (FCA's)	@ 0.0 none	@4 some	@7.1 done
1. Grade level, <u>meaningful</u> research question chosen by you	___	___	___
2. 10+ numbered note cards (mostly in your own words)	___	___	___
3. Source cards (with required fields)	___	___	___
4. Variety of (3+) reliable media sources	___	___	___
5. "Behind the Scenes" reflective journal	___	___	___
[stop your self assessment here]			

6. Rough draft of product with visible changes	___	___	___
7-11 Final draft of product—must include:	___	___	___
7. citations	___	___	___
8. ANSWER	___	___	___
9. <u>explained clearly</u>	___	___	___
10. explained completely	___	___	___
11. Works Cited page	___	___	___
12. Plan for sharing of answer (final product) Includes WHO will benefit from your answer	___	___	___
13. Virtual sharing (actual sharing is optional)	___	___	___

Scoring Key: each of 13 FCA's is worth 7.7 points

Maximum score = 101 points

Your score _____

Notes to Teachers

Completing the Research

If students indicate on Handout One that their research is not yet complete, then students should be told to search for whatever is missing or incomplete. Students may need to locate primary sources, double check key facts, broaden the variety of sources they used (not just Internet), check for bias, etc.

For some students, their original question may have changed so much that their research has now taken their investigation into totally unexpected areas. This is normal and fine. Each student set out to solve the mystery of answering the original research question. If following the facts leads into unexpected areas, that is great! Discovery cannot be scripted into a uniform, lockstep sequence which can be followed by everyone and for every question.

Students must follow the evidence wherever it leads them. Students should not be pre-judging or screening data based on their own hopes for what the answer might be. Instead, students should let the facts guide the search.

Students should not be discouraged if their search keeps surfacing new questions. Research is not a linear process. Research keeps circling back as facts are checked, new questions occur to students, new possibilities arise, new understandings are formed and more information and/or more sources are needed, or become available. Like a detective, the student follows the evidence, examines and reexamines the clues, keeps asking questions, analyzes answers until the evidence speaks for itself and the answer to the investigation appears clear.

The Analytic Score Sheet

For the teacher's consideration, here is an abridged version of the "Analytic Score Sheet" with criteria.

- 1. Question/Thesis/Problem.** Posed a thoughtful, creative question that engaged the student in challenging or provocative research. The question broke new ground or contributed to knowledge in a focused, specific area.
- 2. Collection of Data from a variety of Reliable Sources.** Gathered information from a variety of quality electronic and print sources, including appropriate licensed databases. Sources were relevant, balanced and include critical readings relating to the thesis or problem. Primary sources were included (if appropriate).
- 3. Analysis.** Carefully and thoroughly analyzed the information.

4. **Synthesis.** Drew appropriate and inventive conclusions supported by evidence. Voice of the student writer was evident.
5. **Citations.** Documented all sources, including visuals, sounds, and animations. Sources were properly cited, both in-text/in-product and on Works-Cited pages or Power Point slides.
6. **Sharing of Process or Product.** Effectively and creatively used appropriate communication tools to convey conclusions and demonstrated thorough, effective research techniques. Product displayed creativity and originality.

Voices from the Classroom:

The overall mood in the pilot classrooms at this point was one of "mission accomplished," well, sort of. Verifying the facts still was a problem for many. MassAnswers.org (part of Question Point) is just what the students needed in order to check their findings. It worked like this:

Students logged onto www.MassAnswers.org. A sign-in box appeared. I instructed students to provide only their first name, name of their public library, the school's email address (no student personal information), school zip code and of course, THEIR QUESTION.

A split screen appeared. The students were connected "live" to a library researcher. On the right was the chat transcript between the student and the librarian. On the left of the screen appeared the Home Pages of web sites recommended by the librarian. Students did not have to risk errors in copying long URL addresses because the URL links were emailed to me along with a printed transcript of the student-librarian interaction. The students explored the web site on the screen, texting their joy or frustration as the librarian followed their progress "live." It's like having a "librarian in your computer," asserts the home page of MassAnswers.

