Engineering Librarians as Partners of Faculty in Teaching Scholarly Inquiry to Undergraduate Students through Curriculum Integration: The Biotextiles Product Development Course Blog

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Dr. Martin King joined the College of Textiles, North Carolina State University, as professor of Biotextiles and Textile Technology in September 2000 following over 30 years experience working in industry, higher education, the healthcare and government sectors in Canada and Europe. After graduating in Polymer Technology from UMIST, Manchester, U.K., he worked for Hoechst-Celanese in Canada and the British Ministry of Technology developing new polyester, nylon and carbon fibers. For over 25 years Dr. King has undertaken research at the intersection of biomaterials, implantable devices and textiles. Through his pioneering work he has coined the term ”biotextiles” to refer to implantable medical textile products. He completed his Ph.D. degree in Biomedical Engineering at l’Université de Technologie de Compiègne in France and for 28 years has been a full-time faculty member at the University of Manitoba in Canada. He is widely published with book chapters and research papers in peer reviewed journals in textile and polymer science, biomedical engineering, biomaterials and medical literature. Since 2005 Dr. King has been appointed chaired professor of Medical Textiles at Donghua University in Shanghai, China. For the last 20 years he has also been a visiting professor of Biomaterials in the Department of Surgery at Laval University, Quebec City, Canada. Dr. King is a member of the Society for Biomaterials, the Tissue Engineering and Regenerative Medicine International Society, the Fiber Society, the American Association of Textile Chemists and Colorists, the Textile Institute, and is a fellow of the Institute of Textile Science in Canada.

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Abstract

Group projects are frequently utilized in undergraduate course curricula at the NC State University College of Textiles to achieve a number of different learning objectives. WordPress blogs are one of the many Web 2.0 components that can be used by librarians in collaboration with faculty to enhance their students group learning processes. A WordPress blog is a web communication and collaboration tool that can be utilized to engage students in learning with others within a collaborative environment. This paper presents a case study of blog use within an undergraduate textiles engineering course curriculum that was the developed through a collaborative librarian-faculty partnership and examines literature on blog use in undergraduate education.

Introduction

A number of courses offered at the NC State University College of Textiles department of Textile Engineering, Chemistry and Science (TECS) involve complex multidisciplinary research from a wide variety of subject areas such as medicine, engineering, chemistry and business that challenge students to synthesize information from all of these areas in the new product development process for their student group final projects. During the spring semester of 2011, Dr. Martin W. King a faculty member at the NC State University College of Textiles TECS department who I have collaborated with over the past three years by providing library instruction to variety of his courses requested my assistance in redesigning the final project assignment for his Medical Textiles (MT 366) Biotextile Product Development course curriculum. Dr. King wanted to incorporate Web 2.0 technologies such as wikis or blogs into the final course project in order to increase the collaboration among his students within their groups and enhance their learning experiences. The use of Web 2.0 technologies such as wikis or blogs can provide several learning and collaborative benefits to students through opportunities for the student groups to interact with each other, with faculty and with industry experts who can offer comments after reviewing their blog pages [1]. Other benefits include increasing their writing skills, communication skills and providing an introduction to principles of web design by adding a digital element to their traditional projects and in-class presentations through the incorporation of text, images and streaming video from a variety of sources [2]. The use of Web 2.0 technologies can also provide librarians with opportunities to enhance faculty relationships. These opportunities are highlighted throughout this paper and include my collaboration with Dr. King in developing the final project parameters, evaluation and several in-class instruction sessions. Upon completion of the initial blog project Dr. King expressed interest in continued collaboration that has resulted in subsequent course blog projects in the spring semesters of 2012 and 2013 along with this co-authored conference paper based on the blog projects.

