

Redesigning Course Delivery and Instructional Methods for the inclusion of Web 2.0: Lessons from the Trenches

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Abstract: This paper presents the findings from the early stages of a mixed-methods, multi-phase research project which examines the integration of Web 2.0 tools in the higher education classroom to increase student information seeking, collaboration, and self-regulation. Exploratory research using in-depth semi-structured faculty (n=5) interviews and student (n=17) focus groups suggested that both faculty and students alike are looking for alternative methods of course delivery more in line with the connected world that we are living in. These findings informed the redesign of an undergraduate marketing course trialed throughout one full semester. In order to collect data on the student (n=85) perceptions a French version of the PPI-IvT (Lee & Tsai, 2011) questionnaire was used. The results rather surprisingly suggest that students are not as ready for change as they might purport to be. The paper closes with suggestions for educators who might want to head down this path.

Introduction

Learning, the core business of Higher Education (HE) is being challenged with the increased use of Web 2.0. As the inroads it is making into the classroom grow, innovation in instructional design and an increased focus on the student learning experience will be called for. Students currently entering higher education are not only of a different generation to those educating them but have literally grown up in a different world. A world where Web 2.0 is as pervasive as it is ubiquitous. Technological change of this nature has, and will continue to, impact our lives bringing about change and calling the way things are done into question, not the least of which is education.

As McLoughlin and Lee (2010) so rightly put it, with the growth in Web 2.0 capabilities and applications available to educators “tertiary education institutions are faced with ever expanding opportunities to integrate social media and technologies into teaching, learning and assessment”. (p. 29). These opportunities are directly related to Web 2.0’s “emphasis on active participation, user generation of content and collaboration [which] seems to fit well with the kinds of creative and critical activities we associate with higher education, with the ways that we know students learn through multiple perspectives, and with the communication and teamwork skills we want our graduates to develop.” (Bennett, Bishop, Dalgarno, Waycott, & Kennedy, 2012, p. 532). Yet the impact on higher education of such technology is only just making itself felt and in the long term remains still largely unknown. It would seem, however, that a rupture with past and even current practices is inevitable but “the potential transformation of the practices themselves is yet barely understood [and] Higher Education Institutes and their students find themselves in uncharted territories with respect to their use of Web 2.0 technologies “ (Armstrong & Franklin, 2008, p. 2).

Finally one must not forget that higher education’s mission is “to apply new technologies as a means toward improved learning rather than as an end in and of itself; that is, to take a pedagogically-disciplined approach to teaching and learning innovation.” (Brill & Park, 2008, p. 70). This paper presents the background research which informed the redesign of a specific course comprising innovative delivery methods and incorporating Web 2.0 tools in its design; information on the course redesign and the results of the student feedback on traditional versus Web 2.0 instructional methods.

Context / Background to the study

The area of research related to the use of Web 2.0 technologies in the classroom has, in recent years, flourished. It is, however, a relatively new area of research and it would seem that much of what is published remains very much in the descriptive about what students are doing and what teachers are doing but with little regard for the pedagogical impacts. Wynn (2013) goes so far as to say “there is a dearth of research focusing on actual effectiveness of the instructional technological expansion within the classroom, and even more perplexing is the lack of investigation on student perceptions toward the cavalcade of technological innovations introduced in the classroom (p.23).

Studies that have examined the theoretical foundations for the inclusion of Web 2.0 technologies in higher education have come from various standpoints. Those that are based on a model of social participation (Bangert, 2009; Hung & Yuen, 2010; Summers & Svinicki, 2007) and which draw on situated learning theory such as that of Lave and Wenger (1991). Others are more firmly anchored in constructivism, constructionism, cognitivism or more recently in connectivism (Conradie, 2014; Siemens, 2004). This research project takes a social constructivist approach and uses the constructs of self-regulation together with that of collaborative learning to frame the research.

Self-regulation, first brought to the fore by Bandura (1986, 1991), was later taken up by Zimmermann (1989, 2000) who defined students employing self-regulation strategies for learning as students who “personally initiate and direct their own efforts to acquire knowledge and skill rather than relying on teachers, parents or other agents of instruction” (Zimmerman, 1989, p. 329). Building on the three-phase model developed by Zimmermann (2000), Dabbagh and Kitsantas (2012) have put forth a three-stage framework that takes into account the inclusion of Web 2.0 tools in course delivery as shown in Table 1.