Students in all my classes tried this all day today with great success. Since the students only wanted to verify their facts, the librarian's help was appropriate. The students had done all the heavy lifting. The students uncovered the pieces of the answer in the past two weeks during class and under my supervision. What happened all day today? As librarians sent web sites "live" to the left side of the split screen, over and over students online were heard saying "I already found that one." It was magical. Professional reference librarians were finding and pointing to the same web sites the kids found ON THEIR OWN. The students were so proud.

One student said under her breath, "Tell me something I don't know," as two consecutive web sites popped up on her screen. She had found both a week ago. They were great sites. Having a librarian point to sites students had already located reinforced and affirmed the students' belief in themselves as researchers. The third source suggested by a librarian usually was one the students had not yet found. The students had incorporated librarians as fact checkers. In closing down the "live chat" with the MassAnswers librarian, the students typed in a thank you and always added: "BTW, where are you?" The librarians were located in their homes if off duty) or, if at work, they were at their reference desks in public libraries in places such as Nashville, Hawaii, Oregon, New Jersey, California, Virginia, Boston, and more.

The final feature of MassAnswers is that the service emails immediately a transcript of the chat to the email address provided by the user. Since I required the students to use my school email address, I was able to view the transcript of each chat. None of the students were inappropriate. It was all business for them. Another nice feature is that all transcripts sent to the teacher's email address are stored on MassAnswers in a private archive for that teacher only. The teacher can log on to view any/all transcripts at any time. If a student loses the links, the teacher can retrieve a copy easily and print it out.

Putting it All Together

Overview

Several activities allow students to determine the completeness of their research findings. One activity, "Student Self Assessment: after the research, what's next?" will help students assess the completeness of their research findings. This guided, self assessment will help students determine if they have finished the research phase and are now ready to work on putting it (notes/data) all together. Once students have completed their research, they prepare a narrative draft of their findings (regardless of what their final product will be), and create their final product.

Students wrote in their BTS journals an early prediction about:

Who might benefit from the answer?

How best to share the answer?

In this LE, students write in their BTS journals about their plans for their final product. They note whether their previous thinking about the final product and audience changed from their original predictions and reflect on the reasons there have been changes.

Evaluation

Students submit a draft evaluation, a draft narrative with citations, and a final product.

Activity One: Determining the Medium and Audience for the Research Product

Materials

- LE 9 Handout One: What Audience? What Medium?

Activity

- Brainstorm: Ask for a volunteer to tell his research question. Ask the class to brainstorm who might be interested in hearing the results of this student's research. Push for appropriateness, and thinking outside the box. Then ask students to brainstorm what might be an interesting and appropriate way to deliver the research results. Again, push for appropriateness for each audience (considering whether it

would be easier, for example, to create a website rather than try to convene the individuals comprising the audience), and for a medium that would keep the audience's attention.

- Explain that students will now go through a similar decision-making process for their own research. Distribute Handout One. Students fill it out.
- Place students in triads. Students take turns presenting their research question, chosen audience and medium. Guide groups so that each student has time to present, and then time to obtain feedback about appropriateness and suggestions.

Activity Two: Reflecting on the Product and Deciding if Help is Needed

- Students work individually to respond to these writing prompts:
 - On the day this project is due, what will be the product you will you have completed?
 - What help and what materials do you need to create this product?
 - Look back at what you originally planned. Has the product changed? Has the audience changed? If so, what has changed, and why?
- Collect the journals. Review students' responses to the prompts. Share with classes commonalities uncovered from reading the journals. Allow students to continue data collection, if necessary. Look for ways to help students based on what they wrote. Return journals.

Activity Three: Putting your Notes Together to Tell the Story of your Answer

Materials

- Students' numbered note cards and source cards
- Rubber bands
- Blank index cards

Activity

- Students form triads by content. For example, a group would consist of three students with science-related questions. Another group might have a focus on an historical problem.
- Each individual student is then directed to make one stack of all his note cards.
- Tell students to read the note cards one at a time and decide if the information on that card fits best into an Introduction, a fact-filled middle, or the conclusion. Students help each other. You may want to demonstrate using a few of one student's note cards.

