

## Effects of Teaching Business Web 2.0 Style

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### **Abstract**

*Web 2.0 technologies are becoming less of a news topic and more of a workhorse. Web 2.0 related jobs that did not exist five years ago are changing the playing field, and researchers are moving from mainly disseminating the benefits and problems associated with social networking to more in-depth studies of the way educators use these techniques and, more importantly, the outcomes of using these technologies in the classroom. To assess the impact of using certain Web 2.0 tools in the classroom, a survey was administered at the beginning and end of each of two semesters, for a convenience sample of classes, at a regional public four-year university. The survey attempted to measure students' perception regarding the use of wikis as a collaboration tool. Among other findings, the study indicates that although most students have access to broadband Internet at home and are proficient in using Web 2.0 sites, in-depth training is still a prerequisite to the successful use of a wiki as a teaching tool.*

**Keywords:** Computer-mediated communication, improving classroom teaching, teaching/learning strategies, applications in subject areas, cooperative/collaborative learning.

### **1. Introduction**

One of the main outcomes of Web 2.0 technologies is that they allow for harnessing of the so-called collective intelligence, and sites such as Wikipedia proved this true. Since in a classroom environment students can significantly benefit from tapping into the classroom collective intelligence, using a wiki as a collaboration tool seems only natural. And increased classroom collaboration is one of the requirements of quite a few accrediting bodies including AACSB (Lending, 2010). Furthermore, using a Web 2.0 tool in the classroom also helps to narrow the Internet proficiency gap between the students who already use social networks and those who do not. Although the Web 2.0 frenzy seems to have cooled down somewhat, there is still little doubt that new technology affects the business world significantly. New technologies are developed by academia, the government, or by businesses, and are adopted at an ever-faster pace. With the advent of Google and other "open source" or "free to use" players, these new technologies are increasingly becoming available immediately (many times in the early beta stage) to those that are interested. According to recent research, while Internet usage by businesses is, as expected, high, the use of specific Web 2.0 technology and tools seems still in an infant stage. However, businesses are identifying tools that allow collaboration as the most important future investment (Abramovici, 2007). As such, they are investing in collaboration technologies, and also in tools that allow them to communicate interactively with the exterior. Therefore, any existing or potential competitive employee has to become "Web 2.0 literate". Educators can help students by familiarizing them with these new technologies. In addition, since the use of technology in the classroom is also known to improve the learning process<sup>1</sup>, students benefit twice. Even more, these tools are better suited for networking and collaboration than the ubiquitous WebCT or Blackboard, which are tailored towards a one-to-many approach (Maloney, 2007).

In an attempt to bring a small contribution to this important topic, this research addresses the use of Web 2.0 in education, with emphasis on business education. The paper presents some empirical results and conclusions reached after using Web 2.0 and Internet tools while teaching seven sections of an introductory business course over two semesters at a public regional four-year university.

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<sup>1</sup> Studies show that the use of social network sites is beneficial, at least when it comes to increasing one's social capital in general, and therefore Institutions of Higher Learning should explore this opportunity (Ellison, 2007).

Some tips regarding best practices when teaching with Web 2.0 tools are also presented. One of the main conclusions of the paper is that, due to the diverse background of the students, training students might be required before significant positive effects of using such tools can be observed.

## **1. Web 2.0**

Although there is no generally adopted definition of Web 2.0, it is widely acknowledged that O'Reilly coined the term. According to him (O'Reilly, 2006): "Web 2.0 is the business revolution in the computer industry caused by the move to the Internet as platform, and an attempt to understand the rules for success on that new platform. Chief among those rules is this: Build applications that harness network effects to get better the more people use them. (This is what I've elsewhere called "harnessing collective intelligence.")" While the definition does not seem comprehensive, it does highlight the fact the Web 2.0 term seems to have become synonymous with collaboration.

