Teaching Digital Citizenship by Fostering Digital Citizens

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ABSTRACT

Digital citizenship is drawing increasing attention in the educational system as a means to help students understand how to use technology in a safe and appropriate way. Crucial skills that students need in order to navigate the digital world effectively include: finding reliable information online, detecting suspicious content, being aware of the privacy policies with information collected online, and taking advantage of what technology offers by participating in a responsible way with others worldwide. Following existing initiatives, this paper reports on our experience with a new Computer Science course on Digital Citizenship. We present the design, objectives, and structure of the course. In describing the various course components, we highlight anecdotes from the first half of the semester demonstrating positive outcomes of the course delivery. Overall, this course is well-liked by the students and has received support from several faculty members in promoting enrollment in their programs.

Categories and Subject Descriptors

K.4 [**Computers and Society**]: General; K.3 [**Computers and Education**]: General

General Terms

Human Factors, Security, Legal Aspects

Keywords

Digital citizenship, course design, student-directed learning, blended learning

1. INTRODUCTION

Digital citizenship is drawing increasing attention in the educational system as a means to help students understand how to use technology in a safe and appropriate way. Some of the crucial skills that students need in order to navigate the digital world effectively include: finding reliable information online, detecting suspicious content, being aware of the privacy policies with information collected online, and taking advantage of what technology offers by participating in a responsible way with others worldwide.

Several university courses exist that teach students about appropriate use of online resources (e.g., copyrights, laws) and educating others about responsible online behaviour (e.g., cyberbullying) (see [6, 7, 9] for examples). Some of the major technology companies, such as Google and Microsoft, have launched training programs to either help teachers develop a digital citizenship component in their lesson plans or to directly teach students about digital citizenship [4, 3]. In rare cases, municipal and provincial initiatives have been taken to promote digital literacy and to develop digital citizenship policies [2, 1]. Following these initiatives, the Department of Computer Science at the University of British Columbia at the Okanagan campus designed a new, first-year university course on Digital Citizenship that is designed to provide students with knowledge and skills to navigate the digital society.

We present the design and objectives of the course in Section 2 and the major course components in Section 3. In particular, we highlight aspects of the course where blended learning and student-directed learning are used. Along with anecdotal evidence showing positive outcomes, we describe some initial feedback collected from students and faculty members. Overall, this course is well-liked by students and has received support from several faculty members in promoting enrollment in their respective departments.

2. COSC 132: DIGITAL CITIZENSHIP

This course is designed to provide students with knowledge and skills to navigate the digital world. A key section of the course is devoted to understanding the importance of digital participation, by studying issues surrounding digital access, skills, and utilization. Digital literacy is emphasized through the explorations of computer applications, the use of converging technologies, and online resources. Another section of the course is dedicated to understanding the inner-workings and the implications of technology. Topics include search engines, social networking, collective intelligence, security and privacy, and rights and responsibilities. Lastly, prevalent applications in e-government, online education, and mobile computing are surveyed. In sum, the course content is designed around the following key areas:

- What is Digital Citizenship?
- Importance of Participation
- Understanding How Technology Works
- Applications in the Digital Society

This course includes hands-on lab activities, reflective journals, group blogging, and a community service project. Each of these components will be described below.

The target audience of this course is any university student who wishes to learn more about digital citizenship. This course does not assume students have any Computer Science background; a conceptual introduction to how various technologies work and the use of converging tools are integrated into the course activities. Students are not expected to know about or do any computer programming. As we will see with specific examples later, students who are familiar with programming can still contribute to as well as benefit from the content of this course.

2.1 Course Objectives

The goal of this course is to familiarize students with fundamental concepts of digital citizenship, including the digital divide, participation power, economic impact, digital literacy, and the rights and responsibilities of being a good digital citizen. A central learning outcome of this course is for students to appreciate the opportunities for participating in the digital society and to recognize the impact of not having proper access or skills to use technology effectively. Through hands-on activities, students will actively learn to use a variety of converging technologies, such as blogs, online journals, Wikipedia, and tools for detecting content credibility. These activities will support students in learning how technology works behind the scenes.

