An Inquiry Based Teaching Model Leading Students to Scientific Discovery

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AN INQUIRY BASED TEACHING MODEL LEADING STUDENTS TO SCIENTIFIC DISCOVERY

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After student teaching in a middle school science classroom, participating in a graduate inquiry-based science and math class, reading current articles and conducting personal interviews, I decided to create a unit for sixth grade science that centers around problem-based cooperative learning with an emphasis on inquiry and formative assessments. The use of technology is also a component of the unit.

Cooperative problem based learning involves engaging students in activities that help them apply what they learn to real-world situations. Being cooperative problem-based learning, activities are designed to promote student collaboration and development of shared meaning (Brown, Collins, & Duguid, 1991).

The rationale behind this project is four-fold. First, I chose to include problem-based and project-based learning activities because of the research supporting the conclusion that instructional methods which give students the opportunity to use reasoning to build knowledge result in their deeper understanding of concepts. A constructivist vantage point of learning is the basis for cooperative problem-based learning models. Constructivists assert that knowledge is not transmitted from one person to another, but rather needs to be built by the learner for effective meaning (Driver, Asoko, Leach, Mortimer, & Scott, 1994). Constructivism is usually viewed from the perspective of cognitive processes or social processes. Science learning can entail both personal (cognitive) and social development (Driver et al., 1994), so it can blend each perspective of constructivism nicely.

The second line of reasoning in this project is the affirmation that science-learning needs to give students an appreciation for science as it relates to their lives and experiences. “Inquiry is an approach to learning that involves a process of exploring the natural or material world, that leads to asking questions and making discoveries in the search for new understandings. Inquiry, as it relates to science education, should mirror as closely as possible the enterprise of doing real science” (http://www.exploratorium.edu/IFI/resources/inquirydesc.html). Inquiry appears in science education in many forms, and I believe it is important for the classroom teacher to decide how best to implement inquiry in the classroom. According to Keys and Kennedy, inquiry includes: 1) Pausing planned instruction to investigate questions arising in context 2) Fostering
independence in procedural and social skills associated with scientific work 3) Constructing explanations and concepts from data and 4) Providing opportunities to apply scientific knowledge. While these components may seem vague, in my opinion, they are rightfully open to interpretation by teachers who choose to foster an inquiry approach to learning science. Kennedy and Keys also mention that in past studies, when inquiry-oriented curriculum are imposed on teachers by researchers or school personnel, teachers resist full implementation, and they shape instruction to match their own beliefs about teaching and learning (Cronin-Jones, 1991; Olson, 1981, Welch et. Al, 1981). So, while the actual implementation of inquiry will look different in each classroom, I have attempted to provide a set of materials that includes several options for inquiry, so that teachers can make instructional choices that keep the desired balance of analysis and synthesis in science education.

The third consideration in the development of this project is the aspect of formative assessment. In the current era of high-stakes summative testing and accountability, it might seem odd to talk about formative assessment, but I believe formative assessment is an important tool to continually gauge student learning and make adjustments in instruction as the assessments make clear. Many of the formative assessments used in the lessons included have been taken from one of the two volumes of the book, Uncovering Student Ideas in Science. The assessment probes can be used before, during, or after instruction to help teachers find out how what their students think and know throughout an instructional sequence (Keeley et al, 2005). The use of formative assessments as a tool to create a balanced system of assessment in science classrooms is validated by several studies (Black and Harrison 2004; Black and William 1998;Bransford, Brown, and Cocking 1999). While formative assessment should by no means replace summative assessments and more technical means of evaluation, using it during instruction can help teachers and students redirect and focus on specific concepts and ideas.

Lastly, I chose to include lessons that encourage student use of technology. With the increase in digital information and overall computer use, teachers have a STOPs HERE- TO BE CONTINUED. 😊😊
References

Inquiry quote: (http://www.exploratorium.edu/IFI/resources/inquirydesc.html)


