Invention and Impact

A Conference on the NSF Course, Curriculum and Laboratory Improvement (CCLI) Program

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In the early part of 2003, a number of discussions took place within the Division of Undergraduate Education (DUE) at the NSF to think broadly about the CCLI program. These discussions were inspired by Judith Ramaley, head of the Education and Human Resources Directorate at the NSF. She asked DUE staff to think about how the CCLI program fits together as a whole and how we might look toward improving it. The program had been in existence for about six years and was due to be revisited. Was it meeting the broad needs of the community? Was the focus correct? Were there tangible improvements in student learning, faculty professional development, and the infrastructure of undergraduate education?

Program officers within the division agreed that on the last point, tangible improvements, there were plenty of examples. However, we knew it would be difficult to move some of these often-revolutionary improvements between the disciplines and to gain broader recognition of the widespread efforts of the community in developing innovative materials and practices. Our discussions led to the idea of a conference. We wanted to recognize and celebrate the great efforts of so many individuals contributing to these developments and also to help spread the innovative ideas between and among the various STEM (Science, Technology, Engineering and Mathematics) disciplines. We also wanted to help build collaborations that would foster both the spread of knowledge and the construction of the next generation of ideas to improve student learning. This article describes, briefly, the conference and the resulting publication that is due out in January of 2005.

Although the meeting itself physically took place in the spring of 2004 (April 16-18), there were a number of components that extended beyond it in both directions to help achieve the conference goals. To begin with, many discussions within and beyond DUE helped shape the content and style of interaction to bring together a diverse group of educators, administrators, content developers, education researchers, and undergraduate students. The goals of the conference included a) maximizing the interactivity of the conference so that attendees would have more than a passing acquaintance with the materials and methods presented and, consequently, would be more likely to adapt, adopt, or promote the ideas in their own institutions; b) bridging disciplinary boundaries and building collaborations to enable the broadest possible sharing and cross-fertilization of innovative ideas spawned by CCLI; and c) reaching out to a broader community to help build recognition of both innovations themselves and documented successes attained by many of these projects. To help achieve these goals, DUE partnered with the Education and Human Resource Division of the American Association for the Advancement of Science (AAAS) to host a conference and its ancillary events and outcome activities. Throughout the organization of the conference we imbedded interactivity as the pervading theme. Each workshop presenter and plenary speaker was encouraged to model interactive learning to the extent possible. Further, the format of the conference was organized to facilitate this pedagogical concept.

The conference workshops each consisted of approximately 40 sessions (10 parallel) of 90 minutes. Each of the four workshop periods had a mix of opportunities for attendees to experience aspects of new development, assessment, interactive engagement, educational technology, and other innovations affecting newly developed pedagogies. We also pressed our presenters to shape their workshops for an interdisciplinary audience. In any one session, you were likely to find a collection of biologists, physicists, chemists, engineers, psychologists, mathematicians, computer scientists, and other disciplines. This mixing alone contributed positively toward the second goal of bridging disciplinary boundaries and building collaborations. The CCLI program is most effective when it can bring good ideas together with the people who can effectively implement them in the classroom and who can help spread them beyond the discipline or setting of their initial development.

Beyond the presenters of the 40 workshops, about 200 current or former Principal Investigators of CCLI grants (or their predecessor programs within DUE) were invited to learn about other programs and to share the results of their projects. Two
poster sessions were held that allowed both poster presenters and other attendees to visit all of the posters during the conference.

Although we limited the number of plenary sessions, most of them provided an opportunity to actively engage the conference attendees in some less-than-typical ways. One talk was designated as an "interactive plenary." Eric Mazur from Harvard University presented an interactive, multidisciplinary talk on perception, visualization, and research on how and what students view in textbook illustrations. Dr. Mazur also included an interactive element using a set of 400 Personalized Response System wireless "clickers" to help involve audience members in the details of his presentation. This provided the audience a chance not only to actually use the technology (a significant learning experience), but also to witness ways in which it can be used effectively to engage people in a large lecture environment. Dr. Mazur has championed the use of this technology and associated concept tests in this type of environment in his Peer Instruction methods (portions of which have had CCLI support).

One other interactive feature of the conference was a pre-conference activity in the form of participatory discussions using listserv groups. This communication venue allowed questions to be posed relevant to the development of materials and methods and also to solicit comments from the community regarding the CCLI program itself. This, along with a Sunday morning breakout session, provided supporting evidence of the successes of CCLI funding.

The third goal beyond interactivity and cross-disciplinary mixing was outreach. You are reading one aspect of this effort, but another took place the day before the conference when the AAAS sponsored a Capitol Hill event to help inform the U.S. House and Senate staff members (often the people who actually write laws) of the results of funding education projects through CCLI. A group of eight CCLI principal investigators and their students were assembled to talk with staffers during a lunch on the day preceding the start of the conference. Many of these individuals went on to meet individually with their representatives or their staff later that same afternoon.

Further outreach occurred through the publication of a book of essays written by the presenters of each of the 40 workshops. This book, due to be released by the AAAS in January 2005, contains brief descriptions of many of the sessions, as well as references to the work being done at many of the institutions and groups present at the conference. The book will be available electronically on the web, or through the AAAS in a more traditional book format.

Many of the pieces of this work are also being published in parallel in smaller journals specific to the disciplines of their origin in order to reach out to as wide an audience as possible.

It was also an aim throughout the planning of the conference to invite as diverse an audience as possible and to include diversity not just in the usual sense, but also in ideas, experience, and background. One well-known educator researcher told us before the conference that such events are a waste of time because they are too broad and unfocused. At the end of the conference, the same individual came back and related that it was one of the most valuable conferences he had attended. In the end, however, it is measurable effects, not anecdotes that demonstrate the value of such an event. To this end, we set out to determine the degree to which ideas were spreading beyond the conference itself. Through the AAAS, we are conducting a small evaluation/research effort to 1) determine the degree to which the ideas have spread via surveys and phone interviews and 2) measure the degree to which the "interactivity" of a workshop session affects its dissemination. We believe that getting students to "do" as opposed to merely "listen" improves their comprehension of a subject. We hope to show, in a small way, that the same applies to dissemination of ideas in venues such as this.

So, what next? The Division of Undergraduate Education has committed to holding a conference similar to this on a semi-regular basis (perhaps every 2-3 years). The next event is likely to continue to cross STEM disciplinary lines, but may either be broad or, as has been suggested, focus on a particular area such as assessment, education research, introductory courses, active engagement, or perhaps undergraduate research. The NSF relies on the input from the community to help shape and inform the best ways to develop, evaluate, and disseminate the best ideas and practices in education. Check out the publication of the proceedings from this conference as a first step to seeing some of the hot topics in undergraduate education, and to help inform you about where future funding and ideas might best be directed. The NSF also continually involves faculty across the country in panel reviews, site visits, and in the evaluation and dissemination of many of these ideas. I would also encourage you to participate in as many of these activities as possible.

1http://www.ccliconference.org/