2.2 Winter Term 2, 2012-2013

In January 2013, this course was first offered by the Department of Computer Science at the University of British Columbia at the Okanagan campus. Excluding the exam period, the course runs for 14 weeks, with one week of reading break about halfway through the course. The general format of the course is a one-hour lecture on Mondays and Wednesdays, a two-hour lab investigation on Thursdays, and a one-hour student-led discussion on Fridays. The course website is setup on `wikispaces` as shown in Figure 1. In this way, students become familiar with `wikispaces` by contributing content to it as the course progresses.

In this course offering, 13 students were registered from a wide range of backgrounds: 6 students in first and second year with undeclared majors across the Faculty of Management Science and the Faculty of Arts and Sciences, 3 students in second year in Biochemistry, Chemistry, and Physics, 1 student in third year English, 1 student in fourth year International Relations, and 2 students in fourth year Computer Science. Among these students, 3 were female, and 10 were male. Two of the second year Science students knew each other from highschool, and the two fourth year Computer Science students knew each other through their university course work. The atmosphere in the classroom is generally friendly and relaxed. About one-third of the class was engaged in active discussions, while the rest of the class only voiced their opinions when called upon (either by the instructor or by their classmates).

3. MAJOR COURSE COMPONENTS

This course included lectures, journals, blogs, labs, community service, and exams. While the course content was not best suited for an exam-based assessment, it is a university requirement that all first and second year courses have

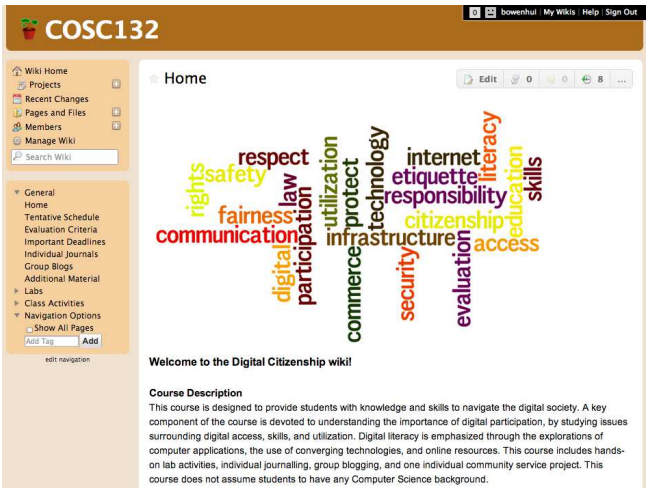

Figure 1: The private course wiki for COSC 132 located at `cosc132.wikispaces.com/Home`.

final exams. Thus, to help students prepare for their final exam, a midterm exam was added as well.

The relative importance of each of these components were reflected in their weighting towards the course grade. First, the weekly reflective journals and two group blogs were treated as individual and group assignments respectively. Both of these activities were worth 10%. The midterm exam was also worth 10% of the course, indicating to the students that it made up a small portion of their grade and should be used as a practice test for the final exam. On the other hand, weekly lab activities provided more in-depth investigations on various technologies and related issues. Thus, labs were worth 20% of the course. Finally, the community service project and the final exam were both worth 25% each. This weighting placed equal importance on the community service component and the final exam.

We first review the textbooks used in the course and then proceed to discuss the various course components.

3.1 Textbooks

The main course textbook used was *Net Smart: How to Thrive Online* [8]. This book was chosen because it covers a wide range of topics relevant to the skills needed in navigating the digital world. For example, one chapter is devoted to *crap detection*, which discusses issues on as well as strategies for identifying reliable content among all the unedited, user-generated content on the Internet. Other topics covered in the book include: managing one's attention when there is so much information everywhere, tools for organizing all the information, different levels of online participation, digital footprints and profiles, different forms of collective intelligence, and social networks. The writing is targeted at a general, non-technical audience, and each topic is filled with usage examples, personal stories, and research that elaborate on the societal implications of technology. Where available, strategies and technological tools to help one participate online more safely and efficiently are presented.

As a supplementary textbook, *Digital Citizenship: The Internet, Society, and Participation* [5] was used to introduce students to relevant definitions and empirical research

reporting on the societal impact of technology. Topics in this book include: different models of citizenship, benefits of online participation from the perspective of economic opportunity, civic engagement, and political participation, shifts from the digital divide and the landscape of broadband connectivity. One drawback in using this book was that the material is very empirical and research oriented. Without the appropriate statistics background, students cannot be expected to understand the methods used nor the models presented in their results. Another drawback was that, being an older book written by American authors, the data was outdated and did not necessarily apply to the Canadian population. Thus, while the descriptive results were useful in providing context on the various issues of technology adoption, the data was less relevant to our students.