Use of Web 2.0 technologies in Undergraduate Education

The use of Web 2.0 technologies such as wikis and blogs in undergraduate education has coincided with the emergence of the social networking phenomena and the near ubiquitous presence of mobile computing platforms on smart phones and tablets [3]. Over the past five years several studies have been published examining the emergent use of Web 2.0 technologies in the classroom environment. Some of the earliest publications reviewed Chao's *Student Project Collaboration using Wikis* (2007), *Wiki as a Teaching Tool* (2007) and Heys' *Group Projects in Chemical Engineering Using a Wiki* (2008) featured case studies of wiki usage in undergraduate computer science and chemical engineering courses. These case studies were notable because they provided examples of advantages offered by the utilization of wikis over traditional paper/oral presentation formats for group projects [4], [5], [7]. Some of the advantages included:

- Providing instructors with a means of continually monitoring the progress of work being done by student groups,
- Providing a platform for archiving student group projects and making the content available for future classes, and
- Providing students with experience working as part of a virtual/web based team [4].

The case studies also noted several practical benefits such as providing an alternative final in-class presentation tool for student group projects that replaced conventional software such as Microsoft PowerPoint [5]. However despite the preponderance of positive use case examples provided in the studies several disadvantages were highlighted such as the time investment needs associated with setting up wikis, the potential for students to plagiarize by cutting and pasting information directly from websites into wikis and issues associated with students being intimidated by some of the complexity associated with the wiki software [4]. In addition to the wiki focused studies several recent case studies have focused specifically on the utilization of blogs to create interactive learning environments. Both Churchill (2009) and Braedner, Kapp and Years (2012) focused on outcomes associated with the integration of blogging technology into their course curricula and reported positive reactions from their students [2],[6]. The Braedner, et al. study also provided an extensive analysis of the WordPress blogging platform that included detailed technical guidance and useful frameworks for curriculum integration.

Technology Choices

A wide variety of options exists for starting a blog or a wiki as evidenced by the results provided in a simple "start a blog" or "start a wiki" Google search that retrieves an immense amount of information. One of the first questions that arose was whether we wanted to use a free Web-accessible wiki or blog that was hosted by another company, or if we wanted to utilize a wiki platform that was housed on our own NC State University server space. Of the variety of hosted blogs available, two of the most popular were Blogger.com (owned by Google) and WordPress.com [8]. Each of these sites allows you to create an identity, and to set up any number of blogs. Unfortunately, as with many free Web 2.0 solutions, there are functionality

and storage limits. Despite these limitations, a hosted blog was a great way to get started, and we found that this platform offered all the functionality required for this project. WordPress.com offered several advantages; first, the free platform on Word Press.com had a large number of professional looking templates and a user friendly administration dashboard [2]. WordPress also offered a stable host space where the blog could reside that was used for archiving group project content for our initial Biotextiles blog: http://biotextiles.wordpress.com/ (as shown in figure 1.) and was scalable to allow for the development of subsequent course blogs. Finally WordPress offered a wide variety of attractive and professional looking theme/templates such as the "Twenty Eleven": http://theme.wordpress.com/themes/twentyeleven/ theme used in the Biotextiles blog that were easily accessible and customizable.