An almost ubiquitous feature of Web 2.0 technologies is the ability of the users to populate web sites with their own content, which many times is produced by the end user himself. However, web sites are much more than just repositories. The availability of collaboration features and other Web 2.0 type tools (add-ons and widgets) adds a lot of utility to such sites. The user content that is posted on Web 2.0 sites ranges from video clips (on sites such as YouTube), to documents (docstoc, Google documents), photos (flickr, photobucket), news (digg, topix), and music (lastfm), to name just a few. Since most (if not all) are available for free, such content may in fact constitute a practically unlimited resource for educators. To better tailor the use of technology in education, it is important to understand how teenagers, students and businesses use the Internet in general and Web 2.0 tools specifically. Fortunately, there are many studies addressing this topic, which itself demonstrates that both researchers and practitioners see this issue as very important.

An interesting finding reported by many studies is the "generation gap" between students and their professors when it comes to Internet usage (Jones, 2002; Kane & Fichman, 2009). Indeed, many studies report that educators are less equipped to cope with these technologies and tools than the students they teach. For example, according to an OECD study, "For broadband users under the age of 30, 51% have placed content on the Internet, 25% have their own blogs, and 41% have posted content online they created themselves" (OECD, 2007). Clearly, teachers could do more to reach students through such innovative tools. Therefore, if this is true, we seem to have the task of finding ways to raise our technology skills to our students' level.

Another important conclusion that can be drawn after scrutinizing some past studies is that students seem to be ready for a more in-depth use of Internet and Web 2.0 tools in the learning process. For example, according to a study of how teens use social media, the Internet seems to have become the main social venue for many teenagers (Lenhart, Madden, Macgi, & Smith, 2007). Over 93% of students are using the Internet, and its use for tasks such as writing blogs, using mashups, and uploading their work on user generated content sites is steadily increasing. Equally important, students tend to rely more and more on the Internet as their main learning platform, and already use Web 2.0 tools for education related activities, albeit in an informal setting (Allen & Seaman, 2007). Overall, students are by and large familiar with the backbone of online collaboration (National School Boards Association, 2007).

The business world is also becoming more dependent on Web 2.0 tools, and, similarly to teenagers, many employees use Web 2.0 sites for work related activities in an informal way (Clearswift Ltd., 2009). However, more importantly, businesses are aware that the impact of the Internet (and especially of Web 2.0 sites) on consumers becomes as important as or even more important than the impact of older media such as television and newspapers (Amis, 2007; Riegner, 2007). They are also aware of the power of Web 2.0 technologies when it comes to internal collaboration and to maintaining contact with their customers, civil society, and media. Therefore, from large banks and well known giants such as IBM and Motorola (Anonymous, 2007; Bielski, 2008; Kupp & Anderson, 2007) to government entities (Hodgkin & Munro, 2007), more and more organizations are adopting tools such as embedded videos, RSS, blogs, live meetings, document sharing tools, wikis, and so on. But the main adopters seem to be universities (Graves, 2008), with teaching fields such as business (Lending, 2010) archaeology and geography (Foster, 2007b), dentistry and general medicine (Downes, 2007; Giustini, 2006; Sandars & Haythornthwaite, 2007), and libraries (Needleman, 2007), to name just a few. As expected, not all educators see the new developments favorably, especially when it comes to delivering education through new tools (Foster, 2007a; Michael Gorman vs. Web 2.0," 2007).

However, implementing such tools is not necessarily easy. One important issue is the existence of significant cultural differences in the classroom. Indeed, these sometimes deeply rooted differences (an important aspect since most universities have a diverse student and teacher body) might also influence the way the Web 2.0 tools are perceived and used (Chau, 2008). Clearly, this is an important research topic that should be addressed in the future. Another difficult issue is motivating players to use Web 2.0 tools to their full potential. For example, although there are several online open access collaborative peer reviewed journals, they are still in an experimental phase, and researchers seem to lack an interest in using these tools<sup>2</sup>. However, here too the literature is divided, with many considering this approach to be a success (Cockerill & Tracz, 2006; Kousha & Thelwall, 2007).

