

P1.14 EARTH2CLASS: TEMPLATE FOR SCIENTIST-TEACHER INTERACTIONS

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1. INTRODUCTION

“Earth2Class” (E2C) provides a template to create valuable science/math/technology resources for K-12 students and teachers through the collaboration among researchers at the Lamont-Doherty Earth Observatory of Columbia University, curriculum and technology integration specialists from Teachers College, Columbia University, and classroom educators. E2C relies on this synergy of specialists in curriculum, educational technology, and scientific research, but the key feature is involvement of the Lamont scientists. Their availability through workshops, web site postings, and e-mail expose teachers and students to stimulating, cutting-edge research that help develop K-12 curriculum activities linked directly to “real world questions.” Such interactions enhance the subject area knowledge of the teachers and excite them about teaching science, while helping scientists to get their discoveries into classrooms. Drawing on the scientists’ expertise, teacher can show students how the science concepts and skills they are learning applies outside the classroom, as well as to other aspects of their studies. Various aspects of the E2C program have been presented at previous Symposia on Education (Passow et al., 2000 – 2002), so the current presentation will provide updates on the scientific, expansions of educational technology applications, evaluation of the efficacy of this professional development model and new ways by which AMS Education Program materials are made available.

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2. STRUCTURE OF EARTH2CLASS

E2C centers around Saturday “Workshops for Educators” held at the Lamont-Doherty campus in Palisades N.Y. Each Workshop features presentations by Lamont research scientists and staff about their areas of investigation, combined with discussion of core concepts, classroom-ready curriculum units, and educational technology strategies that are focused on the theme presented. Each workshop follows this general structure:

9:00 – 9:30 General announcements, technology set-up

9:30 – 10:15 Background Information about the theme

10:30 – 11:30 Guest Scientist(s) Presentation

11:45 – 12:30 Classroom/Educational Technology Applications

12:30 – 1:00 Wrap-up activities for course participants and future planning

Workshops themes vary in each series, reflecting the wide range of investigations conducted at Lamont and the Content Standards included in secondary courses. Among the many topics explored have been: mapping our planet, remote sensing techniques, minerals and rocks, earthquakes and other hazards, climate change and paleoclimatology, marine geology and geophysics, water resources and groundwater contamination, continent-ocean margins, Hudson River studies, hydrothermal vents, and undersea impact craters. Participants have been able to tour such Lamont facilities as the Deep Sea Sample Repository, the largest collection of sea floor materials in the world, and the East Coast Repository of the Ocean Drilling Project.

Before, during, and after each workshop, participants and others are able to utilize the resources available on the E2C Internet site, www.earth2class.org. Among its features are:

- ? K—12 Connections: archived versions of Workshops, curriculum materials, other classroom resources
- ? Distance Learning: resources for online courses based on the Workshops
- ? Resources: links to pertinent Internet sites and electronic versions of print materials
- ? Mentoring: Guides for developing classroom activities, lesson plans provided by E2C participating teachers
- ? Virtual Tour: images and information about E2C field experiences and Lamont
- ? Feedback: template to provide evaluation of Workshops and web site
- ? Contact Us: e-mail link to the E2C Team

The website also provides a convenient link to the many other areas of investigations conducted by Lamont scientists that are of value to students and teachers, but which have not yet been themes for E2C Workshops.

In addition to “live” workshops for teachers coming to Lamont, many of these presentations have been made available to teachers at remote locations through two-way teleconferencing techniques. The “Earth2Class” thus has the potential to increase access to a variety of such experiences through use of electronic networking and two-way video technologies. It can prepare teachers to utilize these emerging technologies in classroom settings. This program can extend electronic networking, information access, and two-way communications to isolated communities, as well as to inner city students and teachers currently bypassed by the digital revolution. The Earth2Class model can significantly expand opportunities in science and technology available to

minority and other students and teachers who might not otherwise have access to cutting-edge science, scientists, or knowledgeable teachers. Through E2C, teachers not only learned where to obtain materials that could be applied to their classroom, but also saw a demonstration of how we used these materials effectively and could provide them with guidance to do so on their own.

Participating teachers have been able to obtain local Professional Development credit, as well as earn graduate education credits based on the workshops through Teachers College and St. Thomas Aquinas College, Sparkill, N.Y. The E2C web site contains support materials for these courses. Field experiences have also extended the benefits of E2C, highlighted by a kayaking trip on the nearby Hudson River. (See “Wandering the Watersheds, Poster 1.15 of this Symposium.)

Other Professional Development opportunities are arising as Earth2Class partners with Teachers College Distance Learning Project to offer “asynchronous” versions of the program. An “Earth2Class” Teacher Enhancement Program will develop a corps of classroom teachers who will utilize national, state, and professional standards to map content and curriculum paths, and create technology-based instructional materials. Overall project strategy will be shaped by continued assessment of goals and objectives.

3. EVALUATION OF EARTH2CLASS

Assumpcao (2002) assessed many aspects of this program in her Teacher College doctoral dissertation entitled “Earth2Class: The Role of Technology in Providing Science Content Delivery from the Research Scientist to the Secondary (6 – 12) Classroom Teacher.” Among her conclusions, she notes that E2C provides a model for “understanding the power of building partnerships between the research institutions, the teachers as classroom experts, and the content professionals as content experts, each one contributing equally within their area of expertise” (pp. 184 –185.)

The study found that Workshops and the website provided participating teachers with:

- ? authoritative content;
- ? organized links that became useful tools for direct use in the classroom;
- ? review notes;
- ? an opportunity to share lesson ideas through interactive forms;
- ? a model of technology integration that they could imitate in their own classrooms;
- ? a source of ideas and model lessons they could test out and comment with other teachers at the next workshop or their own schools;
- ? a model for professional development opportunities; and
- ? an opportunity to increase their own comfort level with the technology as they had time to practice using it and had a chance of seeing it being used during the workshop.

For the research scientists, the E2C program was instrumental in helping get their work more widely known to a non-scientific audience. Reaching out to the teachers meant consequently reaching the teachers' students. Putting materials on the website made these materials more available to teachers and students even after the workshop was over. Providing a common working space for scientists, teachers, and program facilitators through development of the website narrowed the communication gap between these groups, and made the website useful to each in their unique necessities.

Among the lessons learned from E2C research were:

- ? Importance of bridging the gap between the work of the researcher and the classroom teacher;
- ? Need teachers feel for professional development in technology in education;
- ? Need teachers feel to network with different professional to share experiences.

- ? Scientists' and researchers' needs for an educational outreach channel
- ? Need for developing a structured, consistent PD program;
- ? Need for developing readily accessible materials that teachers can use in their daily lessons;
- ? Need to include teachers as research partners, as specialists in their classrooms;
- ? Need to design a program that is flexible and tailored to each teacher's school culture and specific needs;
- ? Need to develop formal partnerships between higher education institutions and secondary schools;
- ? Need to take advantage of what technology allows us and create a more collaborative model of work, with all participants having a more active voice in the process (ownership of the learning process).

Future studies could examine:

- ? The impact of the E2C model on how much Earth Science content teachers actually acquire, perhaps by measuring before and after content knowledge differences;
- ? Analyzing the efficiency of such online course offering;
- ? Measuring the impact of the participation in this professional development on the teachers' students, to see how much of what E2c does effectively helps the ultimate target audience;
- ? Measuring how replicable this model is by identifying which components are generalizable and which are limited to the specific context of the E2C program;
- ? Exploring how learning occurs in such adult education programs that utilize digital technologies to develop effective strategies.

Additional assessment of the program has been obtained informally through comments elicited during presentations at national and local professional conferences.

4. REFERENCES

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