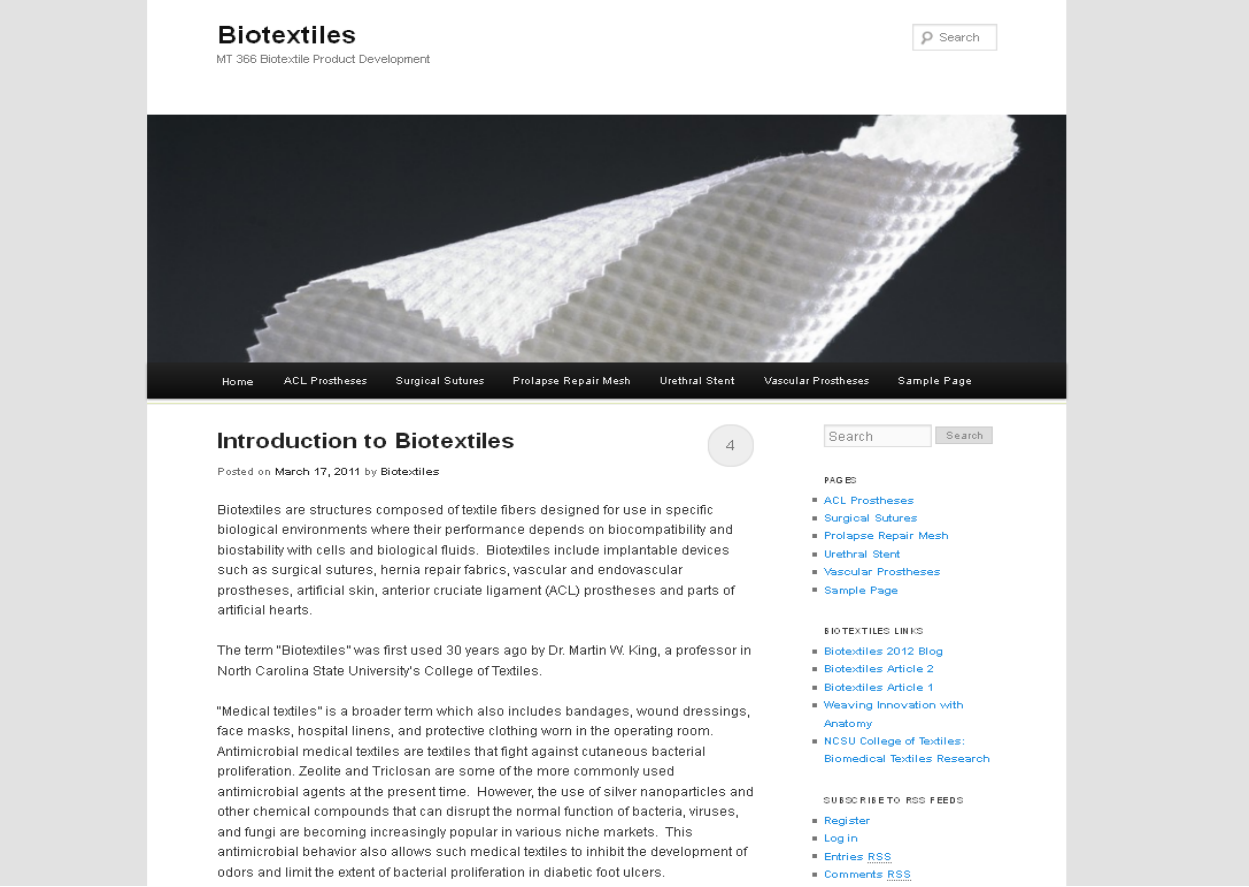

Figure 1: Biotextiles WordPress blog home page.

Creating a WordPress Blog

Developing the Biotextiles WordPress blog was a fairly simple and straightforward process. The first step actually involved going to Google.com and setting up a generic Gmail account that was used to register with WordPress.com. The next step involved signing up for a WordPress.com account which created a platform where the initial and subsequent Biotextiles blogs could reside. When signing up for the WordPress.com account we made sure to name the

account with a username that was related to the primary course subject area in this case "biotextiles" and we then selected a password. The next step involved creating an introductory blog landing page as shown previously in (figure 1) that contained information about the Biotextiles project, links to seminal research articles and Dr. King's Bio-Medical Textiles Research Group homepage at the NC State College of Textiles. A sample blog page was also created to provide the student groups with examples of correct formatting and placement for text, links, images, streaming video and citations. The final initial development step involved creating five blank individual blog pages for each group.

The next phase of the project featured an initial in-class instruction tutorial to Dr. King's MT 366 class where the username and password were given to all of the student project groups to provide access to their individual blog pages after speaking with each group and renaming the five blank individual blog pages with their project topics (as shown in figure 2).

