

INCORPORATING BLOGS INTO THE SYLLABUS: MAKING THEIR SPACE A LEARNING SPACE

RICHARD GLASS

MARSHA SPIEGELMAN

Nassau Community College, Garden City, New York

ABSTRACT

The growth of online resources and the advances Web 2.0 technology are changing the information landscape and impacting teaching and learning. While information literacy has been recognized as a critical component of undergraduate learning, little if any discipline-specific research is done in the lower division mathematics/computer science courses during the first two years of college. The authors of this article collaborated on an instruction project that used course blogs as a new methodology to enhance faculty-student interaction geared to the millennial student. The project, which integrated expository research in core and major mathematics/computer science courses with information literacy learning outcomes, extended the traditional classroom as well as the roles of the participants.

INTRODUCTION

The growth of online resources and advances in Web 2.0 technology are radically changing the information horizon and impacting teaching and learning. The 2006 report from the New Commission on the Skills of the American Workforce emphasized the need for greater technical skill, critical thinking, and information literacy for the millennial generation. "Today's economy demands not only a high level competence in traditional academic disciplines but also what may be

called 21st century skills” [1]. In the authors’ experience prior to the Internet, research meant hours browsing the stacks, picking up books, and examining periodical indexes to locate appropriate citations. Papers in journals and treatises in books were found by asking the librarian for assistance. Even left to their own devices, the information seekers were assured of the validity of research sources in libraries. With online resources, the model has changed to non-mediated end-user searching that requires new skills for the undergraduate.

As early as 1998, the Association of College and Research Libraries (ACRL) recognized the importance of information literacy and formulated the national standards of know, find, evaluate, use, and ethics [2]. Today, undergraduates are faced with an ever-growing knowledge-base of information and increasing number of portals from which to find it. “Born with the chip” [3], not knowing a time when there was no Internet, current students turn to the Web as their primary resource, unaware of or unfamiliar with subscription databases. The assumption that they know how to effectively use the technology, however, cannot be applied with any degree of certainty. The 2006 Educational Testing Service (ETS) pilot survey on Information and Communication Technology Literacy determined that of the 1,400 students studied, only 40% entered terms to narrow a search. Similarly, only 50% used a strategy to minimize irrelevant results in a large database. The ETS findings also indicated that “few could accurately adapt material for a new audience” [4].

The specific skills needed to locate and evaluate information are generally introduced in the lower division composition, humanities, and social science courses. For those in other disciplines, however, the experience has been somewhat different. Leckie and Fullerton found that “it is quite possible for science and engineering undergraduates to avoid the library, if not completely, at least until relatively late in their educational experience” [5]. McGuinness noted that Cannon discovered a greater tendency among Arts and Humanities faculty to invite a librarian to instruct their classes, than among Mathematics and Statistics faculty [6]. And yet, the study of history of mathematics allows students to comprehend mathematical thought and “appreciate its dynamic nature” [7]. Alvarez observed that, “even in the most advanced and abstract mathematics courses, we should include readings that show how and why the subject evolved. In every era, it is possible to find mathematicians whose writings present mathematics as a fascinating social phenomenon” [8]. Clearly, the research shows it is important to find a way to add expository/history-based research assignments into lower division mathematics and computer science courses that stress information literacy outcomes and thus address the findings of the ETS.

COLLABORATIVE MODEL

All the while, educators such as Grafstein have stressed the importance of interdisciplinary collaboration, noting that librarian and classroom faculty should

partner in research instruction “so that each teaches the skills that their credentials and background best qualify them to teach” [9]. This prompted a dialog between Dr. Richard Glass, Department of Mathematics, Statistics, and Computer Science and Prof. Marsha Spiegelman, Reference Librarian, both of Nassau Community College. During a presentation on Information Literacy, Spiegelman not only presented the standards of Information Literacy but also expressed concern that the usual “one-shot” library instruction session did not provide the requisite research skills students needed to complete research assignments effectively as well as to retain and reapply them, especially in discipline-specific inquiry. Dr. Glass reaffirmed Cannon’s view that the Mathematics and Computer Science curricula shied away from research assignments.