- When all cards have been sorted, each student takes one category at a time and places those cards in order. Instruct students to think about how their story will flow. Again, it will be helpful to demonstrate.
- The final step is to try to separate each category into two subcategories. It is most important that the middle be separated into at least two, but preferably three or more stacks, depending on the complexity and/or extent of the research. Students may create as many stacks as seem logical, but five is the recommended minimum.
- Students review the cards in each new stack to be certain the cards are in the best sequence for telling the story. Explain that each stack will become a paragraph, and later may become a Power Point slide or a scene in a public service announcement.
- Students place a blank index card on top of each stack and number these cards to reflect the sequence of their stacks. Ask students to write a phrase or sentence on each numbered index card to describe the contents of that stack.
- Provide students with rubber bands to keep the note cards in each stack together. Students store their note cards in their big envelope.

Activity Four: Checking for Completeness

Materials

- Students' source cards

Activity

- Ask student to review each stack of note cards and ask if any key information is missing or incomplete. Assure students that it's normal to discover some missing or incomplete information even at this point in the process. Specifically instruct students to be sure they have evidence that they verified their most important facts or data by using more than one reliable source. Tell them that they can easily determine this: If you checked your key facts, each key fact should have at least two note cards, each from a different source. If students notice that they forgot to do a "fact check," it will be necessary to conduct additional research to find a second source which proves each key fact is as accurate as possible.
- To fill in the gaps, whether it is to check facts or fill in missing information, students will need to conduct additional research. In some cases, students may decide that they need to return to some of their sources and take additional notes. Remind students that as they locate new information, they must write it on a note card(s) and add the new note card(s) to the stack that needed more information. They may also need to create new source cards.
- Allow time for students to review their notes and conduct additional research as necessary. Provide guidance and assistance.

Activity Five: Creating a Draft Version of the Product

Materials

- Students' note and source cards

Activity

- Point out to students that their stacks of note cards are actually arranged in an outline of their answer. Instruct students to read their note cards in sequence, asking themselves: Do I like the way my note cards are telling the story of my research? If not, students rearrange note cards until they have created the best sequence for telling their story, leading to their answer.
- Regardless of the medium that students will ultimately use to create their final product, ask students to prepare a draft narrative to tell a flowing story, rather than a series of listed facts. The stacks will be their resource. Each stack may be the material for a paragraph. They will include a topic sentence for each paragraph and transition sentences to create a natural flow.
- Instruct students to create the Works Cited page by ordering their source cards alphabetically and typing the ordered list. It is possible that some students may find that they do not use some of their sources. Any sources not referenced in the narrative should be excluded from the Works Cited.
- Students may do some of their writing in class and some as homework. Perhaps the English/language arts teacher(s) would also provide class time for this activity, and assistance in reviewing the drafts.
- Read drafts and assist students as necessary.

Activity Six: Preparing the Product

Materials

- Draft narrative
- Other materials depend on students' chosen medium

Activity

- Students use the draft narrative as a guide for preparing their final product, whether it is a talk, pamphlet, oral presentation, article, or other medium for presenting their research findings.
- The teacher may be able to elicit assistance from other teachers, whose expertise can be helpful to students, such as a teacher of visual arts, computer skills, political science, natural or physical science. Community members with relevant skills, knowledge or profession may be enlisted to help as well.

What Medium? What Audience?

Your research question:

Who is an appropriate audience? Who would benefit from your answer or conclusion?

Circle your choice(s):

- The grade six girls' health classes—or other grade and subject: _____
- New students
- Neighborhood families
- Anyone who is in the summer sun a lot
- The science classes
- The social studies' classes
- Anyone in the community (or school) who wonders about global warming
- The Governor
- Town Council
- The PTO
- Our class
- Elementary students
- or...? (fill in an audience) _____

What is the best medium? How will you reveal the answer to your research question to the audience you've selected? What will your product be?

Circle whichever applies, or make up your own. Consider which would be most interesting and most appropriate for your chosen audience.

- Video
- Poster
- Pamphlet
- Power Point presentation
- Written report
- Speech
- Letter to the editor
- Website
- PSA (Public Service Announcement)
- Hands-on demonstration
- Re-creation of a key experiment
- A short play or skit
- or...? (make up your own here) _____

Notes to Teachers

Only those who have completed their research (including gap detection, additional research, as well as "double checking/fact checking" key facts) move to this stage. The others resume their in-class research.