Yet another problem associated with Web 2.0 technologies is inherited from the “old” Internet: safety. The well-known Internet perils are also Web 2.0 threats. Viruses, accidental posting of confidential information, productivity lost (due to, for example, the access to entertainment content on some Web 2.0 and classic sites) and spam are common threats to those businesses that allow or encourage the use of the Internet. In addition, the new tools of today which are specifically meant for collaboration (transparent collaborative networks), are even more prone to vandalism and identity theft than older Internet technologies. Indeed, one wants to post as much information about oneself so that the confidence of the possible collaborators can be gained, as well as to encourage collaboration. Accordingly, a lot of private information becomes public. This is a concern especially for the younger students (and sometimes their parents), but also for many other potential users.

## **2. The Experiment**

### **2.1. Wikis**

Wikis are excellent for collaboration. According to Wikipedia (2008):

“A wiki is software that allows users to create, edit, and link web pages easily. Wikis are often used to create collaborative websites and to power community websites. They are being installed by businesses to provide affordable and effective Intranets and for Knowledge Management...” Wikis also seem to be the tool of the future for business collaboration, and since many businesses are becoming very interested in e-commuting (telecommuting), their use will probably increase significantly overtime. Some specialists predicted that at least 50 percent of organizations would use wikis as important work collaboration tools by 2009 (Kennedy, 2008). Their versatility and ease of use make wikis one of the most used collaboration tools (Achterman, 2006; Hazari, North, & Moreland, 2009; Lending, 2010; Shih, Qing, & Hsuen-Che, 2007). One of the most well-known products that use the technology is, of course, Wikipedia itself.

A wiki was used in introductory business classes as a tool for organizing students’ group work. Two steps were required for completing the assignment. First, students were asked to use the class wiki to form groups based on common interests. Second, each group was encouraged to collaborate with the help of group wikis. The class wiki was created for them, but they were required to create their own group wiki page and use it throughout the semester. They were also required to post all their work (presentations, written assignments) on the wiki for their colleagues (but more important, for their group mates) to see. Because the feedback gathered during the first semester indicated that students needed training to be able to better utilize the tool, for the second semester a one-hour training session was arranged for each class. Unfortunately, due to severe weather the participation was quite weak, with a little over 60% in each class attending the training. No second round of training was organized due to scheduling conflicts.

### **2.2. Results**

The surveys were administered to a convenience sample formed from seven sections of the introductory business course over two consecutive semesters. The students were given the chance to voluntarily complete the anonymous instruments at the beginning and end of the semester, during the class, but no credit was offered for participation. Each instrument asked short questions aimed at measuring demographic variables, Internet access, computer usage, Web 2.0 tools usage, Internet personal and at-work (school) usage and use of the wiki for school assignments. A few questions addressed other course related issues and are not discussed here.

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<sup>2</sup> This may be due to evaluators (chairs, deans, tenure and promotion committees, etc.) not giving credit for research published in this format.

Table 1 summarizes the survey responses. Probably the most important observation is that the sample suffered from relatively large attrition for both semesters. Indeed, it seems that the absenteeism rate increases towards the end of the semester, and this could influence the results significantly. In order to check for possible significant differences between the groups of students that answered the surveys at the beginning and the end of the semester, as well as across semesters, several tests of goodness of fit and independence were run. The following tables and figures introduce the reader to the student demographics and typology. According to Figure 1, the vast majority of respondents are between 18 and 24 years old, with only 28 students being older<sup>3</sup>. According to Figure 2 less than one third of the students do not work, which suggests that the sample differs from the overall US population. Indeed, an earlier (albeit somewhat outdated) study revealed that 57.1 percent of US students are employed, with 17.6 percent working full time and 39.5 percent part time (Orszag, Orszag, & Whitmore, 2001).

