Volume 6, 2003
ISSN: 1523-4320

Approved March 2003
www.ala.org/aasl/slr

Examining Perceptions of the Science Fair Project: Content or Process?

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Preparing students to become critical readers and consumers of information challenges educators as they design and assign academic work. By looking carefully at one longstanding assignment—the science fair project—we can examine what we believe that students should accomplish in their research endeavors. Those both explicitly and peripherally involved in students' research projects—the rarely consulted "stakeholders"—may reveal the payoff or problems of such standard assignments. Informed by Information Power: Building Partnerships for Learning *(AASL/AECT 1998), the national guidelines for school library media programs dedicated to information literacy, we may think anew about students and their research projects.*

> Students learn to think through issues that do not have prescribed responses or preset solutions. Students learn to identify what is important to them, to construct new meanings, and to explain their new understanding to others in some way that is authentic to the topic.

Kuhlthau suggests that students go beyond the familiar textbook mode of right and wrong answers to enter a realm of ambiguity. Second, she notes that students select a subject area in order to inspire real investigation and prompt new understanding of their own interest. The current National Science Standards concur, suggesting that such knowledge-making may pose more than single, clear-cut results, for

> When engaging in inquiry, students describe objects and events, ask questions, construct explanations, test those explanations against current scientific knowledge, and communicate their ideas to others. They identify their assumptions, use critical and logical thinking, and consider alternative explanations. In this way, students actively develop their understanding of science by combining scientific knowledge with reasoning and thinking skills. (National Academy of Sciences 1995, 2)

In this statement, the standards presume that students undertake many steps to wrestle with their initial question. Only by engaging in the process of probing, questioning, testing, and checking may student begin to understand a topic specifically and the subject generally. Bibens (1980, 87) suggests that inquiry, "requires direct involvement of the student with subject content in the learning process, in the quest for meaning and understanding. This implies active student participation, and emphasizes understanding rather than merely knowing about a subject area." In each of these comments, one notes the emphases on inquiry and understanding rather than knowing about or knowing of a subject. Therefore, to engage successfully in research, a student investigates subject matter through many entry points, uses several levels and kinds of questioning, and assesses findings in a number of ways. Learning to trust such strategies, although at first appearing vague and indefinite, may yield rich results for questioners in both content and the investigative process.

The Problem

For purposes of trying to understand what we mean by student research, a universal and recognizable focus was sought to gain as many perspectives as possible. The science fair project represents an example of students conducting multistage and multitask research. Students have embarked on this particular assignment for generations and the science fair project as a phenomenon of student research endeavor is recognized by many. Stakeholders of the science fair project were interviewed: the teachers who assign the projects, the students who comply, the parents who assist or do not assist their child, the school library media specialists, and the reference librarians in the public library who offer resources. Interviews sought to obtain perspectives on the intended outcome of the science fair project and the assessment of what students had learned. What do stakeholders believe that students are learning and what do they say about their experiences as a stakeholder or participant in the science fair project? Do all stakeholders share a consensus on the objectives and outcomes of such an assignment? How do the resulting perceptions match with explicit standards of *Information Power,* national science standards, or with the definitions of inquiry in learning?

Generally, school districts define standards and protocols for assigning research, agreeing on the grade level and time of year for establishing a public exhibit of student projects. Whether or not the assignment is mandatory or optional, a fairly extensive infrastructure supports the research project tradition, including calling on community specialists or mentors to both advise and judge projects and relying on adequate collection development in both the school and public libraries. Traditional library resources often explain "how to implement and present a project or will give specific project ideas" (Hobbs 1989, 134). New Internet guides for online resources may offer "exciting and dynamic opportunities for collaborative, hands-on learning and problem solving that closely resemble real-life problem solving in the scientific community" (Young 1997, 36). Thus, both print and electronic sources appear plentiful, readily available, and set up for both students' and teachers' use. The sources range from illustrating models of successful projects to offering opportunities for student participation in cross-cultural data collection.

Although most implicitly agree that inquiry is important, "Most of what educators know about teaching research skills has emerged from practice and there are no formal research studies that tell us one instructional approach is better than another" (Gordon 1999, 8). Further, descriptions of both the information literacy process and library research skills models appear to be similar (Eisenberg and Berkowitz 1990). Clyde suggests that the skills of information literacy are

> Definition of a problem, deciding what information is needed to deal with the problem, deciding what sources might provide that information, locating information in those sources, analyzing and evaluating the information in terms of the problem, organizing and applying the information in working on the problem, presenting the results in a form that can be readily understood, and evaluating the effectiveness of the whole sequence of activities and sources. (1997, 48)

These skills may also be called the research process. And, she continues, "It is just as relevant to the use of the Internet as to work involving more traditional information sources" (48). Thus, engaging in research presumes information literacy. Given the vast new resources to support and assist students in their inquiry, one may begin to query the meaning of the assignment itself. What does it mean when we say that a student does a science fair project? What does it mean to do research? What does it mean to exhibit information literacy? Do implicit or tacit goals and objectives, different from the stated goals of meaning and understanding of phenomena (Bibens 1980), guide teachers, parents, students, and school library media specialists in their assignments and expectations for success?