Voices from the Classroom:

Today, the final stage of the research/inquiry project was underway. Students were busy inserting their citations and making their Works Cited page using MLA guidelines found at: www.citationmachine.net

("Son of Citation Machine is the best," wrote one 12-year old in her BTS journal.)

Getting somewhat lost in the attention to citations and rough drafts are the audience and "who benefits" requirements. For many students, the teacher is the audience. They are told that others might benefit more from their answer. Then they are asked "Who are the people you should send a copy to?" Several students have come up with perfect audiences. The "putting it all together" stage was put off by too many students. All data collection work has been done in class until now. Now students have a writing assignment due Friday. They must synthesize or put into writing or on tape the answer to their question. This requires home work. Some do not do much homework. Others receive additional support at home with assignments. The last stage of the research/inquiry project is now out of the teacher's sight and out of the teacher's control. Advice:

- 1. Trust students; they rise to the occasion.*
- 2. Trust in them; they meet deadlines (mostly).*

So, Friday is coming. A month's work is coming to a conclusion.

Everything takes so long. There's never enough time. I didn't sense panic among the students, but the "putting it all together" was hard work. The fun of the discovery of research was over. Now, it's all about paragraphs, spelling, citations, conclusions, and other writing skills. Student weaknesses are becoming obvious again. I saw too much copying off note cards because of deadline pressures and below grade level reading abilities. I was reminding students to write the answer to their question. That is the assignment in a nutshell. Then, I asked them to write it so a 4th grader would understand the question and the answer. That means giving facts and examples. Everyone loves examples and visuals. An illustration is worth a thousand words. The pitfall students must avoid is copying copied information.

Students struggled to balance their facts with their own words of explanation. The advice for students simply is: "Write the answer to your research question."

Sharing the Products of the Inquiry Process

Friday began with the 7:30 A.M. Breakfast Club.

Students arrived early during Breakfast Club and began putting final touches on projects such as assembling pieces of their projects, taping, stapling, punching holes, coloring, and just getting ready for the presentations which were to occur in class today. The day ended later than usual because several students became fascinated by other students' products, and they just hung around after dismissal looking at projects, talking about their projects and packing them up to take home.

From 2:35 until around 2:55 P.M., one student and a few others were still squeezing the tin foil from the Inquiry project: Why Do Cruise Ships Float? They were trying out the experiments again and again. The experiment called for tin foil to be squeezed or spread out into various shapes, then gently placing the foil onto the surface of a bowl full of water. Some students were frustrated because the squeezed-into-a-ball tin foil was not sinking like it did in the rehearsal at home the night before. What was different? The variable was her dad. Her dad squeezed the tin foil into a ball. The student involved figured out which variable was not duplicated causing her Archimedes demonstration to fail at first. She figured it out after school by recalling the steps she followed at home. She recounted the steps until she got to the "Then my dad squeezed the foil into a tiny ball..." part. Eureka. She asked classmates to take turns "really smooshing" the tin foil so it would be the same size as it was at home the night before. She then gently placed the "really smooshed" ball of foil on the water surface. It sank slowly, settled on the bottom. Archimedes lives! There were whoops and high fives. Ah, if only science were always experienced this way.

Learning Experience Ten

Sharing Findings and Conclusions

Overview

This Learning Experience celebrates and exhibits the students' investigative skills, all in pursuit of the answer to the students' questions. It is the culmination of weeks of rigorous research and analysis of findings. Volunteering students present the findings of their research question to their classmates. Some students have other audiences and other venues for presenting their findings. Ultimately, each student's final product and accumulated research materials are submitted to the teacher for a grade.

Evaluation

Students submit/present completed research product which is evaluated by the teacher using a rubric.

Preparing students and the classroom

There are so many possibilities for sharing these products. Student choice is the key to the success of this unit. Help students, as necessary, to complete their products and address their audiences. Students must either send a copy of their final product to that audience, or make an appointment to present their answer in person to that audience. Another possibility is for the student to invite representatives from that audience to the classroom to see the student present her final product.

