

This document describes how training and workshops for the LVPTF project.

## **06/2003 - 05/2004**

### Flash Tutorial Multimedia:

This course was offered to Teaching Fellows and STEM Teachers, and provided an overview of Macromedia Flash MX software which has become the major software to make web-based movies. The interface of Flash MX, different types of tweening, and learning three kinds of symbols are some of the basic concepts in Flash MX that were covered. The course also included select case studies of how to create interaction between buttons and texts, drag and drop objects, load variables or movie clips into current movie, and call Java script/perl script.

### Physics Course:

This course was also offered to STEM Teachers and was required for Teaching Fellows. It acquainted students with aspects of physical sciences and introduced applications that emphasize technology. Although the primary goal is teacher preparation in the physical sciences leading to enhanced subject-matter confidence and enthusiasm, especially at the K-8 levels, the course content can be tailored to meet specific needs of high-school teachers and other interested professionals and students. The properties of matter and the interaction of light and matter served as an underlying theme about which other aspects of physical sciences were taught. In so doing, we revealed the interconnectedness of all science disciplines, and encompassed subjects such as atoms and periodic properties; molecules and compounds; chemical reactions; environmental implications; light, color, sound and waves; electricity and magnetism; heat and phase changes; motion, energy, and forces in nature. The development and use of K-12 classroom demonstrations and inquiry-based activities was integrated with our treatment of scientific content, and included the use of computer-based tools. Course content was aligned to PA Department of Education Standards for Science and Technology. This course provided State of Pennsylvania Act 48 credit toward the professional development requirements.

### Summer Workshop:

THE STEM WORKSHOP: THEORY INTO PRACTICE was a two week workshop at the end of July and early August focused on enhancing mathematics, science, and engineering content in Grade Levels 4-12 classrooms in public schools. Those who participated were classroom teachers, administrators, educators, professors, NSF teaching fellows and industry partners. The teaching fellows are undergraduate and graduate students from mathematics, physics, computer science & engineering, chemistry, and earth & environmental science at Lehigh University. The classroom teachers were from school districts surrounding Lehigh University. The group of participants was wonderfully diverse which made for stimulating interactions and a variety of perspectives on every topic that was presented.

Each morning began with a continental breakfast and a warm-up activity which helped to develop cohesiveness in a group with disparate backgrounds. Every day proceeded with topics such as Process Problem Solving, Learning Styles/Teaching Styles and Lesson Plan Design and with content presentations from each of the professors in the project. A portion of each day was spent in teams for curriculum development for a particular grade level group and content area. Our two week workshop concluded with a Panel Presentation by Principals on Learning the Participating G4-12 Communities and a picnic in the courtyard of Iacocca Hall. From a personal perspective the STEM WORKSHOP was rewarding and productive effort. The invitation 'to think' about mathematics, science, and engineering in new and different ways permeated our two week seminar, which was a rewarding approach.

Dr. Lynn Columba conducted a follow-up Session Workshop for the Teaching Fellows on January 29, 2004.

# Reflections on the STEM WORKSHOP

*THEORY INTO PRACTICE – Dr. Lynn Columba*

October 22, 2005

During our Summer STEM Workshop, we explored writing as a way of making our thinking concrete. The name of the interactive session was *Writing for Learning: Writing as a Way of Knowing*. As a large group we dialogued about how writing can demand participation of the student; help the student to summarize, organize, relate, and associate ideas; provide an opportunity for a student to define, discuss, or describe an idea or concept; encourage the personalization, assimilation, and accommodation of the mathematics/science being taught; and, provide an appropriate vehicle for the student to express and focus on negative feelings and frustrations as well as to emote and rejoice in the beauty of mathematics/science (Azzolino, 1990). Journal writing and The One Minute Paper were introduced as methods for making writing an effective tool for learning. This type of writing can be used in a variety of ways, including the following:

- After completing a topic
- During a topic—on-going assessment
- To help student identify patterns
- To help students articulate their thinking and understanding
- To help students identify interesting and/of important points

Delightful journal entries from the participants modeled how we rejoice in the beauty of mathematics and science. Next, we reviewed analytic rubrics for scoring student writing in fair, objective, and justifiable methods. In summary, we use writing in our classrooms because writing is a way of clarifying and refining one's own thoughts as well as communicating with others.

Another session, during the Summer STEM Workshop was *Does Technology Increase Student Learning? The Role of Technology in the Future?* Through an informal discourse, we explored the following questions:

- Does educational technology increase student learning?
- Does it have a positive impact on student achievement?