To answer all of these concerns and reach the millennial student, the authors decided to form a collaboration that employed Web 2.0 technology. After investigating several applications, Glass and Spiegelman decided to employ blog software for this project. They developed short, interesting, exploratory research assignments in the area of mathematics and computer science that would allow students to develop information literacy skills within their fields while at the same time, offer an opportunity to write about the content of their discipline in a public forum. According to Anson, such assignments, which create a stepping stone to more formal and complex papers, are easily adaptable to an electronic environment for sharing and discussion [10]. A concurrent goal was to use the blogs as a virtual contact zone [11] among reference librarian, mathematics instructor, and students; the authors as faculty could aid, assist, and lead the students to identify the key resources and more so, evaluate them in terms of authenticity. The authors note that this type of collaboration may be forged among faculty from the same or different disciplines when traditional team-teaching modalities are limited or impractical. In fact, Thomas Friedman identified interdisciplinary thinking as the key to innovation in this century [1]. It is the researchers’ conjecture that this collaboration will help correct some of the negative findings as reported by the ETS and provide the students with strong research skills in their field of study prior to upper division courses.

METHODOLOGY

As Glass and Spiegelman developed the methodology, they realized that the project required more than just assistance from the reference librarian. The librarian had to become what Ramsay and Kinnie referred to as an “embedded librarian” who could “reach outward to become an integral part of the routine interactions of faculty and students” [12]. For this to be a true collaboration, first, it was necessary for the mathematics professor to identify expository research topics within the syllabus. Then, the information literacy sessions would focus on both the resources the students had available to them through the Internet and those tools available through subscription databases. Spiegelman and Glass

realized that the *one-time, typed paper* would not do. Students had to get it right or, revise it until it was right, and see why it was right. It was essential that they understand the relationship between peer-reviewed articles and free information sources and be adept at evaluating the latter. If the learning were to be interactive and on-going [10], it had to be progressive and complete. To coax and lead students to the connection, the authors decided to have the students post their assignments on a blog so that they could answer questions and provide hints both publicly on the blog and privately through e-mail. The authors understood that blogs were uniquely suited to millennials and offered a venue for those who did not feel comfortable participating in class [13]. Additionally, Glass' prior experience with students in Webpage development courses coincided with Brownstein and Klein's observation that material posted on the Web "has a wider audience than just the teacher and they elevate their personal expectations for the quality of their posts as a result" [13].

IMPLEMENTATION

During the 2006/2007 academic year, four courses were used, two in the fall and two in the spring. There were fall and spring sections of Calculus 3, a fall section of Assembly Language and a spring section of Computer Architecture. There were four students common to a calculus course and a computer science course while the same core of students took the third and fourth semester Computer Science course. The authors made use of the free blogging software available at Wordpress.com (<http://wordpress.com>). The Calculus 3 course blog spanned the two semesters. All class sizes were approximately 10 to 15 students. Students were given a choice of using their own name or a pseudonym (screen-name) for their posts. This allowed them to remain anonymous via the Internet but known to their peers within the class. The software was configured so that the students were added as *contributors* to the blog which allowed them to add and create posts. All comments were moderated. This was done to prevent spam and/or vandalism by third parties. Both authors retained administrator privileges. Students received credit for completing the assignments and providing proper citations.

Sample Assignments

In computer science, algorithms are sometimes attributed to a person, place, or occurrence. Such topics have a duality to them. One part is the actual algorithm and the second part requires the student to research the legend, person, or place that is contained in the name. Two examples are *the Sieve of Eratosthenes* and *the Towers of Hanoi*. History of Mathematics topics were also a good source of assignments because often what is lost in mathematics courses is the humanity. Mathematics becomes a series of sterile equations on a blackboard when in fact, nothing is further from the truth [7]. One such project was a multi-part assignment

in which students were asked to make posts and then use their peers' posts for additional discussion. By requiring the students to read each others' entries, they shared knowledge and learned from each other. Discipline-related terms and tangential topics provided a source for postings and discussion that added depth and interest to the course. By assigning different topics to different students, all benefited from the research while still allowing time to devote to the coursework in the syllabus.