3.2 Lecture Material

In this course, there were two hours of lectures every week that took place in a classroom with one computer per student. Lectures were generally driven by slide presentations, while the content had a mixture of main points from assigned readings, discussions surrounding these points, videos, podcasts, infographics, and in-class activities on the computer to provide a blended learning experience.

An example podcast used as part of the crap detection topic was an interview with a physicist demystifying the claims of a Canadian company having developed an *invisibility cloak*. An example in-class activity involved students finding recent data reported on the digital divide that pertains to the Canadian population. Another activity involved students using online tools, `whois` [1] and `alexa` [2], to identify the registered owners and traffic of specified websites.

Anecdote: During the first week of class, one of the fourth year Computer Science students said "everyone should think more like a programmer". This comment spurred discussion on why this is *not* the case, and consequently helped other students feel more comfortable with taking a Computer Science class for their first time.

Anecdote: In a lecture on the benefits of participation online, one of the fourth year Computer Science students shared his knowledge about *mass collaboration* on GitHub [3]. He explained to the class what GitHub is and how the repository structure supports open source development with much enthusiasm. He provided several examples, one of which was a petition application owned by the White House [4].

3.3 Reflective Journals

Assignments were designed as reflective journal entries based on specific questions asked each week. Students used a free online journaling tool, Penzu [5], for this activity, which kept their entries private but enabled them to share specific entries with others by providing email addresses. Questions students reflected on included: What are the most important aspects of digital citizenship and why? With reference to the Power Law of Participation from the text, which levels do you participate in? What kinds of skills and responsibilities are required in new jobs such as "Social media specialists" and "Web communications specialists"?

[1] `http://www.whois.com/whois/`
[2] `http://www.alexa.com/`
[3] `https://github.com`
[4] `https://github.com/WhiteHouse/petitions`
[5] `http://penzu.com`

As part of helping students appreciate the value of Internet and relating to those who have little to no access to it, an "Internet blackout" period was designed in the course. Because some students had jobs that relied on Internet use, it was not possible to require a mandatory Internet blackout. Instead, this activity was designed to see how long students could survive without Internet, and to help them better understand how much of their lives depend on Internet use.

Anecdote: In response to the kinds of technologies that would benefit the senior population the most, one student suggested that a mind reading technology would help seniors a lot because it would alleviate the need for fine-motor control. Consequently, the lecture content was adapted to introduce the research area of brain machine interface and examples of mind-controlled games.

3.4 Group Blogs

Students formed their own groups of 3 or 4 to lead two one-hour class discussions over the course of the semester. To support student-directed learning, each group selected an article from a reliable source pertaining to a current event related to digital citizenship. In addition, each group developed three discussion questions and posted them on the course wiki, so that the rest of the class would prepare individual responses to those questions. At the beginning of the discussion, everyone took turns writing their responses on the board. In the remainder of the class, the group directed the discussion by eliciting opinions and reviewing as well as updated responses on the board as needed. At the end, the group took a picture of the notes, and blogged up the content on a free blog, WordPress [6]. A screenshot of the course blog is shown in Figure 2.

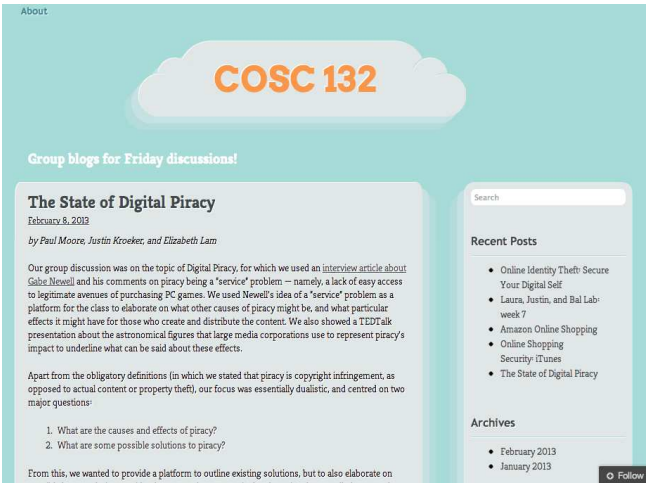

Figure 2: The public course blog for COSC 132 located at `http://cosc132.wordpress.com/`.

