Providing and Evaluating Instructional Multimedia Institutes for Science, Mathematics and Technology Educators

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Abstract

This paper describes a series of two-week summer institutes for college faculty and secondary school teachers of mathematics, science, and technology. National Science Foundation funding provides stipends for forty educators to learn how to use several website development, screen capture, and multimedia software packages. Participants create interactive Multimedia Learning Activities for use in their classes, and agree to attend two-week institutes in two consecutive summers.

Keywords: multimedia, NSF, evaluation, Dreamweaver, Authorware, PhotoShop, JavaScript

1. INTERNET AND MULTIMEDIA TECHNOLOGY PROGRAM

Beginning in 1999, an Internet and Multimedia Technology (IMMT) program providing three associate's degrees and several certificate programs was created at the Community College of Baltimore County, Essex campus as described in (Sorkin, Mento, Harmeyer 2000) and (Sorkin, Tupper, et al 2003). In September 2002 National Science Foundation funding was awarded for a three-year project with these goals: development of a new Instructional Multimedia certificate program for inservice educators; organizing an annual Internet and Multimedia Technology conference; creation of a digital audio/video computer

production studio; providing two-week intensive instructional multimedia institutes for 40 secondary teachers and college faculty (with half returning from the previous summer and half new participants) in science, mathematics and technology fields. In July 2003 the first such institute, called *Teaching with Instructional Multimedia in Mathematics, Science and Technology* (TIM^{2}S), was provided for 39 participants, with instruction provided by six faculty from the IMMT program, with assistance provided by two IMMT students.

These secondary school educators and college faculty participants had indicated their desire to employ multimedia elements in their science, mathematics, or technology classrooms. In addition to teaching the computer skills necessary to create, modify, and maintain multimedia presentations, we aimed to promote the intelligent use of these activities and the opportunities they present. In particular, multimedia presentations and activities can be used to clarify and visualize abstract concepts, to provide opportunities limited by physical and/or safety concerns in the classroom, and to accommodate various learning styles. The expectation was that each participant should create a classroom website and a multimedia learning activity, using Macromedia *Flash* or *Authorware*, for classroom use.
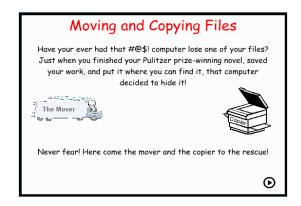
2. TOPICS COVERED IN THE INSTITUTE

Faculty and participants met for seven hours per day for two weeks, with an optional eighth hour for extra help from faculty. Figure 1 shows the schedule for the first day. This was typical of the entire first week of the institute, which was very labor intensive for both the faculty and the participants.

The main topics covered for participants in their first summer were Macromedia *Dreamweaver*, *Photoshop*, *Flash,* and HTML and JavaScript basics. However, participants were also introduced to copyright law, ADA guidelines, FTP, digital cameras, web animation, *PowerPoint*, and TechSmith *SnagIt.* In their second summer participants began using *Authorware*, *Fireworks*, *Shockwave* and *Camtasia's Production Studio.* Although we do have hands-on exercises on each of these topics

that are worked on while we are in the lab, participants still felt overwhelmed by the pace. Their concerns did subside during the second week, which is devoted to creating their Multimedia Learning Activities (MLAs). Figure 2 illustrates two MLAs that participants created, *Moving and Copying Files*, and *Box and Whisker Plots*. All MLAs created by participants are available online at (Harmeyer 2004) for educational use.

Dreamweaver topics covered included a basic introduction, images, image maps, rollovers, navigation bars, forms, frames, website management and how to ftp. *Flash* topics included creating graphics, symbols, movie clips, motion tweening, shape tweening, using layers to perform multiple simultaneous animations, inserting buttons for interactivity, basic introduction to ActionScript to control playback of the movie, and how to publish their movie and create a web page for it. *Photoshop* topics included creating animated gifs, creating buttons with rollovers in Image Ready, cropping images, using filters to create visually simple graphics (for when photo realism becomes distracting), drawing objects, illustrating in *Photoshop* to enhance images, saving as JPG, PNG, and GIF and making selections, adjusting color, using Layers, History, and Styles. JavaScript topics included basic form handling, for loops and conditionals. These topics were introduced in the form of self-grading tutorials that participants could modify to use in their own classes.

We found that flexibility was the key in teaching a labor-intensive institute like this. Although we posted an hourly schedule of topics online at (Harmeyer 2003), we found out on the first day of the workshop that people in our advanced group did not need a review of *Dreamweaver*'s introductory topics. They were able to start with rollovers, navigation bars and image maps. They needed only a brief review on how to ftp their work to the server. This gave us more time to cover *Flash* and introduce *Camtasia's Production Studio*. Similarly, the beginning participants felt we were covering material too fast and requested more time, especially for *Flash*. During our two-week session, the schedule was modified five times. Although we were initially concerned about the apparent lack of organization, the
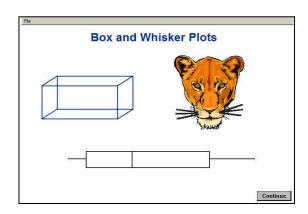
Figure 2. Multimedia Learning Activities created by TIM²S 2003 participants. Left to right, *Moving and Copying Files*, which animates how to perform these operations on a computer; and *Box and Whisker Plots*, which provides an example and defines associated terms.

participants were actually very appreciative of our willingness to adapt to their needs (or desires) on such short notice. For the 2004 summer institute, we will ask returning participants to send us a list of topics they wish to work on so that we could be better prepared with our handouts.