RESULTS

Positive outcomes of course blogs have been identified by Ferdig and Trammell [14]. They point out that students can become "subject-matter specialists," feel more closely tied to the learning process, and have greater opportunities to be actively involved. Brownstein and Klein break down the characteristics into three categories; those that affect the class, those that relate the individual student and those that pertain to the faculty. Among the outcomes for the class are "extension of knowledge, collaborative relationships, diverse perspectives, peer to peer interactions and voice to all." For the individual student, they highlight "reflection, shar[ing] data, commentary and constructing understandings." Faculty benefit professionally and personally as well [13]. In the authors' experience, the positive outcomes of blog interaction overlapped and at times benefited two or more of the above categories. Our results, which mirror many of the attributes identified above, were positive and informative.

For the Class

For the class, the blog provided a platform from which students could learn from each other as they shared their research and ideas. By enhancing communication, the blog increased the dialog among all involved. Students extended the curriculum by posting on related topics or commenting on tangential subjects mentioned in class. Use of the blogs generated several spontaneous discussions. In the Assembly Language course one question raised was whether an ill-formed program can cause damage to a machine. One student, without prompting, started a thread on *Programming in Assembly "in the safety and privacy of your own home"* [15]. This post generated nine comments from both the instructor and students.

Another unexpected and constructive result of using blogs first appeared in the Assembly Language course. The students inserted animated Graphic Interchange Format (GIF) images into their posts to demonstrate the algorithms and enhance their work. One student posted an animated GIF showing how to solve the *Towers of Hanoi* puzzle [16]. Although animated GIFs were not new to the authors, their use in student research immediately showed the advantage of the electronic post. Now both the writing and an animated GIF of the solution could be shared

among those students who worked on other projects. With growing interest in impressing classmates, the blog fostered pride in work product that pushed students to go beyond minimum expectations. Shortly after an in-class comment on the *Towers of Hanoi* solution image, another student posted an animated GIF which graphically showed how the *Sieve of Eratosthenes* worked [17]. In these instances the blog provided “a way for students to individualize their content; thus help us rethink using technology to deliver content” [14]. Holzberg reiterated that students who publish material on the Web “often produce higher quality work than students who write only for the teacher . . .” [18]. This became apparent in the Calculus 3 course where the student who had posted the *Towers of Hanoi* solution in the prior semester computer science course, morphed together the four known images of Leonhard Euler [19]. Not to be outdone, another student created an excellent PowerPoint presentation in response to part 2 of the History of Mathematics project [20].

Blogs can also extend the classroom by inviting visitors to the blogosphere when further expertise is desired. Where an outside entomologist identified a particular bee in Lauer’s case [21], in this case a professor from another institution was invited to the blog to identify the actual birth date of a particular scientist in the assignment. After a student had found a discrepancy about a historical figure among suggested sources, a colleague from a neighboring university was asked to join the discussion. A noted scholar on Leonhard Euler, he was quite happy to post a comment that clarified the misstatements in what were recognized as scholarly sources [22].

For the Student

Brownstein and Klein observed sharing of data, reflection, and construction of understanding as a part of the student experience [13]. From the students’ perspective, posting on the blog gave them the opportunity to enhance their skills at data manipulation and presentation as was reported in their use of animated GIFs. In another instance in this project, the student who took theoretical concepts from one course and applied them as a practical solution to another course, reaped the personal reward of extending his knowledge and correct thinking within the subject field. With encouragement from the professor, both problem and solution were posted on the two course sites to be shared among students in both courses. From this Dr. Glass gleaned that his student received satisfaction in educating his classmates and so acknowledged the contribution by informing the student that this kind of work would be highly praised in the workplace. In another example, a student posted excellent information he had found about RSS readers and aggregators that extended the discussion of that technology beyond the classroom. That he had increased his own personal knowledge was clear, but more obvious was his enthusiasm and willingness to share his research with others in the group, including the professors [23].