According to Figure 3, about half of the students declared a business administration major, while the rest are almost evenly divided among other majors or undecided. The sample seems to differ from the overall US population in this respect too. Indeed, at the national level, for four year institutions, only about 20 percent of students choose a business major (National Center for Educational Statistics, 2005). Finally, according to Figure 4, more than half the respondents are freshmen. Overall, the main type of student participating in the study is between 18 and 24 years old, is a business administration major, and works at least part time<sup>4</sup>. Since this analysis also suggest possible significant bias as well as heterogeneity in the student typology, tests to assess the impact (if any) of these issues were also performed during the analysis.

Table 2 summarizes students' access to the Internet. While the vast majority of the students have broadband access at the place of residence, there are more students with no access than with dial-up access. A chi-square test fails to reject the hypothesis that no significant change in the frequencies occurred between the surveys, suggesting that the type of Internet access did not change during the semester or from one semester to the other. Table 3 shows the sample composition by major for each survey, confirming that the sample is heavily biased by business administration majors. However, a chi-square test also fails to reject the hypothesis that there is no significant difference in the sample composition among the four surveys. Therefore, the percentage composition of the four samples remained constant over time, suggesting that no bias could have occurred due to any change in the mix of majors.

The next table (Table 4) reveals the weekly use of computers for study by college or major. The vast majority of students self-report using computers between one and five hours a week, followed by five to ten hours and less than an hour. These results seem similar with those reported in other studies (Khan, 2009). Again, no significant difference between groups appears (Pearson's Chi-squared test with simulated *p*-value is not significant at the .05 level), suggesting that there is no difference in how much different student types (students of different majors) report their use of computers. One of the main research questions concerns whether students have a negative view towards posting assignments on the Internet. Indeed, posting assignments on the Internet might be perceived as a breach of privacy, among other things. Interestingly, the vast majority of students do not mind posting assignments on the Internet (Table 5). However, about 25% of students who had an opinion were against posting assignments on the Internet. This represents a significant number, and future research could try to identify the reasons underlying this attitude.

In addition, while there is a significant change in the number of students who answered they never did post assignments on the Internet between the beginning and the end of the semester surveys, there is no significant difference between the proportions of students who do not versus those who do mind posting assignments on the Internet between surveys. This finding suggests that while some of the undecided students made up their minds about posting assignments on the Internet (evidence of the educational value of the assignment), their overall attitude mirrors that of those students who already had an attitude at the beginning-of-the-semester surveys (which could be evidence of no transformative learning outcome). A somewhat unexpected result is revealed in Table 6. Here, the treatment had no significant impact on students' perceptions about using the Internet for group assignments. The test reveals no significant differences between the groups, not even when it comes to the undecided students. Indeed, while the difference between the before and after treatment for the undecided category is 7 students for the first semester and 8 students for the second, the chi-square test *p* value is very large.

<sup>3</sup> A large number of students are counted twice, since the survey did not identify individual respondents.

<sup>4</sup> Only a small proportion of the participants were international students, which excludes culture as an important factor.

A similar, albeit more specific, question was introduced after the first survey. The students were asked specifically about the use of wikis for group assignments (Table 7). The results were similar to those in Table 5, with a significant number of students making up their minds but with no change in the overall proportions. This result seems to contradict the relatively warm feelings about wikis reported in other studies (Walsh, 2010). Similar to the results portrayed in Table 5, there are indications that the tool has educational value but, no evidence of transformative learning was found. Several detailed tests were also performed (such as looking at the impact of the treatment on certain majors, and isolating the semesters—that is—looking at the effect of the treatment for each semester) but again we found no significant difference between groups. The conclusion that the treatment did not change the overall perception of students remains (no evidence of transformative learning). A test that compared only the “after treatment” groups (one for each semester) also failed to find any difference in their perceptions, suggesting that training had any significant impact.

