

Fostering Inquiry-based Learning in Technology-rich Learning Environments: The Inquiry Page in the GK-12 Fellows Program

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Abstract: This paper analyzes the uses of the Inquiry Page (www.inquiry.uiuc.edu) in the National Science Foundation GK-12 Fellowship Program*, where scientist-fellows and K-12 teachers partner to integrate the use of computer-based modeling, scientific visualization, and informatics in science and mathematics education. The Inquiry Page is a web-based, knowledge-building tool that facilitates and fosters real-world application of inquiry-based learning. By creating “Inquiry Units” teachers and learners collaboratively engage in the inquiry path, building new knowledge as well as a resource for other teachers and learners. By offering structures for inquiry teaching and learning, a-synchronous community-building is occurring with teachers/learners being able to draw upon and share their own applications of inquiry-based teaching. The Inquiry Page, then, becomes the nexus between theory and application. It emerges as a “portal” for the scientist-fellow, teacher, and students in the classroom; facilitates communication between the teacher/scientist team and other educators both at the school and in the larger education community; supports inquiry-based teaching in the real world of the classroom; and nurtures the development and professional growth of the teacher and scientist/fellow by engaging in reflective educational theory and practice.

**The EdGrid GK-12 Fellowship Program supports annual teaching fellowships for graduate student scientists from the University of Illinois, Urbana-Champaign and is administered by the National Center for Supercomputing Applications.*

Evaluation methods: The GK-12 Evaluation team is adopting a situated evaluation approach to gathering data at each high school site, using online formative and summative evaluations of students, teachers, and fellows in addition to observation, videotaping, and interviews. Teacher and fellow reflections are thus captured quantitatively and qualitatively. Artifact/products of students, teachers, and fellows are reviewed. Key to the evaluation process is an understanding of and sensitivity to each site’s context and dynamics. Of particular interest for the Inquiry Page is identifying its uses and utility, and this is determined by units created and interviews with teachers/fellows.

Sites: **Site 1** is located in a suburb of a large city. It was formed to offer alternative (i.e., vocational) education for students grades 10-12 to supplement their regular high school curriculum. **Site 2** has approximately 2,325 students and offers a traditional college-preparatory high school curriculum. It is located in a comparatively wealthy cosmopolitan suburb of a large city. **Site 3** has approximately 1600 students and is located in an industrial district. The school offers a diverse curriculum that includes two “academies” specializing in medical science or math/engineering/information technology for accelerated students. **Site 4** is located in a twin-city that is home to a large university. It offers a traditional college-preparatory curriculum.

The Inquiry Page: The Inquiry Page (www.inquiry.uiuc.edu) is a five-year-old project developed initially as a supportive tool for teacher development by Dr. Bertram Bruce at the

University of Illinois, Urbana Champaign. It has since evolved into a web-based tool and collaboratory to facilitate inquiry-based learning and teaching within much broader contexts. Evaluators, teachers, and scientist-fellows participating in the GK-12 Program have used the Inquiry Page, identifying its utility for their needs.

Facilitating Inquiry in Teaching/Learning: Each site differed in its adoption of the Inquiry Page. Two of the fellows found it unusable in their specific classrooms: one fellow noted teacher disinterest in learning methodologies or new technology, while another fellow noted a sense of it not being relevant to his/her teachers' subject/learning context. Each of the other fellows, however, employed the Inquiry Page as (1) a lesson planning tool for teachers, including tutorials, resources, and personal reflections in their role as fellow/teacher in the classroom; (2) an archive for their own work and reflections on their particular GK-12 site, including site-specific resources; and (3) as a way to more deeply understand inquiry-based learning and engage in a "co-learner" relationship with their teacher. The model identified by the fellows in their mid-year evaluation as most successful was one in which the teacher and fellow worked collaboratively in teaching/learning. The Inquiry Page facilitated this type of relationship in and out of the classroom; with units serving as new points of communication with educators both within and outside of the individual district/sites. The GK-12 Evaluation team initially thought the Inquiry Page could be used to document their observations; however, they found that it was more useful as an artifact of the teacher/fellow teams' evolving teaching models. Unexpectedly, the Inquiry Page has been used as a presentation tool with the units being demonstrated at NSTE, NABT, TeachIT, and various district meetings. Perhaps most interesting is the Inquiry Page's role in introducing inquiry-based learning to the fellow/scientists and giving a "name" to what teachers were already doing or wanted to do in the classroom. Although all had heard the term, and had an intuitive sense of what it meant, it was during the process of creating units that points of recognition and understanding of real-world application occurred. Essential features of classroom inquiry in the sciences as defined by the National Research Council are identifiable at each of the sites; particularly at one site, where the scientist fellow/teacher/students are generating new research questions that are being incorporated into the scientist-fellow's dissertation work. The Inquiry Page is bridging the gap between education pedagogy and real-world applications in the classroom, creating a framework for scientists and teachers to collaborate—to the benefit of both.

References:

Mehra, B., Bruce, B.C., Harnisch, D., Comstock, S. & Takahashi, A. (forthcoming) Complexities in Development of Educational Collaboratories as a Socio-Technical System: A Situated Study of the GK-12 EdGrid Graduate Teaching Fellowship Program. Proceedings of The 6th World Multi-Conference on SYSTEMICS CYBERNETICS AND INFORMATICS SCI 2002, Orlando, Florida, (July 14-18, 2002).

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