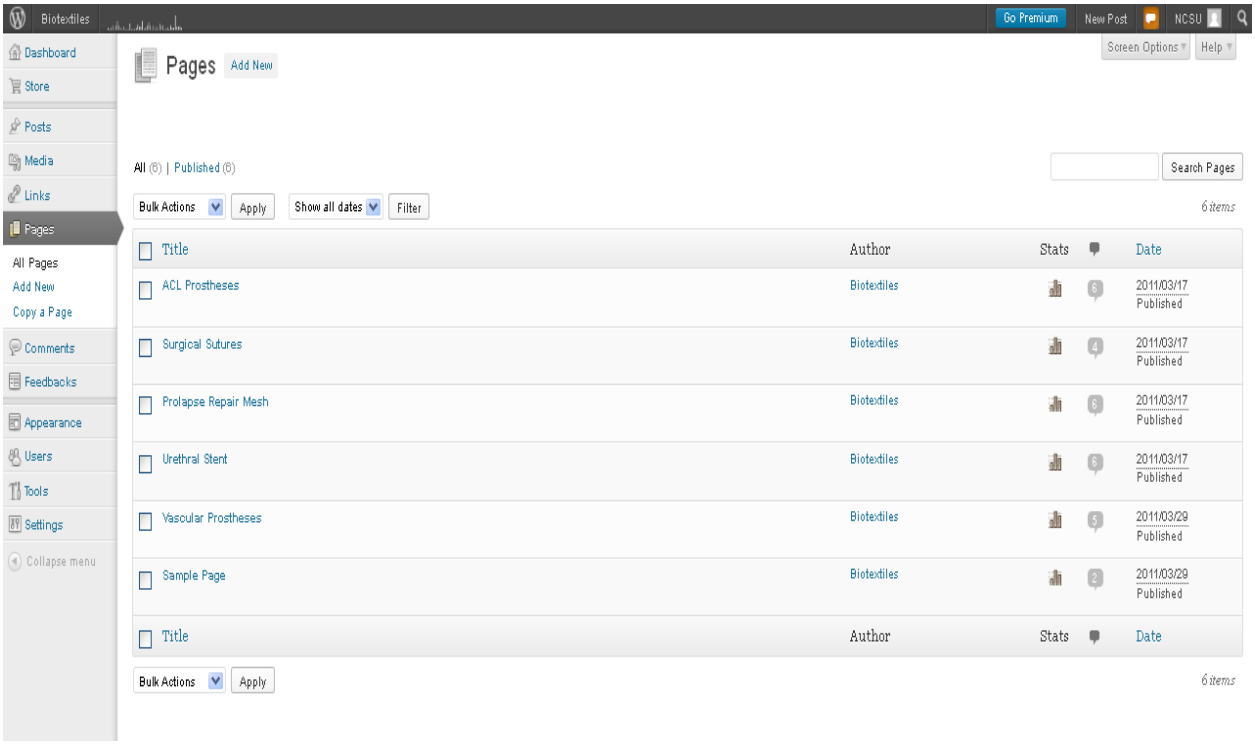

Figure 2: Biotextiles WordPress blog dashboard student group pages screen.

The in-class tutorial also included a demonstration of WordPress.com blogging platform features such as the WYSIWYG (What You See Is What You Get) editor to the student groups (as shown in figure 3) and live examples of the streaming videos and images on the sample blog page to show the full range of multimedia possibilities available (as shown in figure 4). An instructional handout was also developed and was provided to the student groups at the end of the tutorial. The handout contained images and detailed written instructions to assist students with the login process, navigating the main blog dashboard, editing their group project blog pages, posting comments to other group pages and posting comments to the main blog landing page. The in-class tutorial was followed up three weeks later with an in-class question and answer tutorial that addressed blog page formatting problems that were being encountered by several groups. I also

held several additional meetings with groups and individual group members in my Library office throughout the semester.

