

Important Research

Head for the Edge, November 1999

My son Brady is a wonderful young man. Handsome, intelligent, caring and sweet, he is in his father's humble opinion, better than about 99% of the rest of kids out there. But the one thing my son is not is much of a scholar. He has always been diligent about his school assignments, but his work is usually perfunctory at best.

On occasion, however, he gets very excited about his schoolwork. Science fair is one of those times. He spends weekends conducting experiments, visiting the library, searching websites, making graphs, taking photos, and carefully designing a presentation board illustrating his findings. He is involved, working entire days consumed by his task. It's enough to make me want to say, "Who are you and what have you done with my son?"

One of his best projects was one he completed in the fifth grade. He wanted to determine what substance, when applied to ice would melt it the most quickly. (We do live in Minnesota, remember.) He drilled holes in the bottoms of four or five aluminum pie plates, taped over the holes, and then filled them with water. After being left outside over night, he removed the tape, carefully balanced them on measuring cups, spread a variety of materials on top of each icy pie plate, and then diligently recorded how much water dripped through the opening each hour during the day. He used his findings to design spreadsheets and graphs. He researched facts about water, ice, and commercial de-icers. He used the information to verify his hypothesis. He practiced answering questions a judge might ask at the science fair itself.

Not much here that could not be replicated. Nothing really complex. But for Brady it was a highly motivating research project. Why? As the last issue's column suggested, it might have something to do with it being intrinsically, rather than extrinsically motivating. I would suggest some of these factors might have been involved:

1. **Motivational research projects have a clarity of purpose and expectations.** When Brady started his science fair project, he had a good guide at: <<http://www.isd77.k12.mn.us/resources/cf/welcome.html>>. On this website are also the forms which would be used to judge (assess) his completed project. An understanding of the scientific method including how to form a hypothesis and how to collect supporting data through experimentation and research is clearly stated as the purpose. This is a life-long, usable set of skills. Brady, I believe, understood it was a project worth doing, not just busy work.
2. **Motivational research projects give students choices.** Anyone who has ever attended a science fair has to marvel at the range of topics kids are interested in. Good projects surround every aspect of every branch of science from chemistry to physics to biology. Now here is the important concept: *If the purpose of the assignment is to teach the scientific method, it doesn't make any difference what the topic is!* Dig down and look at the core concepts your research assignments are trying to teach, and let the students pick a specific subject that interests them.
3. **Motivational research projects are relevant to the student's life.** Good research projects are personal, timely, and have a local impact. Guess why Brady was interested in melting ice? Right – it's his job to clear our sidewalks. Ice chipping is hard, cold work (but it builds character). He worked on his project during the winter. And, yes, the effects had to apply to the ice conditions right here in Minnesota. So many times we ask our students to research important topics – environmental issues, historical issues, health issues - but fail to help them make the vital connection of why the findings are important to the people in town in which they live.
4. **Motivational research projects stress higher level thinking skills and creativity.** Think how different the results of a science project are than a paper that simply asks an "about" question. Hey, Brady, write a research

paper about ice. Boring! Instead brainstorm an original theory, design a means of testing it, and find ways to effectively communicate your findings. Suddenly we've moved up on Bloom's taxonomy from the knowledge and inference levels right to application, analysis, synthesis, and evaluation. What fun!

5. **Motivational research projects answer real questions.** Neither Brady nor I knew at the beginning of his project what really would melt ice the best. Brady's rather creative guess was the laundry detergent (the kind with blue specks) would do the trick. I, secretly, guessed that there was a reason people paid good money for commercial de-icer. But the fact was, I genuinely did not know. It was interesting to watch as the experiment's data grew. Teachers rarely ask questions to which they do not believe they know the answer. Sort of sad, really. Diminishing to the student; boring for the teacher.
6. **Motivational research projects involve a variety of information finding activities.** As media specialists we are comfortable with our familiar old primary sources of reference books, magazine indexes, and trade books. Yet the answers to many of the personal, local, and timely questions cannot be found in them. They can provide excellent background information of important facts, but often we need to talk to experts, conduct surveys, design experiments, or look at other kinds of primary sources to get precise information. Brady's experiment involved using a hammer to pound nails, a camera to document his progress, the computer to generate charts, and scissors and paste to complete the poster board. He spent time with secondary sources too, but the generation of new knowledge through hands-on experimentation was motivating.
7. **Motivational research projects have results that are shared with people who care.** Science fair participants don't get grades. In Brady's school they don't even get any academic credit. So why bother at all. I believe kids get hooked because big people take the time to really look at the work they have done and comment on it. Lots of other students all gather on science fair day and share their findings. People take science fair seriously. (Thankfully, however, it is not yet like hockey – a sport that should only be played by orphans.)

Assignments must matter. The research needs to be important to the researcher. If it isn't, students will go through the motions. And Johnson's First Law of School Work will kick in: *A job not worth doing is not worth doing well.* One of the best things we as teachers and media specialists can do is work very hard to make sure research projects are well designed and intrinsically motivating. Compare your next assignment to the rubric below. Aim for level three in *all* your projects, and hope your students are lucky enough to get a number 4 assignment at least a few times during their school years.

BookReport

A Research Question Rubric: not all research questions are created equal.

- Level One: My research is about a broad topic. I can complete the assignment by using a general reference source such as an encyclopedia. I have no personal questions about the topic.
Example: My research is about the economy of Minnesota.
- Level Two: My research answers a question that helps me narrow the focus of my search. This question may mean that I need to go to various sources to gather enough information to get a reliable answer. The conclusion of the research will ask me to give a supported answer to the question.
Example: What role has manufacturing played in Minnesota's economic development?
- Level Three: My research answers a question of personal relevance. To answer this question I may need to consult not just secondary sources such as magazines, newspapers, books or the Internet, but use primary sources of information such as original surveys, interviews, or source documents.
Example: How can one best prepare for a career in manufacturing in the Twin Cities area?
- Level Four: My research answers a personal question about the topic, and contains information that may be of use to decision-makers as they make policy or distribute funds. The result of my research is a well support conclusion that contains a call for action on the part of an organization or government body. There will be a plan to distribute this information.
Example: How might high schools change their curricula to meet the needs of students wanting a career in manufacturing in Minnesota?

Library Talk

A Research Question Rubric: not all research questions are created equal.

- Level One: My research is about a broad topic. I can complete the assignment by using a general reference source such as an encyclopedia. I have no personal questions about the topic.
Example: My research is about an animal.
- Level Two: My research answers a question that helps me narrow the focus of my search. This question may mean that I need to go to various sources to gather enough information to get a reliable answer. The conclusion of the research will ask me to give a supported answer to the question.
Example: What methods has my animal developed to help it survive?
- Level Three: My research answers a question of personal relevance. To answer this question I may need to consult not just secondary sources such as magazines, newspapers, books or the Internet, but use primary sources of information such as original surveys, interviews, or source documents.
Example: What animal would be best for my family to adopt as a pet?
- Level Four: My research answers a personal question about the topic, and contains information that may be of use to decision-makers as they make policy or distribute funds. The result of my research is a well support conclusion that contains a call for action on the part of an organization or government body. There will be a plan to distribute this information.
Example: How can our school help stop the growth of unwanted and abandoned pets in our community?