Anecdote: Two groups integrated technology in their discussions. One group combined online with whiteboard note-taking, while the other presented a short video and interacted with the rest of the class during the discussion.

Anecdote: One group discussed an article on security and identity theft. The members consisted of one senior Com-

[6] `http://wordpress.com`

puter Science student and three junior students with undeclared majors. Since digital security is a technical topic, everyone expected the Computer Science student to be the expert. However, the students soon found that was not the case, and both the levels of engagement and contribution were spread evenly across the group.

3.5 Lab Investigations

Weekly lab activities were integral in supporting blended learning in this course. Each lab consisted of an investigation where students were tasked with finding or deciphering something. Depending on the exercise, students worked individually, in pairs, or in groups. At the end, learning outcomes were presented and shared on the course blog.

3.5.1 Wikipedia

The first lab introduced students to the authoring process behind Wikipedia [7]. Students chose from one of the top 25 most popular Wikipedia articles and made minor edits to it. Students also came up with a topic that did not already exist on Wikipedia and created a new article for it. The content included text and references to other Wikipedia articles, and optionally included images and tables. Near the end of the course, students revisited their articles and commented in their journals how their articles evolved.

3.5.2 Phishing Emails

The purpose of this lab was to learn how to detect phishing emails. Students analyzed a set of emails in pairs to determine whether they were genuine or not. At the end, students discussed the differences between phishing and spam emails, common characteristics between the two, how spam filters work, and methods for teaching a typical user the difference between phishing, spam, and malware.

3.5.3 Author Credibility

Students were provided with a list of references on how content and author credibility can be determined. Using these sources and any other information they discover, students developed strategies for evaluating the credibility of blogs, magazine articles, and academic papers.

3.5.4 Photoshop Forensics

Similar to the lab on phishing emails, this lab helped students learn techniques to detect the authenticity of images. Here, students learned about different image formats, as well as image metadata analysis and error level analysis. Students also used the online tool fotoforensics [8] to examine a set of genuine and photoshoped images.

3.5.5 Digital Profiles and Facebook Privacy

This lab was designed to help students understand the image they project online and the potential impact on future employability. First, students were asked to list what they wished a potential employer would and would not see on their profiles. Then, they worked in pairs to conduct online searches on their partner's name and evaluate the appropriateness of what appeared in the search results while noting any surprises. The second part of this lab explored the privacy settings in Facebook by comparing different profiles. Students learned the steps in changing privacy settings, as well as the difficulty in deleting a Facebook account.

3.5.6 Online Shopping

Students explored the security and privacy policies of several online shopping sites: Amazon, eBay, iTunes, and WestJet. Students were split into four groups, with one group researching on an assigned company site. The activity required students to identify how these companies store personal customer data and credit card transactions, as well as the security measures in place. Since policies vary by country, students then determined where the data was collected and stored. Lastly, students identified what regulations applied to the companies in collecting the information and what regulations were in place, if any, to protect costumers outside of those countries (with emphasis on Canadian consumers).

3.5.7 Copyrights and Licenses

In this lab, students learned the difference between copyrights, trademarks, and licenses. Students investigated on the copyright regulations and conditions for using someone else's intellectual property they found online, including images, music, and videos. Students also learned about different types of license agreements, including the General Public License and the Creative Commons License.

3.5.8 Video Creation and Editing

This lab spanned over two weeks, where the first week focused on video creation and the second focused on video editing. In the first lab, students chose a topic on digital citizenship and planned a script to use in the video for teaching that topic to a general audience. The average video length was about 2 minutes per student.

In the second week, students learned to use free video editing software, either using Windows Movie Maker [9] or Apple iMovie [10]. All the videos were required to have titles, images, music, transitions, audio, subtitles, and credits. The final video was reviewed by the instructor and then published online. Students had the option to submit their videos to YouTube [11] or Vimeo [12].

3.6 Community Service

This component began in the second half of the course, after the students completed the module on understanding the importance of online participation. Integrating a community service component into the course provided students with the opportunity to learn about barriers of access and to practice the skills they learned in the classroom.

