The Effect of inquiry Based labs, using a Biotechnology Model; a study on the attitudes and performances of students in an alternative school setting

An Action Research Project

Dr. Kaye Sheets

ksheets@henry.k12.ga.us

Patrick Henry High School

Henry County, GA.
Abstract: This study reports the findings of an action research project done in an alternative high school in Georgia on the effects of interjecting Biotechnology labs into an existing inquiry based lab program. The study uses Likert based scales, as well as formal assessments, student led conferences, and teacher commentary as components to help determine the effectiveness of the intervention. Acquisition of content knowledge as well as attitudes toward science and science careers are foci of the study.

Rationale: I have worked with at risk high school students for over a decade. These students are mostly low performing, behind more than 2 years in reading and math and do not have any intentions of going further in their schooling. They also have no idea that there are careers in biotechnology within their reach. According to Holland (2009) biotechnology jobs for high school students are rapidly expanding and readily available, even in these times of economic decline.

Alternative high schools... lack many of the necessary resources for conducting important science activities. The benefits of quality, innovative hands-on activities and activities in the high school science classroom are well documented (Griffard, 2006) and as a national issue, there is a growing need for more science education that relates to the versatility of the American workforce (Leshner, 2007). Hands-on science activities enable active participation of learners in the teaching process and connect students to the world of science, which plays a substantial role in the contemporary world (Obadović, 2007). High schools should assume the responsibility to provide quality hands-on learning opportunities in science and expose students to careers in science. Orzalli, 2009, p 3

America currently lags behind many other industrialized countries in preparing tomorrow’s labor force and is absent from the list of top-ten science and math education countries (Leshner, 2009). At PHHS we have many reasons to justify our lack of success in science, lack of funding, lack of equipment, low socio-economic clientele, high student turnover ..but all of these are merely excuses from my point of view.

Research clearly shows that inquiry is the way to go but, according to Roehrig and Luft (2004) few teachers have the skills to really implement this type of teaching and the rigors of teaching drive many teachers to abandon the best practices and do kill and drill to prepare students for the “TEST”. In addition Holbrook and Kohler(2000) point out that the alternative school student is very resistant toward the type of thinking required by inquiry based labs since it requires a higher level of thinking skills that have not been developed. They are poor readers and less organized in their thought processes and since they have experienced failure they are less likely to try new methods of thinking. Therefore, as science chair, I am proposing an action research project that will interject biotechnology inquiry based labs into the current inquiry based lab program in order to study the effectiveness of these labs on the science skills, ability and attitudes toward science and science careers in ninth grade high school students.

Intervention: Patrick Henry High School (PHHS) is an alternative high school for grades 9-12. We also
have a middle school component housed in an adjoining building. The majority (over 75%) of our students are at PHHS by a disciplinary hearing. The school is a zero tolerance school and is usually a last chance for students who have not been successful in a traditional setting for a variety of reasons. These "at risk" students are usually low performing students and 80% are more than 2 years behind in reading and math. (Henry County Schools' Report card; PHHS, 2010). Less than2% of these students will attend college or technical school.

I teach and chair the science department for these students. Four years ago we started an inquiry based lab component for each student because research shows that inquiry science creates better scaffolding for higher level thinking and that students learn more content as well as retain more information for high stakes tests. Our data indicate that this intervention has indeed raised our test scores and our students are more excited about science. However, (I predict) most of our students do not even have a career in Biomedical technology on their radar.

Therefore, I propose to add 4-5 biomedical technology labs to my inquiry based labs to see if there is a difference in the attitudes toward science and an elevated interest in science careers. I will use a focus lesson twice a week that will last only 5-7 minutes. It will utilize demonstrations, film clips, provocative phenomena, and any other type of hook that fits the focus. From this focus an inquiry lab will be offered.

The focus lessons and labs will begin the week after Labor Day with the first biomed lab target date set for the third – fourth week in September. Low to mid-range performing students from the ninth grade academy will comprise my target group. An attitudes survey will be administered prior to beginning the labs and at the conclusion of the labs to determine change in attitudes toward science. Results from the student learning objectives test will be used as a pre and posttest indicator of academic growth. Lab journals, rubrics and student conferencing will round out the assessment component for this research. All data will be “blind” with no student identified or linked to results. Permissions do not need to be obtained since this is a regular part of a teaching/learning environment.

**Data Collection and Analysis:** Data will be collected and disaggregated using Excel. A team of teachers will review the data and determine the effectiveness of the biomedical technology labs for this group of students. Qualitative data will be assessed and reported according to the guidelines set forth in E. Stringer’s (2000), ACTION RESEARCH, second edition. and Geoffery Mills, (2004), Guide for the Teacher Researcher. Both of these guides recommend formulating categories and identifying key terms to group responses so that qualitative data can become more meaningful.

**Budget:** My main cost will be the found cost of water molecule kits. Although they are provided in one of the lockers, I and expect to use them in at least 2 other investigations. I will also need to purchase an external hard drive so that I can store the data and Power Points that I want to access.

References and Literature citations.


Orzali, J.(2009), Connecting students to Sustainability through hands on learning in the Science Classroom. Summer Sustainability Institute, Harvard University.
