

Encouraging Technology and Hands On Science: A School System Model for Systemic Change in Science Education

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Abstract

Concern over deteriorating student skills in the areas of science and technology prompted science supporters in our community to develop a vision for an intervention program. As a result, ETHOS, (Encouraging Technology and Hands On Science) an educational non-profit organization, worked with Elkhart Community Schools and Purdue University to submit a proposal for a Math and Science Partnership Grant. The grant was awarded for three years from May 2005 – September 2008. The impetus of the grant was to execute a strategic plan to promote inquiry-based learning and teaching approaches in order to influence student achievement. The plan proposed interventions in our kindergarten through sixth grade classrooms and is composed of five key components. Thus far, we have experienced promising changes among teachers and a growing enthusiasm with students and community members. The financial support and strong partnership provided through the MSP grant has allowed us to produce a sustainable program model with a wealth of future possibilities.

Introduction

In light of the current trend in all curricular areas to develop programming and curriculum that aligns with State and National Standards, Elkhart Community Schools has risen to the challenge to provide high quality Science education to its students. The vision of a local scientist and leader in science education initiatives led to the development of a grant proposal. As a result, Elkhart Community Schools, ETHOS, and Purdue University have partnered to develop a unique program that includes professional development for teachers and high quality science instruction for students. There are five key components to this plan:

1. Using research based inquiry materials- recommended by the National Science Resource Center (NSRC) and approved by the Indiana Department of Education.
2. Provide quality refurbishment service- ETHOS manages science kits adopted by the school system and assists teachers directly with other materials.
3. Teacher Professional Development- ETHOS facilitates summer Inquiry Science Institutes and other workshops throughout the year.
4. Proper Assessment Tools- PD on the latest research in alternative assessment utilizing Indiana and National Science Standards.
5. Administrative/Community Support – Strong support from the Superintendent of Schools, school administrators, and business professions who have a dedicated interest in the future of our local students.

In addition, the grant provided funding for two experienced teachers to serve as Master Science Teachers (MSTs). The MSTs were relieved of full time classroom duties to participate in extensive professional development focused on inquiry teaching methods, science content, and assessment tools. The District Science Teacher (DST), ETHOS staff members, and the MSTs designed a comprehensive professional development plan for interested K-6 teachers to promote inquiry-based science teaching and learning. The Supervisor of Curriculum and Instruction for Elkhart Community Schools oversees and participates in professional development planning. A Science Liaison program was designed to provide 80+ hours of professional development for participating teachers. This included a two-week summer workshop to encourage an understanding of science content and pedagogy, as well as additional PD opportunities throughout the school year. In addition to training the Science Liaisons, *all* elementary teachers have access to science content training for the materials they are using and the opportunity to use

the MSTs and DST for field trip experiences, content questions, classroom modeling, and science curriculum support.

Now in the third and final year of our current grant, we have worked continuously and thoroughly to track, organize, and evaluate data collected from participating teachers and students. Current data shows a marked improvement in teacher attitude toward inquiry based science teaching and science in general. Student achievement data, although still being reviewed, is also promising.

The Need for Systemic Change

The American Academy for the Advancement of Science and the National Research Council have both stressed the need for science education that not only builds a child's content and process knowledge but prepares them for responsible citizenship as a contributing participant in a global economy. The rate of science and technological advances has heightened the need for well prepared students with the necessary skills to procure such field related employment. The national STEM Initiative is a direct result of these concerns. Knowing that such training must begin with our youngest students, the partners in this grant devised the goals and objectives of the program to begin with our K-6 student population. However, teachers are a key component to the program's success. In the last several years, science had evolved from a vital part of the curriculum to a subject taught when and if there was time enough in the school day. We also found that many teachers did not feel competent enough to teach science concepts through an inquiry-based method. Thus, reaching teachers and changing their attitudes about science education became the focus of the first training year.

After the first summer inquiry institute, our liaisons began utilizing their training in their classrooms. As word spread among their peers, the MSTs and DST were asked to make frequent classroom visits not only to the liaison classrooms but to non-liaison classrooms. In the second year ETHOS began hosting field trip experiences for any interested classroom in the district. The DST and MSTs also created and executed in-class experiences for those who could not come to ETHOS.

Materials and material management also play a large roll in our program's success. ETHOS orders, refurbishes, and manages the science kits that the district uses. Every teacher in the district has the opportunity to attend training that is facilitated by the kit manufacturer and hosted at ETHOS. Some of the kits have been provided through generous private donations solicited by ETHOS. In addition, the ETHOS staff is dedicated to prompt follow up support when needed by providing teachers direct contact information via fax, phone, or e-mail.

As a result of ETHOS commitment to training and management, the school administration has encouraged program enrollment by providing incentives to participating teachers. The Director of Curriculum and Instruction continues to generate and sustain interest in the program among the building principals through district meetings and individual contact. This year our program secured its largest enrollment, even though participation remains voluntary.

Recently, Elkhart Community Schools, and the community at large, lost a major contributor to local science education when a large science research based corporation was relocated. Although there remains a small contingent of support among the scientific community, the grant partners have continued to seek support from local higher education entities, as well as the education council and other local business leaders. ETHOS hosts several community events to increase awareness for science education. The largest and most popular event draws nearly 2,000 local and surrounding community members to an interactive science showcase.

Conclusion

Data collected thus far has proven our program successful in training and encouraging science educators, providing high quality science materials and instruction, engaging school administrative support, and involving community members. It is our hope to strengthen and expand the program with continued public and private funding. We believe this model has made a measurable, sustainable difference and can be replicated successfully.