Some students will want to present their findings to the class, even if they have another primary audience. The following serves as a guide for the teacher to prepare for these presentations.

A few days prior to class presentations, compile a list of students who intend to share their product with the class. Obtain a description of the type of product they will share. From that list you will know what resources students need to effectively share their product with the class.

- The Power Points need a projection device, the Power Point, a computer capable of reading a Power Point, and speakers if the student added music or narration.
- If students made a brochure or pamphlet as a final product, they might prefer that the teacher make a class set of brochures or pamphlets.

Passing one around the room is another alternative, but this is much less effective than everyone having a copy.

- If a demonstration is planned, like demonstrating why ships float, students will need all their equipment and supplies.

It is the student's responsibility to figure out in advance the best way to share the answer. Telling the teacher at the last minute that something is needed shows a lack of organization and a lack of preparation. The students have the last week to "put it all together." Waiting until the last moment might place a disappointing ending onto an otherwise successful investigation.

This is a day for celebrating the students' performance of learning and for everyone to celebrate weeks of planning and research. Take pictures. Encourage applause.

Remember to collect all the research pieces including: the product, the BTS journal, the note cards and source cards, and any other artifacts of the research process.

Evaluate using the rubric at the end of this LE.

Activity One: Presenting Research Findings and being a Good Listener

Materials

- Handout One: A Guide to Being a Good Listener
- Paper clips

Activity

- Students who will be doing presentations or demonstrations are instructed to first present their question and give a brief explanation of what inspired that question.
- Distribute Handout One, which is a guide to being a good listener. Review the handout before the presentations begin. Ask the audience to complete a handout for each presentation.
- Collect the handouts after each presentation and clip together.
- Prior to the next class, review the responses for each presentation and then give helpful responses to the presenters.

Activity Two: Debriefing the research experience

Materials

- Handout Two: Debriefing the Research Experience and Giving Advice

Activity

Note: After an emotional experience, a debriefing session is recommended. Do not try to debrief this unit on the same day or for homework that night. Let students rest. It is recommended that this unit be debriefed the day after the projects were shared and products submitted. After a day away from the research, students' minds will be rested and recharged and thus more capable of reflection.

- Distribute Handout Two. Ask students to reflect on their research experience by answering each question on Handout Two. Point out to students that the last question asks students to pass on to next year's students helpful advice about how to be successful (or, get an "A") on this inquiry unit. It is also a way to reflect on what they have learned.

Guide for Listeners

Instructions: *Write down evidence or an explanation to support each answer that you give. You may not be able to answer every question.*

1. Is the information collected focused on answering the research question?

Yes or No

Evidence:

2. Were many sources used to be sure facts were accurate?

Yes or No

Evidence:

3. Is the information well organized so it is understandable?

Yes or No

Evidence:

1. Have different opinions been represented and explored?

Yes or No

Evidence:

**Debriefing the Research Experience
Giving Advice for Next Year's Student Researchers**

(Answer on lined paper.)

2. What did you learn about research?

- List the two most important things you learned.
- Explain how you learned each.

3. What is a sequel to your research?

- If you were to research a sequel to your question, what would the sequel's question be? Write one new, important question you now have. This is a question which grew out of all your thinking and research. (We will not actually have time to find the answer to the new question in class, but you could pursue the answer on your own for extra credit if you use the steps we learned in class.)

4. What advice do you have for novice researchers?

- Now that you are an experienced student researcher,
- What are the two most important pieces of advice you can pass on to a rookie student researcher just beginning this unit?
 - Explain why each is so important.

Notes to Teachers

Grading

The rubric follows.

There should be no surprises regarding grading because students were given both the Analytic Score Sheet and the rubric very early in this unit. Students should have been self assessing their progress by referring to the 13 requirements listed on the analytic score sheet throughout the unit of study. Although the final product is being submitted now, the unit grade is not based on the product alone. The process has been assessed throughout the unit. The research process was assessed through teacher observation, teacher feedback written in each student's BTS Journal, teacher inspection of the note cards and source cards, and teacher evaluation of worksheets and activities.