The survey instrument also asked for any feedback from the students. Only a very few students chose to provide comments. Of these, a few students praised the integration of wikis and the Internet into the course, while a comparable number of students raised the issue of training. This outcome seems to be in line with previous findings which reveal that only about a third of the surveyed students agree that they have adequate training for the IT in their courses (Smith, Salaway, & Caruso, 2009). The main message surfacing from the comments was that the wiki is a tool most students never used before and therefore some training is required. While a statistical analysis of the comments is impossible, there is some evidence that training actually did have an impact, since in the second semester survey only one student mentioned training as an issue. Finally, in the first survey administered during the second semester, a few students expressed interest in learning to use wikis, which suggests that the word of mouth about wikis (and other Web 2.0 tools) being used in the class raised some interest among students.

Another possible question is what is the effect (if any) of using Web 2.0 tools in the classroom on student evaluations? Leaving aside that student evaluations in general are extremely controversial (Langbein, 2008), it is interesting to see if the introduction of such tools impacts students’ perception of faculty performance. While again, there is not enough data to allow for a formal statistical analysis, it appears that discontinuing the use of wikis in the classroom did not affect the overall perception of students about the instructor’s performance. Of course, more research is needed to validate this claim, but comparing the results across several student evaluations of teaching gathered while using the wiki and after discontinuance led to the conclusion that, while using such a tool in class did not seem to have created transformational learning, it did not affect students’ perceptions about the teacher either.

### 3. Conclusion

Since Web 2.0 tools are becoming widely used by businesses, familiarizing students with them has a twofold benefit. First, it prepares students for their future work place. Second, since technology in general is known to improve the learning process (at least when utilized wisely), the use of such tools may in fact improve the overall education experience<sup>5</sup>. However, using such tools may sometimes prove difficult, the main issues than need to be considered being the steepness of the learning curve, vandalism, accessibility, availability, and difficulty in motivating students to use them. Nevertheless, the perils of using these tools should not deter educators from teaching students to benefit from them. As mentioned, vandalism can be a serious problem, especially for some of the “free” versions of Web 2.0 sites, where the access to the tool is more difficult to control. For example, one can modify the wiki page or post comments on blogs without the permission of the owner(s). However, after using a wiki for two semesters (over 200 students knew the password, which was the only security tool) no incident whatsoever occurred. Several other users of such tools found similar results (Achterman, 2006).

Motivating students to use such tools may also be a challenge (and may be the most difficult one). While students acknowledged using Web 2.0 sites and having a broadband Internet connection at their residences, some participated sporadically, with little initiative on their part, unless participation was clearly linked to the overall class performance evaluation. However, in informal surveys as well as in student teaching evaluation comments, students acknowledged that they found the use of YouTube (and other Internet resources) video clips useful, and that they believe that making the class materials available on the Internet was helpful.

<sup>5</sup> Studies report that students themselves perceive the use of IT for learning as beneficial (Khan, 2009).

One explanation for a low student interest in such tools may be insufficient training. Indeed, although many students are very familiar with sites such as MySpace and Facebook, they seem less comfortable with other Web 2.0 tools. Therefore, since many of them have a very busy schedule, a steeper learning curve might offset the perceived benefits<sup>6</sup>. The heterogeneity of the student typology as well as the high absenteeism might be among factors that could explain why the treatment seems to have had no effect on the student perception of the use of Internet and Web 2.0 technologies in class. Indeed, even if the tests show no differences among the respondents' characteristics (especially no difference in composition between the beginning and the end of the semester), taking other variables (such as GPA) into consideration might lead to different conclusions. Generally, a better understanding of the attrition process could improve the overall assessment. Taking a panel data (cohort data) approach could provide more insight.

A relatively challenging issue is that about 25% of students who had an opinion were against posting assignments on the Internet. Such a large number of students with a strong opinion against posting their work on the wiki may by itself explain the apparent lack of impact using this type of tools had on the class. Future research should try to identify the reasons for this finding, since employers (at least medium to large businesses) are adopting Web 2.0 technologies and students' reluctance to use such tools while in school could result in their reluctance to use these tools at work. Both faculty and students would benefit from research aimed at understanding how best implement the use of Internet and Web 2.0 tools in the classroom. Finally, the results suggesting that wiki training had no impact on students' perception of the usefulness of the tool need to be interpreted carefully. The relatively low training participation and the relatively short training (only one hour for each section) are likely some of the reasons behind the apparent lack of impact which training had on students.