The blog format allowed certain students to express themselves individually and contribute to the class in a format that was more comfortable for them. As observed by Pick and others in Brownstein and Klein [13], the format gave the class member an opportunity to participate in discussion and communicate his knowledge and abilities to the professor. The student who began a previously mentioned discussion on assembly language had contributed little in the face-to-face class meetings but was quite eager to explore the topic in an online venue. Numerous studies have shown that online discussion fosters such interaction. Jin's recent study "support(s) the contention that Web-based communication tools are effective means to help students construct their own knowledge through interactions" [24]. Paulus and Roberts suggest that "these environments may facilitate greater equality of participation because students do not have to compete with one another for the opportunity to speak" [25].

A higher standard of excellence on the part of the students was observed as another positive outcome of this project. Brownstein and Klein appreciated that students wanted their work to be correct [13]. In this online arena, they were able to easily correct the parts of their work that needed revision. One key component of this project was the correct use of resources, evaluation of sources, and correct citations. As students developed a rapport with the librarian, they felt comfortable asking for assistance and some communicated with the author on a congenial level [26].

For Faculty

For the faculty, the blog allowed the authors to develop assignments that students could revise until correct. This was especially critical in the areas of information validation and citation. Working for mastery was more important than getting a one-time grade. Additionally, the blog extended the contact zone of the librarian so that students felt more comfortable asking questions and getting feedback from another member of the instruction faculty. After the first round of posts, the authors discovered several instances of copy-paste plagiarism. The blog provided a simple mechanism to alert everyone in the class [27]. In some cases, students were e-mailed directly [26], while in others, general postings were made [28]. Prof. Spiegelman was able to identify instances where students did not properly validate their sources. After a student cited About.com, for example. Prof. Spiegelman was able to lead the student through an exercise in researching the criteria required to be an About.com guide [29]. This post generated additional research by the student in the form of comments; more importantly, this exercise in source validation was shared with the class.

This online vehicle allowed the course instructor to enhance the syllabus by moving discussions on ancillary topics or those "*we will get back to that*" topics

to the blog. Multivariable calculus is a mathematics-intensive course that is a gateway to engineering and applied mathematics fields of study. The tightly packed syllabus offered little room for the examination of classic problems and historical personages. On the blog, Dr. Glass introduced these interesting but tangential problems in a way that did not impact coverage of the actual syllabus. An anecdotal comment made by a student in the class expressed surprise and pleasure in the fact that one could do research in higher level math without calculations.

Another exciting if unexpected result for the authors was shared learning on their part. In one course a student uncovered a practical, current use for the classic problem (*Towers of Hanoi* used as a tape back-up scheme in industry) he had researched, while in another, a member of the class revealed an interesting mathematics-library connection. Although known for his work in prime number theory, the famous mathematician Eratosthenes was also chosen by Ptolemy III for the prestigious position of director of the Library of Alexandria [17].

DISCUSSION

Web 2.0 technology has opened the door for interactive collaborative teaching and learning. The authors have found that course blogs create unique environments where students and faculty learn and share. The ability to post and comment without the constraints of the traditional class hour provides the essentials of online learning, notably “timely feedback . . . clear guidelines for each class activity (and) . . . rich environments for interaction . . .” [24]. Both faculty and students had positive experiences which fostered a sense of community. Wang and Fang observed that their students felt the blog environment provided “support and encouragement in completing assignments” [30]. Quible found the technique to be a very successful method for introducing material prior to class and noted overwhelmingly affirmative reactions to course blogs [31]. The venue provided another outlet for students to demonstrate their knowledge and gave the faculty a multidimensional view of the students’ abilities. Course management systems such as Blackboard, may provide similar opportunities for this type of collaboration and its associated projects.