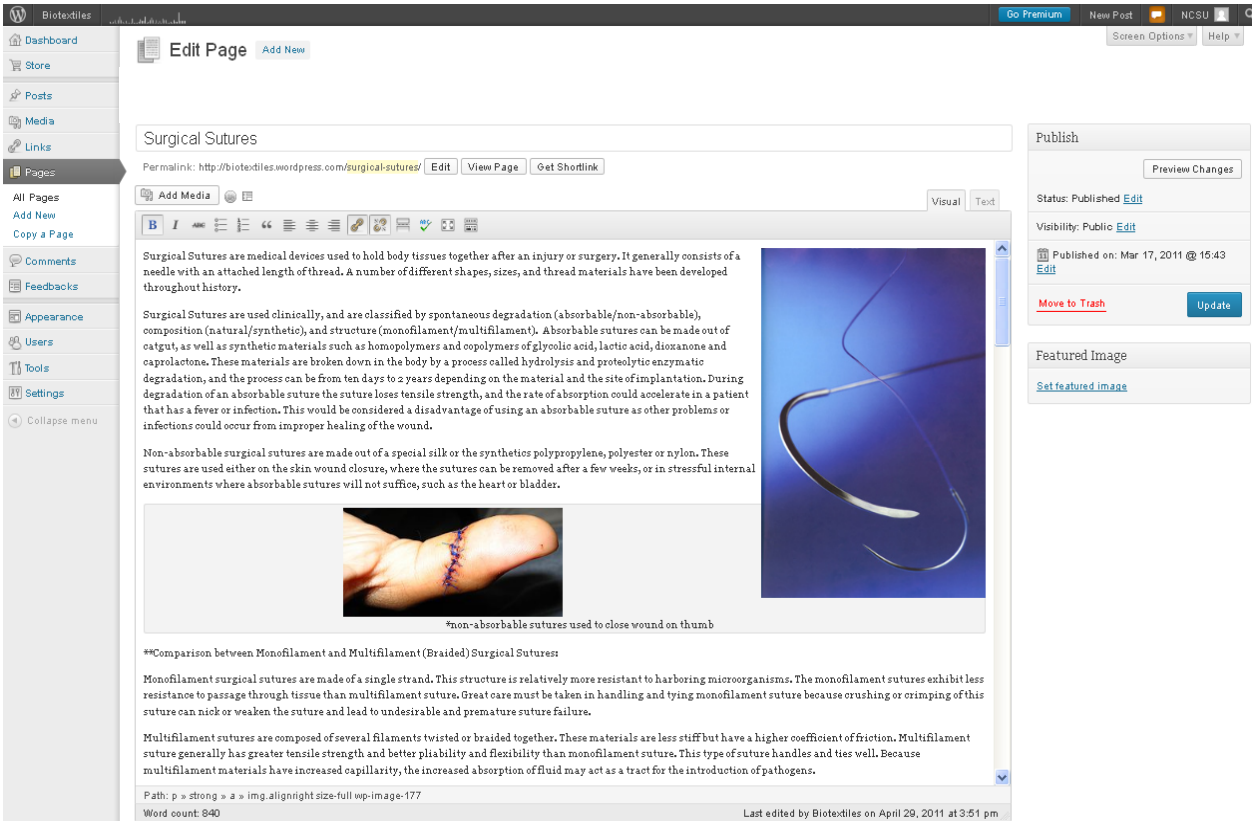

Figure 3: Surgical Sutures Student Project Group page editor.