The teacher can expect a variety of products, such as: Power Points, tri-fold brochures, table top displays, posters, videotaped Public Service Announcements, written reports, demonstrations, and letters to the editor of the local or a regional newspaper. All products will have MLA citations visible along with a Works Cited page. Students who create a Power Point as a product might create a "crawl" style for their Works Cited page, or a George Lucas/Star Wars-like "rolling Works Cited" ending to their Power Point. Regardless of the creativity of the final products, the 13 requirements stated on the analytic score sheet must be evident.

Final Evaluation Rubric

Criteria	Descriptors
<u>Data Collection</u>	
There is strong factual evidence to answer the research question.	There are many different, reliable sources of information focused on the research question
The research methods match the question.	Surveys or experiments are conducted when necessary, Sources used are appropriate
Many sources were used to be sure the facts are accurate.	Information is documented with citations from at least 2 sources
The sources appear to be reliable.	Scientific data comes from scientific sources (researchers), original sources are used when available
Bias is revealed (if appropriate) and addressed.	Claims that aren't supported by facts from 2 or more other sources are identified as likely biased or incorrect
The information is adequately referenced. Rubric Page 2	Citation style is used consistently, every source has a citation
<u>Analysis and Synthesis</u>	
The information/data presented addresses the research question.	The information has an obvious connection to the question
Different opinions are represented and explored.	At least 2 different opinions are presented and either supported or refuted by data from other sources

Criteria	Descriptors
<u>Analysis and Synthesis (continued)</u>	
The researcher’s own opinions and beliefs are acknowledged.	The author identifies his or her own point of view or belief on the subject, giving facts to support or refute
The results or answer(s) reported are supported by reliable facts.	There is a logical and obvious connection between the researched information and the stated result
New questions or areas for research are given.	The author suggests at least one new research question or area of interest linked

<u>Communication of Results</u>	
The choice of audience is appropriate.	The audience matches the topic and research question, are people who are interested and can use in the results
The choice of venue for communicating is effective.	The place is one that the specific audience would likely visit (either physical location or on the internet)
The information is presented in a way that is clear and understandable.	A reader or listener can tell back accurately the message(s) the author is presenting
The choice of product and presentation is strategic, demonstrating social responsibility.	Given the options, the choices were made intentionally to have the greatest impact possible

APPENDIX

Standards-Based Curriculum

Both the National and states' Standards for social studies, science and English/language arts, include standards for research and inquiry. The National Science Education Standards can be viewed at <http://books.nap.edu/html/nses/6a.html>. "Science as inquiry" is one of the eight categories of the science content standards. The following is a sampling of Massachusetts State and National Standards on Teaching Research and Inquiry in the Middle Grades.

The following are excerpted from the Massachusetts State History and Social Studies Curriculum Frameworks:

<http://www.doe.mass.edu/frameworks/hss/1997/sect10.html>

1. Using the History and Social Science Curriculum Framework in Schools:

"A curriculum framework is not a curriculum. It is a guide to the design of curricula for schools framed in terms of Core Knowledge in subject areas or disciplines, Learning Standards describing reasonable expectations for student learning in the grade spans, and intellectual skills students must acquire to become independent learners.

"The design of curriculum and the selection of patterns of instruction and methods of teaching necessarily rest with schools and their teachers. By working together and with partners in higher education, they can design and implement programs of study for all their students that are coherent from grade to grade-free of useless repetition, but laced with provisions for progressively deeper and more sophisticated study of subject matter.

"Teachers at different grade levels need to know what they may expect of one another, what their colleagues in different grades will try to accomplish with their students in terms of Core Knowledge and skills of reasoning and research. No school can succeed where teacher expectations of each other remain unclear."

2. Designing and Teaching Individual Courses:

"Teachers may find it helpful to ask the following questions as they work together on the structure and content of individual courses, grade by grade:

- Has it been decided which topics are worth extended treatment and which may be touched upon more briefly? Which lend themselves to student inquiry, to use of primary sources, and which to other pedagogical approaches?