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### **References**

- Abramovici, G. (2007). Companies are adopting social media, study finds. In *DMNews*: Haymarket Media Inc.
- Achterman, D. (2006). Making Connections with Blogs and Wikis. *CSLA Journal*, 30(1), 29.
- Allen, I. E., & Seaman, J. (2007). Online Nation. Five years of growing in online learning. In. Needham, MA.: Sloan Consortium.
- Amis, R. (2007). You can't ignore social media: How to measure Internet efforts to your organization's best advantage. (Cover story). *Public Relations Tactics*, 14(5), 10.
- Anonymous. (2007). Web 2.0 at Work. *Information Management Journal*, 41(4), 26.
- Bielski, L. (2008). New prospects for corporate customers. *ABA Banking Journal*, 100(1), 41.
- Chau, P. Y. K. (2008). Cultural Differences in Diffusion, Adoption, and Infusion of Web 2.0. *Journal of Global Information Management*, 16(1), i.
- Clearswift Ltd. (2009). Demystifying Web 2.0. In. Berkshire, England: Clearswift Ltd.
- Cockerill, M. J., & Tracz, V. (2006). Open Access and the Future of the Scientific Research Article. *Journal of Neuroscience*, 26(40), 10079-10081.
- Downes, P. K. (2007). Putting it all together; dentistry and the Internet. *British Dental Journal*, 203(2), 75.
- Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook "friends." Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication*, 12(4).
- Foster, A. L. (2007a). Second Life: Second Thoughts and Doubts. *Chronicle of Higher Education*, 54(4), A25.
- Foster, A. L. (2007b). Teaching Geography in Second Life. In *Chronicle of Higher Education* (Vol. 54, pp. 36).
- Giustini, D. (2006). How Web 2.0 is changing medicine. *British Medical Journal*(7582), 1283-1284.
- Graves, L. (2008). A Second Life for Higher Ed. *U.S. News & World Report*, 144(2), 49.
- Hazari, S., North, A., & Moreland, D. (2009). Investigating Pedagogical Value of Wiki Technology. *Journal of Information Systems Education*, 20(2), 187-198.
- Hodgkin, P., & Munro, J. (2007). The long tale: public services and Web 2.0. *Consumer Policy Review*, 17(3), 84.
- Jones, S. (2002). The Internet goes to college: How students are living in the future with today's technology. In. Washington D.C.: Pew Internet & American Life Project.
- Kane, G. C., & Fichman, R. G. (2009). The Shoemaker's Children: Using Wikis for Information Systems Teaching, Research and Publication. *MIS Quarterly*, 33(1), 1-17.
- Kennedy, B. (2008). Seven Strategies for Implementing a Successful Corporate Wiki. In *Industry Week* (January 25, 2008 ed.): Penton Media, Inc.
- Khan, M. B. (2009). Effects of Information Technology Usage on Student Learning - An Empirical Study in the United States. *International Journal of Management*, 26(3), 354-364.
- Kousha, K., & Thelwall, M. (2007). The Web impact of open access social science research. *Library & Information Science Research*, 29(4), 495.
- Kupp, M., & Anderson, J. (2007). Zopa: Web 2.0 meets retail banking. *Business Strategy Review*, 18(3), 11.

<sup>6</sup> Other studies (Hazari, et al., 2009; Lending, 2010) identified this as an issue.