Research and practical implementation were reviewed with the following conclusions:

- With the constant advancement and use of technology in work and personal life, it cannot be ignored in the classroom.
- Technology integration must be considered thoughtfully.
- Educators must make their decisions based on the needs of the students, teaching methods used, learning styles, and professional development needed, as well as hardware, software, and networking requirements.
- Gain knowledge about different technologies.

## **Team Building Workshop Update**

**Roy Herrenkohl November 30, 2004**

A 2½ hour workshop, entitled “Charting a Team Course,” examined the basics of team development. It was conducted on July 27, 2004 for the Lehigh Valley Partnership for G4-12 STEM Teaching Fellows by Roy C. Herrenkohl, Ph.D., Professor of Sociology and Anthropology at Lehigh University.

The session considered the nature of team goals and their relationship to team functioning. This included an examination of each individual’s perception of their team’s goal and the importance of members reaching agreement on a mutually acceptable team goal. It also considered developing a plan to achieve the goal. There was discussion of how to achieve the goal, specifically what steps need to be taken and what resources and capabilities are needed to accomplish the steps. There was also a discussion of problems related to implementing a plan and how each might be addressed.

Individual goals for participation were considered in terms of what different team members hope to gain from their participation. Fulfilling these aspirations can be an important source of member satisfaction. Team member roles were also examined in relationship to each team’s plan as well as the resources and capabilities needed to carry out the plan.

Finally, there was a discussion of how the preceding considerations can be incorporated in a “team charter.” The issues covered in such a charter - the team’s goal, its vision, its core values, and its operating principles - were discussed and each team was to develop a charter on their own. The discussion closed with an examination of what was accomplished and what remained to be accomplished as each team continued to develop into an effective operating unit.

## Workshops for Dissemination

Dieruff High School and STEM teacher Chad Neff gave a tutorial on the “Design-First with Java” curriculum at the National Academy Foundation conference in July, 2005.

Fellow Sally Moritz and Co-PI Glenn Blank organized the first meeting of the Lehigh Valley Computer Science Teachers Association, at Lehigh University, in April 2006. About 25 high school and college teachers attended. Four of the six talks featured Fellows Sally Moritz and Chris Janneck, Glenn Blank, and STEM teachers Chad Neff and Donald Stahl discussing their experiences and products developed in connection with this project. One result of this meeting was that Whitehall High School teacher Jeffrey Lear agreed to have Dr. Blank’s team bring the first week of the design-first curriculum to his Java class in January 2007, which helped Dr. Blank’s students gather data to evaluate the DesignFirst-ITS (intelligent tutoring system).

Blank, G., Moritz, S., Parvez, S. and Wei, S. A ‘Design-First’ Curriculum and Eclipse Tools, a tutorial presented at *Conference for Computing at Small Colleges*, Mary Washington College, October 2006. Sally Moritz led this tutorial for college and high school teachers.

Co-PI Glenn Blank led a workshop introducing Object-Oriented Programming in Java was held in the East Career and Technology Center in Memphis, TN , March 14-15, 2007. Professor Linda Sherrill helped to make the arrangements and invited students at high schools associated with a GK-12 program at the University of Memphis. Twelve high school students participated in the workshop; six were African-Americans and six Caucasian, four were females and eight male. Multimedia introduced object oriented concepts and guided them through practice exercises modifying two Java graphics-oriented projects in Eclipse IDE, creating objects and manipulating them with methods, then modifying a constructor and methods to draw scene of a sun setting next to a house. In the second day of the workshop, students a step-by-step procedure for designing a class diagram given an instructor’s prose problem description, then designed a class diagram for a Movie Ticket Machine. As they created the class diagram in our novice-oriented LehighUML plug-in, the DesignFirst-ITS provided hints based on their actions. All of the students successfully created a valid class diagram for the problem. The data from the workshop helped to evaluate the student model of the DesignFirst-ITS. The accuracy of the student model is represented by average correct diagnostic rate. The analysis result from the student data in the work shop showed that the student model has an accuracy of 88%.

After the Object-Oriented Programming in Java workshop, Dr. Blank presented a seminar about the intelligent tutoring system to the Computer Science Department at the University of Memphis. The seminar closed with a discussion about the ITEST Launch-IT and GK-12 LV STEM projects. Dr. Blank also gave similar talks at the University of Massachusetts and Worcester Polytechnic Institute in December 2006, and the University of Pittsburgh and Ramapo College of New Jersey in April/May, 2007.