While no conclusions were made as to whether individual, semester-based course blogs or course blogs spanning multiple semesters were favored, eventually assignments will need to be repeated. It is interesting to note, however, that when asked at the end of the semester, students overwhelmingly preferred a course blog over an individual, personal one on which to post their work. Additional responses from this student assessment reflected keen interest in historical research and the blog modality.

RECOMMENDATIONS AND CONCLUSIONS

Considerations for the future include:

- Formulate an assessment matrix that quantifies attitudes and results.
- Train support staff in Web 2.0 tools.
- Create a rubric for grading substantive posts and comments.
- Make categories/tags to sort on assignments and individual student screen names.
- Have students comment on the research process as well as the blog experience.
- Create online video tutorials on blog signup, library database access Website evaluation.

Recommendations for those interested in using course blogs:

- Find an interested colleague and collaborate.
- Discuss the structure and goals of the blog to students.
- Explain the sign-in process through tutorials or a brief computer lab session with support staff.
- Create assignments that are enjoyable and easily researched.
- Incorporate reliable Internet sources with appropriate evaluation discussions as a starting point.
- Build a mechanism into the assignments that requires students to read all posts.
- Identify students who thrive in the online environment and encourage them to post first.

REFERENCES

1. Wallis C., & Steptoe, S. (2006, December 18). How to bring our schools out of the 20th century. *Time*, 128, 51-56.
2. Association of College and Research Libraries. (2007, May 16). Information literacy competency standards for higher education. Retrieved May 22, 2007 from: <http://www.ala.org/ala/acrl/acrlstandards/informationliteracycompetency.htm>
3. Abram, S., & Luther, J. (2004, May 1). Born with the chip. [Electronic Version] *Library Journal*, 129, 34-37.
4. Educational Testing Service. (2006). *2006 ICT literacy assessment preliminary findings*. Retrieved May 14, 2007 from: http://ets.org/Media/Products/ICT_Literacy/pdf/2006_Preliminary_Findings.pdf
5. Leckie, G., & Fullerton, A. (1999). Information literacy in science and engineering undergraduate education: Faculty attitudes and pedagogical practices. *College and Research Libraries*, 60, 9-29.
6. McGuiness, C. (2006). What faculty think—Exploring the barriers to information literacy development in undergraduate education. *The Journal of Academic Librarianship*, 32, 573-582.