The following are excerpted from the Massachusetts' English/language arts state standard on the research process (*ELA Standard 24.4, 2004 Massachusetts State ELA Curriculum Frameworks*):

“Apply steps for obtaining information from a variety of sources, organizing information, documenting sources, and presenting research in individual projects.”

Topic 24: Research

Students will gather information from a variety of sources, analyze and evaluate the quality of the information they obtain, and use it to answer their own questions.

As the amount and complexity of knowledge increases, students need to understand the features of the many resources available to them and know how to conduct an efficient and successful search for accurate information.

Grades 7-8:

24.4. Apply steps for obtaining information from a variety of sources, organizing information, documenting sources, and presenting research in individual projects:

- differentiate between primary and secondary source materials;
- differentiate between paraphrasing and using direct quotes in a report;
- organize and present research using the grade 7-8 Learning Standards in the Composition Strand as a guide for writing;
- document information and quotations and use a consistent format for footnotes or endnotes; and
- use standard bibliographic format to document sources.

3. Conducting research in all disciplines every year:

“To become independent learners, students need to engage in research throughout their school years. Expository writing becomes particularly important in middle and high school, and students are frequently asked to generate questions, find answers and evaluate the claims of others. Teachers of all disciplines in a school should develop and use common guidelines for research papers, teach the research process consistently, and evaluate students' written work using the standards in the ELA Frameworks” (p.71).

4. Using new technologies in composition and research:

“The availability of computers offers teachers many opportunities to enhance the teaching of composition. Because computers allow for easy manipulation of text, their use can motivate students to review their work and make thoughtful

revisions. When students are engaged in a research project, electronic media provides easy access to multiple sources of information. Even the beginning user of the Internet and CD-ROM technologies has access to the collections of major research libraries and museums, the full texts of literary works and periodicals, scientific reports, data bases, and primary source historical documents. Indeed, the greatest challenge these electronic media present is the sheer volume of data they offer. Therefore, students need to learn criteria for evaluating the quality of online information as well as standards for ethical use of resources they find (p.71).”

The following are excerpted from the 2006 Massachusetts State Curriculum Frameworks on Science and Technology (pp.14 & 15).

“An effective program in science and technology/engineering addresses students’ prior knowledge and misconceptions.

“Students are innately curious about the world and wonder how things work. They may make spontaneous, perceptive observations about natural objects and processes, and can often be found taking things apart and reassembling them. In many cases, they have developed mental models about how the world works. However, these mental models may be inaccurate, even though they make sense to the students, and inaccuracies work against learning.

“Research into misconceptions demonstrates that children can hold onto misconceptions even while reproducing what they have been taught are the “correct answers.” For example, young children may repeat that the earth is round, as they have been told, while continuing to believe that the earth is flat, which is what they can see for themselves. They may find a variety of ingenious ways to reconcile their misconception with the correct knowledge, e.g., by concluding that we live on a flat plate inside the round globe.

“Teachers must be skilled at uncovering inaccuracies in students’ prior knowledge and observations, and in devising experiences that will challenge inaccurate beliefs and redirect student learning along more productive routes. The students’ natural curiosity provides one entry point for learning experiences designed to remove students’ misconceptions in science and technology/engineering.”

Investigation, experimentation, and problem solving are central to science and technology/engineering education. Investigations introduce students to the nature of original research, increase students’ understanding of scientific and technological concepts, promote skill development, and provide entry points for all learners. Teachers should establish the learning goals and contexts for investigations, experiments, and laboratories; guide student activities; and help students focus on important ideas and concepts. Lessons should be designed so

that knowledge and skills are developed and used together (also see *Inquiry, Experimentation, and Design in the Classroom*, pages 9–12).

Puzzlement and uncertainty are common features in experimentation. Students need time to examine their ideas as they apply them in explaining a natural phenomenon or solving a design problem. Opportunities for students to reflect on their own ideas, collect evidence, make inferences and predictions, and discuss their findings are all crucial to growth in understanding.

Students should also have opportunities in the classroom to replicate important experiments that have led to well-confirmed knowledge about the natural world, e.g., Archimedes' principle and the electric light bulb. By examining the thinking of experts, students can learn to improve their own problem-solving efforts (p.22).