- Langbein, L. (2008). Management by results: Student evaluation of faculty teaching and the mis-measurement of performance. *Economics of Education Review*, 27(4), 417-428.
- Lending, D. (2010). Teaching Tip Using a Wiki to Collaborate on a Study Guide. *Journal of Information Systems Education*, 21(1), 5-13.
- Lenhart, A., Madden, M., Macgi, A. R., & Smith, A. (2007). Teens and Social Media. In. Washington, D.C.: PEW Internet & American Life Project.
- Maloney, E. J. (2007). What Web 2.0 Can Teach Us About Learning. *Chronicle of Higher Education*, 53(18), B26.
- Michael Gorman vs. Web 2.0. (2007). *Chronicle of Higher Education*, 53(44), B4.
- National Center for Educational Statistics. (2005). 2003-04 National Postsecondary Student Aid Study. In: U.S. Department of Education.
- National School Boards Association. (2007). Creating & Connecting // Research and Guidelines on Online Social — and Educational — Networking.
- Needleman, M. (2007). Web 2.0/Lib 2.0 "What Is It? (If It's Anything at All). *Serials Review*, 33(3), 202.
- O'Reilly, T. (2006). Web 2.0 Compact Definition: Trying Again. In T. O'Reilly (Ed.), *O'Reilly Radar*.
- OECD. (2007). *Participative Web and user-created content. Web 2.0 Wikis and social networking*: Organization for Economic Co-operation and Development.
- Orszag, J. M., Orszag, P. R., & Whitmore, D. M. (2001). Learning and Earning: Working in College. *Upromise Inc.*
- Riegner, C. (2007). Word of Mouth on the Web: The Impact of Web 2.0 on Consumer Purchase Decisions. *Journal of Advertising Research*, 47(4), 436-447.
- Sandars, J., & Haythornthwaite, C. (2007). New horizons for e-learning in medical education: ecological and Web 2.0 perspectives. *Medical Teacher*, 29(4), 307.
- Shih, T. K., Qing, L., & Hsuen-Che, Y. (2007). An Editorial on Distance Learning 2.x. *International Journal of Distance Education Technologies*, 5(3), i-iii.
- Smith, S., Salaway, G., & Caruso, J. B. (2009). The ECAR Study of Undergraduate Students and Information Technology, 2009. In. Boulder, CO: EDUCAUSE Center for Applied Research.
- Walsh, L. (2010). Constructive Interference: Wikis And Service Learning In The Technical Communication Classroom. *Technical Communication Quarterly*, 19(2), 184-211.
- Wikipedia contributors. (2008). Wiki. In *Wikipedia, The Free Encyclopedia* (Vol. 2008).

**Table 1: Survey response**

Survey	Responses
First	111
Second	66
Sample attrition	45
Third	129
Fourth	92
Sample attrition	37
Grand Total	398
Number of variables	72

**Table 2: Internet access for each survey**

Internet access/Survey	S1	S2	S3	S4
Fast Internet-Broadband (cable, DSL)	101	61	121	82
Dial-up	4	4	1	3
No Connection	6	1	6	7

Note:  $\chi^2 = 7.3626$ ,  $df = 6$ ,  $p = 0.2886$

**Table 3: Students' College or Major**

Students' College or Major/Survey	S1	S2	S3	S4
Arts, Media, and Design	6	8	12	7
Business Administration	58	29	58	41
Education and Professional Studies	7	6	12	13
Liberal Arts	6	7	15	15
Mathematics and Science	12	4	11	6
Undecided	22	12	20	10

Note:  $\chi^2 = 16.712$ ,  $df = NA$ ,  $p = 0.3324$  ( $p$  value simulated based on 10,000 replicates)

**Table 4: Students' weekly use of computers for study, by College or Major**

Hours of computer use/College or Major	AMD	BA	EPS	LA	MS	N	Total
< 1 hours	6	21	2	2	2	15	48
1 - 5 hours	17	85	21	23	18	36	200
5 - 10 hours	6	44	8	9	8	10	85
10 - 20 hours	3	26	6	4	3	2	44
21 - 40 hours	0	5	0	4	2	0	11
> 40 hours	1	3	0	1	0	0	4