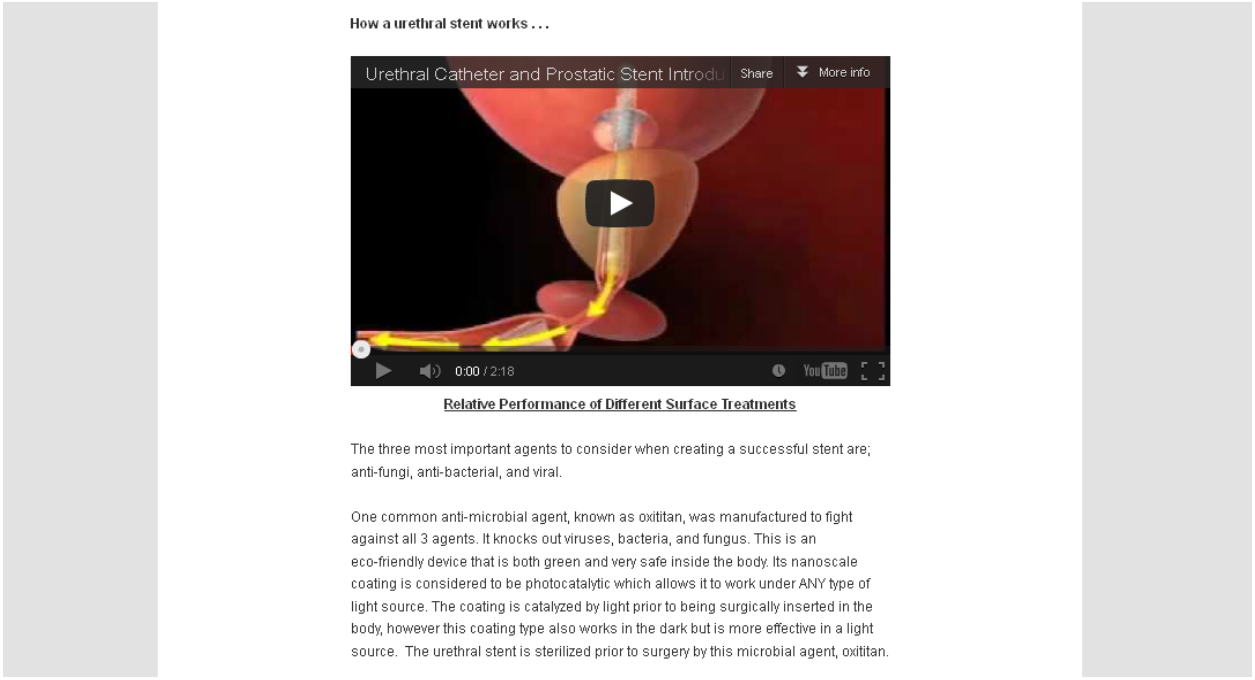

Figure 4: Multimedia content embedded in Urethral Stent student group page.

Course Project Goals and Objectives

In designing and planning this type of final group project, it was important to establish at the outset and agree on the expectations and goals for the assignment. Sometimes we call these "objectives", but we prefer to refer to them as "Student Learning Outcomes". For this interactive group project the expectation was that students would experience the following nine outcomes:

1. Learn about the collaborative and iterative process of creating a blog page on the topic of a commercial biotextile product.

2. Understand the various steps associated with the design and development of a commercial biotextile product from the inception through to clinical trials.

3. Have an enhanced level of understanding about creating a balanced, neutral blog page that generates new knowledge by identifying, sharing, revising and editing written and visual contributions in a collaborative, transparent editorial process.

4. Be able to undertake a comprehensive review of the research, technical, business, regulatory and medical literature using a range of different databases and research strategies.

5. Be more accepting of feedback from teammates, and be prepared to take all feedback into account when revising your work to improve their style and writing competency.

6. Be more open to consult others who have a different expertise and experience than your own, and to seek the honest opinions and criticism from others on your work in progress.

7. Have the satisfaction that you have contributed and distributed a new on-line publication about a commercial biotextile product, which may be of interest to members of the public, patients, healthcare providers, manufacturers and other students interested in biotextiles.

8. Better understand the proper use of scholarly secondary sources of information, and be able to build a valuable resource list of precise and accurate sources of reference.

9. Recognize the importance of writing and editing the blog page in a timely manner, and meeting the deadlines for the intermediate steps to be undertaken each week.

Evaluation

For practical and administrative reasons the blog writing assignment was divided into four discreet and iterative steps. Step one involved each of the five teams of students researching and reviewing relevant medical, engineering, regulatory and business journal articles, identifying commercial websites and health promoting webpages that described the disease state, the type of injury, the patient cohort, alternative types of therapy, surgical operations and patient outcomes associated with a particular type of biotextile product. This included writing text, copying illustrations and video clips that explained how the biotextile device is used and posting all this information on the blog page. Students found a variety of different devices to focus their attention on, including surgical sutures, prolapse repair meshes, vascular prostheses, anterior cruciate knee ligament prostheses and urethral stents.

Once the initial WordPress page was uploaded, the second step was to ask the other four teams of students to review and evaluate the blog pages and post their comments on the content, style and approach of each of the other blogs. This gave each team an initial layman's reaction to the clarity, readability and usefulness of the posted information. Each team was then expected to respond to the comments by revising and/or adding to their initial WordPress page.

In the third step the students were asked to contact an expert in the field to evaluate their revised blog and to get a more technically discerning and independent commentary on their work. The difficulty here was to find the appropriate qualified person who was available and who would have the time and interest to undertake the blog evaluation and post his or her comments in a timely fashion.

The fourth and last step involved the instructors who also reviewed and evaluated the revised blogs. The instructors' comments, which included both creative and technical aspects of blog page development, were also posted and led to the annotation "Final Version" being indicated at the bottom of the blog page. This led to the final evaluation of the teams' work and achievement using the following criteria:

a) The look and feel of the Web 2.0 blog page. Is the theme informative and attractively presented?

b) Is the explanation of the sidebars and I plots concise and complete?

c) Does the blog include diagrams, figures, tables, animation and videos to illustrate the technical and medical points?

d) Is the style of written English, spelling and grammar acceptable?

e) Is there a comprehensive list of references, citations and/or footnotes that indicate where the primary and secondary sources of information came from?

f) Were the intermediate deadlines for each step achieved on time?