7. Liu, P. (2003). Do teachers need to incorporate the history of mathematics in their teaching? *Mathematics Teacher*, 96, 416-421.
8. Alvarez, J. (2001, January 19). Loving math infinitely [Electronic Version]. *Chronicle of Higher Education*, p. B14.
9. Grafstein, A. (2002). A discipline-based approach to information literacy. *The Journal of Academic Librarianship*, 28, 197-204.
10. Anson, C. (2006, November 10). *Literacy across the disciplines*, keynote presentation Nassau Community College First Annual IDEAS Symposium.
11. Elmborg, J. (2006). Libraries in the contact zone: On the creation of educational space. *Reference and User Services Quarterly*, 46, 56-64.
12. Ramsay, K., & Kinnie, J. (2006). The embedded librarian. *Library Journal*, 131, 34-35.
13. Brownstein, E., & Klein, R. (2006). Blogs: Applications in science education. *Journal of College Science Teaching*, 35, 18-22.
14. Ferdig, R., & Trammell, K. (2004). Content delivery in the 'blogosphere.' *T H E Journal (Technological Horizons in Education)*, 31, 12-14. Retrieved June 7, 2007, from Expanded Academic database.
15. Dimitar. (2006, October 23). Programming in assembly "in the safety and privacy of your own home." *CMP 207 Information Literacy Blog*. Retrieved on May 21, 2007 from:
<http://glassr.wordpress.com/2006/10/23/programming-in-assembly-in-the-safety-and-privacy-of-your-own-home/>
16. Dimitar. (2006, October 12). Tower of Hanoi overview. *CMP 207 Information Literacy Blog*. Retrieved on May 21, 2007 from:
<http://glassr.wordpress.com/2006/10/12/tower-of-hanoi-overview/>
17. Tracey, J. (2006, October 12). Sieve of Eratosthenes by Tracey John. *CMP 207 Information Literacy Blog*. Retrieved on May 21, 2007 from:
<http://glassr.wordpress.com/2006/10/12/sieve-of-eratosthenes-2/>
18. Holzberg, C. (2003). Education weblogs. *TechLearning*. Retrieved May 8, 2007 from:
<http://www.techlearning.com/showArticle.php?articleID=12803462/>
19. Dimitar. (2007, April 8). Leonhard Euler, *Information Literacy Blog for MAT 225*. Retrieved May 21, 2007 from: <http://glassrcalc3.wordpress.com/2007/04/08/50/>
20. duncanis. (2007, May 1). Leonhard Euler: Modern notation in mathematics (ppt). *Information Literacy Blog for MAT 225*. Retrieved May 21, 2007 from:
<http://glassrcalc3.wordpress.com/2007/05/01/leonhard-euler-modern-notation-ppt/>
21. Trammell, K., & Ferdig, R. (2004). Pedagogical implications of classroom blogging. *Academic Exchange Quarterly*, 8, 60-66. Retrieved June 7, 2007 from Expanded Academic database.
22. Bernie. (2007, April 3). You can't always believe what you read. *Information Literacy Blog for MAT 225*. Retrieved May 21, 2007 from:
<http://glassrcalc3.wordpress.com/2007/04/30/you-cant-always-believe-what-you-read/>
23. Bernie. (2006, October 13). Receiving RSS feeds to the desktop. *CMP 207 Information Literacy Blog*. Retrieved May 21, 2007 from:
<http://glassr.wordpress.com/2006/10/13/37/>
24. Jin, S. (2005). Analyzing student-student and student-instructor interaction through multiple communication tools in Web-based learning. *International Journal of Instructional Media*, 32, 59-66. Retrieved June 7, 2007 from: Infotrac Onefile database.

25. Paulus, T., & Roberts, G. (2006). Learning through dialogue: Online case studies in educational psychology. *Journal of Technology and Teacher Education*, 14, 731-754.
26. Glass, R., & Spiegelman, M. (2007, May 9). *Paperwiki collaboration results*. Retrieved June 18, 2007 from: <http://paperwiki.pbwiki.com/CollaborationResults>
27. Spiegelman, M. (2007, April 4). Plagiarism gets somebody fired. *Information Literacy Blog for MAT 225*. Retrieved May 21, 2007 from: <http://glassrcalc3.wordpress.com/2007/04/13/plagiarism-gets-someone-fired/>
28. Spiegelman, M. (2006, October 30). Are your citations correct? *CMP 207 Information Literacy Blog*. Retrieved May 21, 2007 from: <http://glassr.wordpress.com/2006/10/30/are-your-citations-correct>
29. Spiegelman, M. (2006, October 23). Curious about "about.com." *CMP 207 Information Literacy Blog*. Retrieved May 21, 2007 from: <http://glassr.wordpress.com/2006/10/23/curious-about-aboutcom/>
30. Wang, J., & Fang, Y. (2005). Benefits of cooperative learning in weblog networks. ERIC Online submission (ED490815). Retrieved June 20, 2007 from ERIC database.
31. Quible, Z. (2005). Blogs: A natural in business communication courses. *Business Communication Quarterly*, 68, 73-76. Retrieved June 8, 2007 from Business Source Premier database.

Direct reprint requests to:

Richard Glass
 Nassau Community College
 Mathematics and Statistics
 One Education Drive
 Garden City, NY 11530
 e-mail: glassr@ncc.edu

Copyright of Journal of Educational Technology Systems is the property of Baywood Publishing Company, Inc. and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.