Insight into such questions might arise from listening to the voices of those most involved with student research endeavors: the student, parent, teacher, school library media specialist, and public librarian. Their responses might offer ways to understand how novices engage in research.

Method

Phenomenological research examines what is ordinary and familiar in a situated life (Van Manen 1990,19); it offers the possibility of recognizing universal meanings. The examination of a small sample brings to light the particulars, the essential events and details that make an experience unique, rather than offer generalizations. Specific and concrete examples of the lived life help researchers and readers of research ask more questions to extend their own consideration of the phenomenon. The very nature of constructing knowledge and understanding suggests that many

interpretations can be offered to make sense of a single phenomenon. The results of such labor may be to assist one's own thinking and understanding of the nature of student research projects in general and specifically the science fair assignment.

Such qualitative work presumes the bias of caring about subjects' opinions and perceptions as one way to understand meanings of what we do. In considering the science fair as one exemplar of assigning research activities to students, we care about and appreciate the elusive qualities of intent and expectation, as well as what really happened in specific instances. In uncovering what really goes on or what people really think about assignments such as the science fair project,

an article. I have more resources than just books I can pull. I want to show them CD-ROMS. Otherwise, we may as well open up the books for them . . .Then we start talking about wha- stwi w8oha- sthe4(n w)-8(e)-6(s)-1(t)-2(a)4elMSrSr. IM6-.04 0 01(L)17(i)-17(i)-1(b Tf (t)

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A student, S, in this class, agrees that learning the organizational process made sense. “It was good even though I didn’t really like it at the time. It was a lot of work. . . . It was a good experience to learn all the different things about the science experiment.” When asked if she had an hypothesis about her yeast and bread making, she replied, “We thought, I 4( )-10(or)TJ 14.99 (t)-2(hou)-10(

> They think that they know, but when they start breaking down the steps, it's very difficult for them. And to know the degree of background of material that they need. One was doing one on electricity and there's tremendous amount of information they need to grasp before they can start applying the principles [of experimentation].

DD concurs that the teachers' assignment is to learn the scientific process. She states clearly that students are not learning pure science or content, but rather learning the difficult skill of articulating the steps. She offers students resources on the topics available in the library, thus helps to shape the selection of topic, but notes that they require a lot of information before they can proceed to engage in experiments. She states that students need to know background information in order to investigate questions in a step by step fashion. DD uses the teachers' vocabulary of "breaking down steps." She understands that this assignment is about producing a project or report, but not about inquiry.

Discussion

As I make sense of the stakeholders' understandings regarding content and process above, I notice unanimity in agreeing to the teachers' goals for learning a step by step process. I do not perceive a tension between whether students must engage in genuine inquiry—a wondering about a real matter of interest—or learn the skills of managing information and time. The stakeholders make it clear that they believe students should and do learn procedures rather than learn content. However, if one agrees that genuine inquiry suggests real doubt (Schwab 1962), ambiguity and uncertainty (Gabella 1995), students must wrestle in ways with subject matter and

As teachers and librarians point out Websites, offer how-to books and pull resources on topics, they inadvertently limit the students' selection of topic. Such parameters of selecting and framing the initial topic limit the possibility of genuine inquiry. Second, topics that are brand new to students offer little foundation for novices to frame genuine questions. That is, if one does not know, appreciate or understand a phenomenon, how can one begin to question or wonder about its possibilities?

Perhaps many teachers consider the linear approach appropriate for younger (middle school) students so those students learn the basics of how to search for, keep track of and present information. But such a clean-cut exercise does not pretend to be about idea making or

assignments offer students modes for questioning phenomena and for testing the questions about which they wonder?

Further study of the nature of teaching and learning during an era when schedules and accountability drive how teachers orchestrate time, materials, and assignments warrants a continued look at student inquiry efforts.

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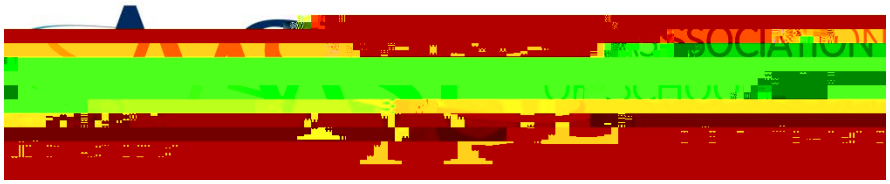

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