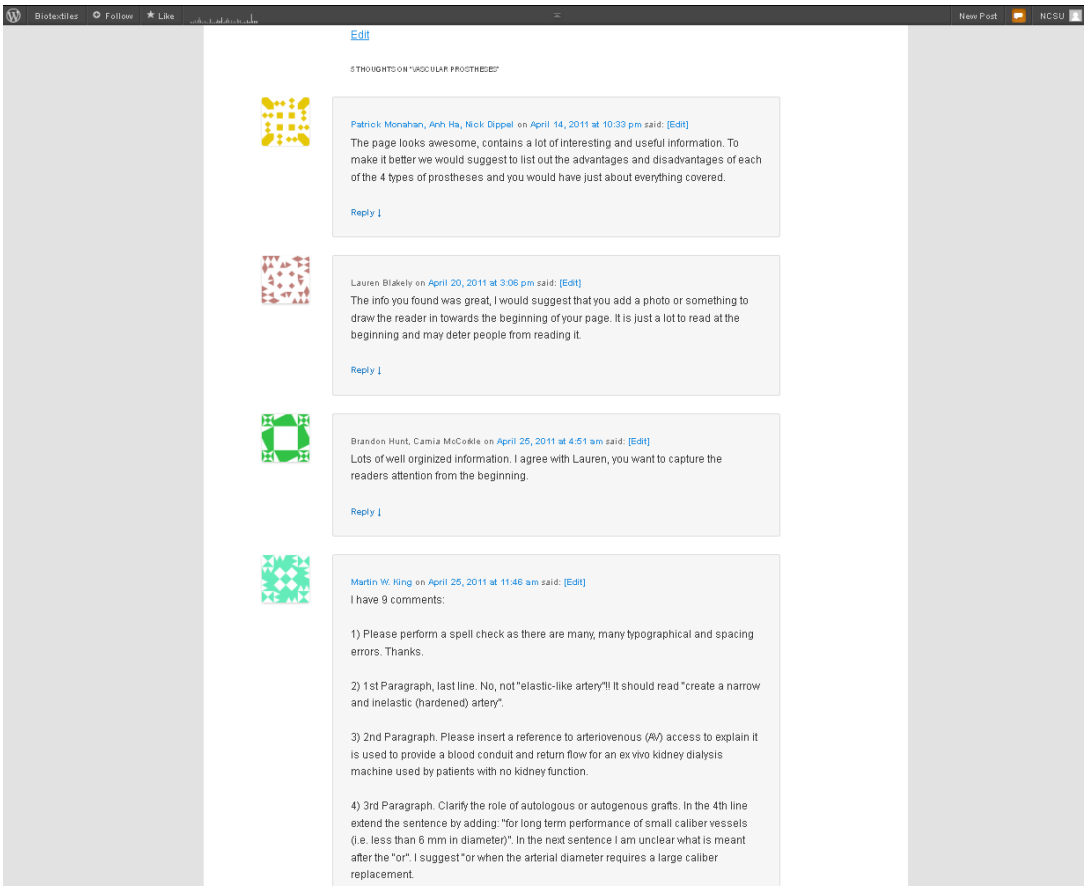

Figure 5: Vascular Prostheses student group page comments.

Conclusion

The students worked well together in teams of either two or three members selected by the instructor and based on their submitted topics of interest. The four iterative steps in building, evaluating, modifying and refining the blogs worked well, with students willing and able to make helpful and positive comments about the other teams' work (as shown in figure 5). The one difficulty was in identifying and finding independent experts in the clinical disciplines who had the time and interest in reading and posting their comments. When this type of assignment is attempted in future, more time and thought will be put into involving external independent reviewers.

WordPress.com provided a suitable and easily manipulated platform for the creative development of Web 2.0 blog pages. We look forward to hearing about its use for other student team work assignments in other academic disciplines and across discipline boundaries.

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