

Pew Midstates Science and Mathematics Consortium
Workshop on Interdisciplinary Teaching and Learning:

*Can Introductory Science Teaching and Learning Be Interdisciplinary
within the Natural Sciences and Mathematics?*

Final Report

The workshop was held at St. Olaf College on October 7-9, 2005, with 32 registered participants in attendance. This includes the two keynote speakers, Michael E. Moody from Franklin W. Olin College of Engineering (who spoke on Friday evening and attended the entire workshop) and Mary Morton from the University of Dayton, who spoke on Saturday afternoon. Five participants were from Carleton College; the remaining 25 were from Pew consortium schools:

<u>School</u>	<u>Number of participants</u>
St. Olaf College	15
Carleton College	5
Hope College	3
Washington University	2
Knox College	2
Grinnell College	1
Luther College	1
Macalester College	1
Olin College	1
University of Dayton	1

Chemistry departments were the most heavily represented at the workshop:

<u>Academic Department</u>	<u>Number of participants</u>
Chemistry	14
Biology	8
Math/Computer Science/Statistics	6
Physics	3
Psychology	1

Keynote Speakers

Michael Moody addressed the group on Friday evening. As background he described his experiences as Math Department chair at Harvey Mudd College and Dean of Faculty at Olin College. He described “interdisciplinary” as way in which those who have multidisciplinary expertise “begin to think another way” and presented the spectrum

Separate → Cooperating → Multidisciplinary → Interdisciplinary → Nobody remembers

noting that students can be confused if they are targeted in a part of the spectrum for which they are not yet ready. He described the process of curriculum revision that

occurred in the Math Department at Harvey Mudd and, on the basis of this experience, pointed out the value of careful focus on curricular objectives, “thorough reconnaissance” of academic needs of the departments that are involved, analysis of constraints, seeking external advice, and planning for sustainability. In addition, he advised not to avoid conflict, but to invite open sharing of ideas—something that he feels is a key aspect of the environment at Olin. Students in their interdisciplinary experiences need to learn how to acquire knowledge but also how their own knowledge is limited. A goal should be that students develop a level of confidence and autonomy that will enable them “to ask really good questions.”

In her Saturday afternoon address, Mary Morton provided perspective based on her experiences at College of the Holy Cross as well as University of Dayton. She spoke of ways in which sciences share common interests—for example, in data analysis, problem solving, and asking questions to try to make sense of observations—yet may address questions in different ways, using different vocabularies. Like Michael Moody and other presenters at the workshop, she emphasized being *very* clear about stating the goals of interdisciplinary teaching at the beginning of a program or course development. In regard to general education courses, she spoke also of worrying less about depth but more about building a set of skills in common among the different sciences and mathematics. In addition, she pointed out the need to give attention to courses that students would take following their interdisciplinary experiences. A model of teaching in which faculty themselves do the integrating, then present what they have integrated to the students, may be a more desirable model than a team teaching approach in which faculty present their own disciplinary material but do not become “integrated” themselves.

Panel Discussions and Other Discussions

The workshop included two panel discussions. The first of these, presented by Susan Singer, Truman Schwartz, and Jason Engbrecht, described the panelists’ experiences in interdisciplinary teaching innovations, primarily at the introductory level. In the second panel presentation, Joanne Stewart and Trish Ferrett gave attention to the issue of when students may be ready to do interdisciplinary work, focusing on the particular types of experiences they have had at Hope and Carleton. Summaries of the main points of these panel discussions, comments made in the discussions that occurred during these and other activities during the workshop, and posters prepared by the participants have been sent electronically to all participants.

Our Reflections

Overall, we were very pleased with the workshop, and we feel that it met our goals and expectations. The workshop left us energized to take on the development of interdisciplinary or multidisciplinary courses in our own teaching and was highly informative in terms of examples, approaches and implementation of interdisciplinary teaching. We feel that the speakers and panelists did an excellent job of bringing up

issues involved in interdisciplinary teaching and learning and gave some direction, advice, and examples of how to cope with these issues. We were delighted that most of the presenters were able to participate in the majority of the workshop and feel that they contributed significantly to discussions. The participants were also a key factor in the success of the workshop. Although the participants were not evenly distributed through the sciences and mathematics, for example chemists far out-numbered the other disciplines, many of the participants were interdisciplinary themselves and their opinions and ideas did not fall within disciplinary lines.

For logistics, we found the Pew Consortium guidelines very helpful, and have nothing to add other than to emphasize the importance of working with Marlene Field, enlisting student help, and also the help of an administrative assistant locally. For us, Karen Renneke proved indispensable in helping with logistics. We also enlisted the help of a colleague to transport people to and from the airport and are grateful to Wes Pearson for volunteering to do this. For future Pew Workshops we would recommend that the allotted money for honoraria to outside speakers be increased. We supplemented the Pew honoraria with money from HHMI for our two speakers. We are fortunate in that the catering services at St. Olaf are first rate and reasonably priced and took advantage of their services for all meals and breaks except dinner on Saturday night. We used the newly reopened Ole Store for Saturday night's dinner and would recommend this venue to future Pew workshops held at St. Olaf.