The logistics were planned by the university's Community Service Learning Program. A program organizer gave an in-class presentation on the program, and arranged for an orientation at the non-profit organizations with the students. The purpose of the community service component was to have students work with a non-profit organization and teach technology skills to members of those organizations in four one-on-one sessions over six weeks. This year, the partici-

[7] http://en.wikipedia.org
[8] http://fotoforensics.com
[9] http://windows.microsoft.com/en-CA/windows-live/movie-maker-get-started
[10] http://www.apple.com/ilife/imovie/
[11] http://www.youtube.com
[12] vimeo.com

pating organizations involved the Canadian Mental Health Association and the Ki-Low-Na Friendship Society.

During the orientation, students met their client and elicited several technical skills they wished to learn. Example skills included: being able to transfer files from a USB key to a laptop, creating a resume, and printing business cards. Students researched and designed learning activities that were relevant to their clients' needs. After each session, clients provided feedback on the students' helpfulness and professionalism as part of the course evaluation.

3.7 Exams

Both the midterm and final exams consisted of a short answers section and an essay section. Short answers involved both definitions and characteristics of concepts taught in class, as well as questions that asked students to use certain computer tools that were used in the lectures or in the labs.

The essay section required students to pick from a list of statements and argue for or against it, while providing credible, supporting evidence. An example statement that was taken from the main textbook is: Knowing how to blog, tweet, wiki, search, innovate, program, and/or organize online can lead to political, cultural, and economic value.

In preparing the students for the exams, the format was discussed, as well as expectations of references usage and regulations for plagiarism. In addition, steps in creating an outline and writing an argumentative essay were presented.

To help students review definitions and facts covered in the course before the final exam, the whole class played Jeopardy lecture. In preparation, students formed groups to come up with 5 quiz questions of varying levels of difficulty on 5 designated topics one week before. All the questions were combined, along with additional questions developed by the instructor. During the game, students were split into groups in answering randomly selected questions. The group who scored the most points won.

Anecdote: Students wanted to type rather than handwrite their essays during the exams. To standardize the expected length of the essay, everyone had to use the same margin width, font family, font size, and spacing in a Microsoft Word document. During the midterm, one of the fourth year Computer Science students did not know how to format the document and we could not start the midterm. A first year student walked over and taught him how to change the settings successfully.

4. INITIAL FEEDBACK

Feedback on various course activities were collected about halfway through the course. In-class activities and discussions were separated out from other lecture activities because we wanted to gauge student interest in these areas. Results from asking students to rank 6 course activities in terms of engagement and interest are reported in Figure 3. Overall, labs were the most engaging, followed by in-class activities and in-class discussions. Not surprisingly, this suggests that lectures designed with hands-on activities and discussions improve student engagement. While some individuals really liked blogging and journaling, these activities were ranked lowest overall.

Professors from the Faculty of Creative and Critical Studies and the Faculty of Management Science expressed keen interest in having their students take this course as a mandatory requirement in their programs. As well, Computer Science faculty members value the importance of training students in digital citizenship, and hope to grow this course over the coming years.

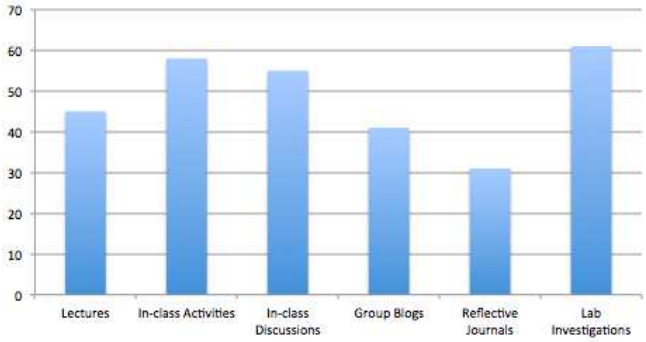

Figure 3: Total ranking of course activities.

5. CONCLUSIONS

Digital citizenship plays an increasingly important role in educating our students about effective and responsible use of technology in the 21st century. The design and structure of a new first-year university course on this topic was presented in this paper, along with our experience and initial student and faculty feedback. Overall, students were engaged in various course activities and found the content valuable. In the future, we hope to incorporate more content and activities on social media, and continue to update the course as technology evolves quickly over time.

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