

“Creating a Middle Ground between university and classrooms, teacher education and K-8 education, and language minority and mainstream communities through a transformative science, math, and technology methods course.”

by

Lorie Hammond
CSU, Sacramento
6000 J St
Sacramento, CA 95819-6079
lhammond@csus.edu

Julita G. Lambating
CSU, Sacramento
6000 J St
Sacramento, CA 95819-6079
lambating@csus.edu

Susan O’Hara
CSU, Sacramento
6000 J St
Sacramento, CA 95819-6079
Ohara@csus.edu

Objectives/Goals: This presentation describes the possibilities and challenges inherent in the creation of a community of learners which involves diverse and language minority k-8 students and their families, pre-service teachers, collaborating teachers and researchers. This community of learners is transformative in itself, in that the power relationships between different members of the team are transformed and equalized. In addition, this community of learners performs several functions, as listed below:

- 1) It serves as a transformed methods class which integrates three required methods courses in science, math, and technology, for a group of pre-service teachers enrolled in Middle Ground, a Professional Development School which is part of the Title II Equity Network at CSU Sacramento. The Equity Network consists of twelve PDS schools committed to educating teachers to work successfully in diverse communities. Middle Ground has the dual focus of increasing minority students' academic performance in science and other subject areas, while affirming family and communities cultures and languages.
- 2) It serves as community service learning at several levels. Pre-service teachers learn to work with 4-8th grade students through working with them on teams doing real, integrated projects in science, math, and technology. Students create products (power point presentations, native plant gardens) which are shared with their school community and which in turn create more laboratories for continued inquiry in science, math, and technology. In addition, minority parents are incorporated as experts who assist students in their research, and older students mentor younger students in the creation of garden projects. In short, an organic chain of mentors develops, involving various ages of people who exchange various types of knowledge.
- 3) Both "official" school science and traditional community knowledge about plants and other matters are valued and shared. The status of language minority families' knowledge is raised by becoming valued in the school community.
- 4) Skills and techniques for teaching project-based inquiry science are incorporated, so that pre-service teachers are prepared to teach not only in classrooms but also in learning communities which include but are broader than the classroom.
- 5) Skills and techniques for teaching project-based math applications are incorporated into real world settings, so that pre-service teachers and students alike can see the value of mathematical operations.
- 6) Technology is incorporated as a tool for accomplishing goals, gaining understandings, and communicating the projects of the learning community. Pre-service teachers learn technology skills in context, and reinforce these skills by exploring them with students in grades 4-8. For example, pre-service teachers (PT's) will work in small groups, two PTs with three or four sixth graders, to study a family plot in the school garden. In the process, they will gather and analyze data using Excel, take digital photos, create and scan

drawings, and create a power point presentation which incorporates all of these. All projects will then be shared on the Middle Ground web site.

Theoretical framework: This project draws from several contemporary theoretical frameworks. Many of these are combined in the notion of “sociotransformative constructivism”, as defined by Alberto Rodriguez and Andrew Gilbert at NARST 2002. Rodriguez’ description of this approach locates it at the intersection of multicultural education, sociocultural constructivism, and inquiry-based science. This project is multicultural both because of the diversity of the players involved and because the themes chosen for study are based on community issues and on the school-community garden. It is constructivist and inquiry-based because learning teams are engaged in project based learning which involves active science exploration, supported by math and technology skills. It is also transformative because the students addressed are affected by the digital divide, being members of low income language minority communities with little computer access.

The project also draws from reform notions of teacher education, as forwarded by Ken Zeichner and others, which posit that mainstream pre-service teachers need significant experience in minority communities if they are to become proficient in teaching there. It follows on the work of one of the authors (Hammond) and Heredia, which posits that pre-service teachers must learn to teach in communities and not just in classrooms.

Finally, the project builds upon Moll and Gonzalez’ notion of building upon community funds of knowledge. By focusing science studies on the gardens created by Southeast Asian and Mexican families, we give status to these families’ skills and knowledge, which are otherwise ignored and hence devalued in school science.

Methods used: The work to be presented is a small part of an ongoing action-research, teacher education reform project sponsored by Title II, through the Equity Network, and CSU Sacramento. The focus is on specific projects enacted in our science/math/technology course as an example of the kinds of meaningful science explorations which can happen when 1) pre-service and in-service teachers work together with students and researchers in communities of learners, as a means of professional development, 2) courses are taught in a community setting where real science projects, such as the garden project, are ongoing, 3) everyone is engaged in community service learning, sharing and receiving knowledge, and 4) minority community funds of knowledge are incorporated in the curriculum. The projects are treated as “caselets” (Tippin and Nichols, 2001), in which themes which recur in other settings can be examined. Data is gathered using ongoing, ethnographic techniques including technology (digital cameras, video), journaling and dialogue between the authors, interviews with and among participants, and examination of products produced. The audience is invited to participate in this critical dialogue.

References:

The following authors have influenced the authors over time. References to specific works do not fully express the multiple dimensions of these influences.

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