3. EVALUATING THE 2003 INSTITUTE

Results from the daily formative and overall summative evaluations used during the TIM²S 2003 institute are in (Sorkin, Tupper, Harmeyer 2004). In addition, participants were surveyed by mail by the project external evaluator approximately six months after the conclusion of that institute. This gave the participants enough time to use material they gathered from the summer institute in their own classes. Figure 3 contains the Evaluator Questionnaire part of the survey instrument. The second part of the survey contained a list of software topics covered in TIM²S 2003, and asked participants which topics they had used during the school year, and which ones they needed more practice with for efficient use.

There was a 74% return rate (29 of the 39 TIM²S 2003 participants) for this survey by outside evaluator (Cinaglia 2004). Those who responded felt that *Dreamweaver* and *Flash* were the two most valuable and/or useful sessions they attended. When asked which TIM²S software topics they used during the school year, 12 or more of the 29

respondents listed these: digital photo/scanning, creating a website, *Dreamweaver*, using existing graphics from Math/Science web resources, *Photoshop Elements*, FTP, *SnagIt*, and *PowerPoint*. As shown in Figure 4, when asked which sessions they needed more practice or instruction on to use effectively, the most frequently selected topics were Advanced *Flash*, JavaScript, *Authorware, Fireworks*, *Shockwave*, and creating graphics. This information provides us with a valuable starting point in planning for the TIM²S 2004 institute.

4. CONCLUSION

Science, mathematics and technology educators participating in the two-week TIM²S 2003 summer institute have found Macromedia *Dreamweaver* website development software and *Flash* animation software to be particularly valuable for creating their own websites and multimedia learning activities for classroom use. They have indicated that they need more practice in the use of JavaScrip*t*, advanced *Flash*, *Authorware, Fireworks*, *Shockwave*, and creating graphics. This will be provided when they attend their second TIM²S institute in 2004.

5. ACKNOWLEDGEMENTS

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Teaching with Instructional Multimedia in Mathematics, Science and Technology
(TIM²S)
2004 Winter Survey

Name: _____

School District/College: _____

Position:_____

Subject(s) taught:_____

Grade(s)/level(s) taught: _____

Year(s) associated with the CCBC TIM²S program: ____2003 only _____both 2002 & 2003

How did you learn about the TIM²S Institute? _____

My work during the school year has required me to use ADA
(Americans with Disabilities Act) guidelines.   ____yes ____no

My work during the school year has required me to address copyright issues. ____yes ____no

I have shared what I learned at TIM²S with other teachers/faculty at my school. ____yes ____no

  If "yes:" list topic(s)_____

I have used the Multimedia Learning Activity (PLP) I created this summer. ____yes ____no

  If "yes:" in the following class(es)_____

I have used PLPs, available on the CCBC website, that other participants
 have created.   ____yes ____no

  If "yes:" cite names/topics of PLPs used:_____

_____
_____

The Science, Mathematics and/or Technology websites I used with my class(es) this fall include:
_____
_____

Have your students been affected by your use of these new materials? ____yes _____no
  If "yes:" state student reaction:_____

_____

CCBC Essex will host an Internet, Multimedia and E-Business Conference on June 24-25, 2004.

I intend to participate in the June conference as a presenter.   ____yes ____no

I intend to participate in the June conference as attendee.   ____yes ____no

The most valuable/useful sessions this summer were:_____

  If you have feedback that would benefit future sessions please include that on the back of one of

the survey sheets or on another paper in printed or word-processed form or email to me at

Cinaglia@rowan.edu   February 2004

Figure 3. Survey distributed to participants six months after the TIM²S institute.

TIM²S 2003 Topics	Used during this 2003-2004 school year	Need more practice/ instruction to use effectively
Digital Photos/Scanning	16	2
Create website	18	4
Dreamweaver	15	4
Tables & forms in Dreamweaver	13	2
HTML	11	7
Math and Science Web resources	9	2
use existing graphics	13	1
use existing sound files	7	1
use existing videos	7	1
use existing animations	10	1
Graphics with Flash	9	6
Flash animation	10	9
Advanced Flash for Learning Game	4	12
Photoshop	10	6
Photoshop elements	12	5
FTP	13	5
JavaScript	6	13
Self-grading online quiz	8	4
Using advanced features of email	10	7
Using 3DMeNow for Web Animation	3	7
Authorware	4	12
Using SnagIt for image capture	17	4
Capture video	4	8
Create video	4	11
Capture audio	8	10
Create sound files	8	8
PowerPoint	21	1
Advanced PowerPoint	17	4
Fireworks	2	16
Shockwave	3	13
create graphics	7	12
create animations	6	11

**Figure 4. Responses from 29 of the 39 TIM²S participants
to the software use portion of the survey.**