# TECHNOLOGY INTEGRATION IN A SCIENCE AND MATHEMATICS METHODS COURSE: ADDRESSING VIRGINIA'S COMPUTER/ TECHNOLOGY STANDARDS OF LEARNING

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The Standards of Learning for Virginia Public Schools [1] require a high level of knowledge in the use of computers and technology on the part of both students and educators. The Education Department at Mary Washington College has decided to prepare its students to meet this challenge by adopting a strategy of program wide integration of technology, bringing appropriate uses of technology into each education course. This strategy calls for the use of technology by both students and instructors. The course *Instructional Skills in the Elementary Classroom*, a science and mathematics planning course, served as a proving ground for this approach. The integration of technology in this course includes the use of presentation software, spreadsheets, mathematics and science content software, the evaluation of World Wide Web-based resource materials, and a course web page. Halfway through the third semester of this integration experiment, we believe the integration approach to be a proven success. The students enrolled in the course have become enthusiastic users of technology, carrying the skills into other courses and student teaching, and they view the acquisition of these skills as an integral and important aspect of their preparation for teaching careers.

## Introduction

The Virginia Computer/Technology Standards of Learning (SOL),[1] adopted in 1995, require a high level of knowledge on the part of both educators and students in the educational use of computers and associated technology. These Standards appear as lists of skills that students must possess by: the end of the third, fifth, and eighth grade, and by the end of course (prior to graduation.) A separate list of Computer and Technology Skills for Instructional Personnel [2] has also been developed by the Commonwealth of Virginia.

As Virginia's public schools focus on the knowledge and skills listed in the Standards, the Commonwealth's Schools of Education have begun, as well, to implement plans for preparing their students to meet the demands of the Standards. Virginia now requires that graduating education students must possess the knowledge and skills set by the Standards by the year 2002.

In this paper we briefly describe the model the Department of Education at Mary

Washington College (MWC) has developed to prepare its graduates for the Standards of Learning, with a focus on the education course dealing with instructional skills in mathematics and science for the elementary classroom.

## Mary Washington College Department of Education Technology Integration Program

Efforts aimed at preparing future teachers in the educational use of computers and technology have ranged from developing a single course focusing on the use of technology in education [3, 4], to providing education students with their own laptops [5]. While a review of the literature suggests that the former approach is still predominant, education departments are attempting to develop new models [6]. The approach taken by Mary Washington College is that of program wide integration of technology. This model calls for the meaningful integration of technology in each education course. Rather than simply providing our students with training in word processing, the use of spreadsheet and database software, and other skills, the use of technology is closely linked to the objectives of the course. Students learn the skills in an educational context and they learn by seeing the use of the particular technology modeled by the instructor and utilized in day to day teaching. If an assignment requires the use of technology, the use must be meaningful rather than serving as a vehicle to teach some computer skill.

## Instructional Skills in the Elementary School – EDUC 300

The course Instructional Skills in the Elementary Classroom serves as an example of the application of the program-wide integration of technology. This course, enhanced through collaboration with the NSF-funded Virginia Collaborative for Excellence in the Preparation of Teachers (VCEPT), has served as a testing ground for developing new approaches to the teaching of science and math in the elementary classroom. In this course, students focus on the planning and implementation of innovative science and mathematics lessons, developing skills that will prepare them not only for teaching these subjects, but providing them with models for planning and teaching that are transportable to other content areas. This course was one of the first MWC education courses to implement the new technology integration model. The length of this report precludes a detailed description, but examples may be accessed through the course web page [7], much of which is available to the general public.

**Integration of technology in Education 300**

As with all Education courses at MWC, the integration of computer technology in Education 300 focuses on meaningful educational applications and the demands of the Virginia SOLs. The following brief descriptions provide a summary of how several aspects of computer technology are integrated into this elementary level mathematics and science planning course.

1. Course Web Page – While the role of a course web page is still developing in EDUC 300, current use focuses on two areas: an electronic discussion forum, and the posting of students' work for class-wide dissemination. Student responses and reflections, formerly only available to the instructor, can now be posted for the entire classes reading and response. This is especially meaningful in the posting of student's evaluations of educational science and mathematics web pages. Active links in the student's evaluations allow readers to instantly access the page being evaluated. The electronic forum allows a threaded discussion of class work, including assignments and practicum teaching experiences.

2. Presentation Software – Presentation programs, such as PowerPoint and Astound, serve as powerful alternatives/accessories to the use of the board or overhead projectors. The use of presentation software by the instructor provides students with models of meaningful integration, while requiring that students develop their own use of the software in groups provides the opportunity to learn the skills needed to develop their own presentations.

3. Spreadsheet Software – Spreadsheets provide an excellent tool for developing data tables, charts, graphs, and data analysis skills. These programs allow students to make decisions regarding the construction of tables and graphs and to quickly see the results of their approach. Data can be easily formatted and re-formatted, and the type of chart or graph can be easily modified.

4. Content Software – A great deal of content software is available, as commercial (sometime expensive) software, shareware, and public domain freeware. These programs can provide a vast range of educational applications, but, without consideration as to integration in daily planning, are of little value. Class efforts focus on the evaluation of these programs in terms of educational applications and in terms of valid classroom use.

## Conclusion

Perhaps the best evidence for the success of our approach is seen in our students' effective use of many of these techniques in other courses and educational settings. Often, this use is to fulfill another course's use of technology integration, but frequently the students will also apply these integration techniques in areas where no such technology use is required. This is especially heartening in the area of student teaching, where the student teacher might serve as the technology innovator, bringing skills to her or his cooperating teacher.                      ■

## References

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