Note:  $\chi^2 = 36.6173$ ,  $df = NA$ ,  $p = 0.065$  ( $p$  value simulated based on 10,000 replicates)

AMD – Arts, Media and Design

BA – Business Administration

EPS – Educational and Professional Studies

LA – Liberal Arts

MS – Mathematics and Sciences

N – Undecided

**Table 5.: Student opinion about posting assignments on the Internet**

Do not mind posting assignments	S1	S2	S3	S4
Never did it	28	6	46	7
No	17	18	19	20
Yes	65	42	64	65

Note:  $\chi^2 = 34.303$ ,  $df = 6$ ,  $p = 5.878 \times 10^{-6}$

**Table 6.Student opinion about using the Internet to work on group assignments**

Internet for group assignments	S1	S2	S3	S4
I don't know	18	11	18	10
No	19	17	25	10
Yes	73	38	86	72

Note:  $\chi^2 = 8.913$ ,  $df = 6$ ,  $p = 0.178$

**Table 7.Student opinion about using wikis to work on group assignments**

Wikis for group assignments	S1	S2	S3	S4
I don't know	NA	6	55	12
No	NA	24	21	17
Yes	NA	36	52	62

Note:  $\chi^2 = 23.309$ ,  $df = 2$ ,  $p = 8.678 \times 10^{-6}$

Figure Captions

Figure 1. *Distribution of student age.*

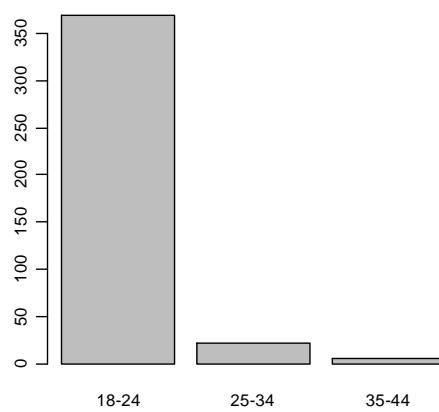


Figure 2. *Number of students by working status*

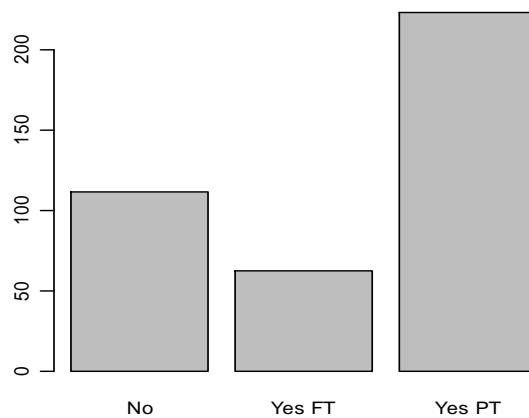


Figure 3. *Number of students by College or Major*

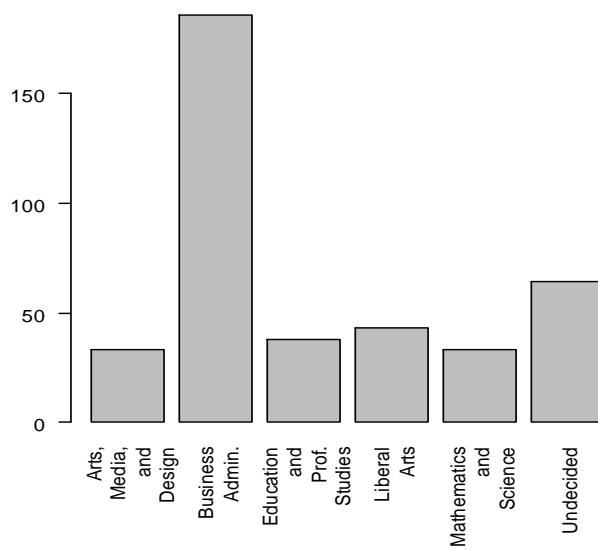


Figure 4. *Number of students by classification*