	Zimmerman (2000)	Dabbagh and Kitsantas (2012)
	<i>Phase</i>	<i>Stage</i>
1	Forethought	Personal information management
2	Performance or volitional control	Social interaction and collaboration
3	Self-reflection	Information aggregation and management

Table 1: Framework comparison

Nicol and MacFarlane-Dick speak of self-regulation as something that “is manifested in the active monitoring and regulation of a number of different learning processes: e.g. the setting of, and orientation towards, learning goals; the strategies used to achieve goals; the management of resources; the effort exerted; reactions to external feedback; the products produced.” (2006, p. 199). Other research (Pintrich, 2004; Winters, Greene, & Costich, 2008; Zumbrunn, Tadlock, & Roberts, 2011) highlights aspects of purposeful action, active construction of learning, and the control of one’s learning directed actions All being skills that institutes of higher learning not only hope their students might develop but are part of the skill set that will impact employability and provide adequate reason for looking into the construct of self-regulation in order to inform course design and delivery. Skills that the students are particularly called on to develop within this framework include those of information-seeking and collaboration. The management of their own learning takes on new proportions and its management calls for the development of self-regulation processes, however, as Zumbrunn, Tadlock and Roberts (2011), point out, “few students naturally do this well” (pg. 4).

This research also draws on previous work which has designed pedagogical innovations drawing on self-regulation with the intent of fostering collaboration (Fisher, Bruhn, Gräsel, & Mandl, 2002; Järvelä, Näykki, Laru, & Luokkanen, 2007; Leinonen & Järvelä, 2006; Li, Ingram-El Helou, & Gillet, 2012), some of which incorporate Web 2.0 tools.

Clearly there are opportunities to review practice with the aim of scaffolding the students through staged guidance and the integration of Web 2.0 tools to become increasingly self-sufficient, self-regulated learners. Cristol speaks of the “educational ecosystem” (2014) [which] calls for the self-regulation of learning and this in an unprecedented context of information access and exchange which naturally lends itself to collaboration. Research in collaborative learning has taken many turns over the years moving from a focus on the individual to having more of a focus on the group (Dillenbourg, Baker, Blaye, & O'Malley, 1996; Roschelle, 1996). More recent research has looked at the relationship between self-regulation and collaborative learning (De Corte, 2012; Järvelä, et al., 2007; Lee & Tsai, 2011; Leinonen, Järvelä, & Häkkinen, 2005; Li, et al., 2012) to which one can add research on pedagogical innovations drawing on self-regulation with the intent of fostering collaboration (Fisher, et al., 2002; Järvelä, et al., 2007; Leinonen & Järvelä, 2006; Li, et al., 2012), some of which incorporate Web 2.0 tools.

Finally the question is what instructional strategies can be used in order to elicit collaborative learning and self-regulation processes and how can the use of Web 2.0 tools contribute to this. As Järvelä et al. (2007) remind us, “there is a need to increase student opportunities for self-regulating their learning on an individual as well as socially shared level. Wireless networks and mobile tools will provide future potential for developing learning in higher education, which needs to be explored in detail” (p. 77).

Methodology

This paper reports the preliminary findings from the exploratory and first stages of a larger project currently being carried out at the University of Applied Sciences in Western Switzerland HES-SO Valais Business School. The sample and method for each of the stages are presented below.

A mixed methods, multi-stage approach has been taken in this research. The initial exploratory stage which was conducted to explore current practice and attitudes towards the inclusion of Web 2.0 in course delivery as well as to permit the identification of issues on the sides of both the faculty and the students, included two qualitative means of gathering data. Business school faculty were asked if they would be interested in participating in an interview on the topic of “course design and delivery for the 21st century: the integration of Web 2.0 in higher education”. Five 30-minute long, semi-structured interviews were carried out. Participating faculty had between five and twenty-plus years of teaching experience in various business-related subject areas (corporate governance, marketing, human resource). An interview guide which included broad subject areas of style of instruction, use of Web 2.0, student expectations was used to conduct the interviews all of which were all recorded with the participants’ permission. The interviews were then fully transcribed and coded. An integrated approach was taken for the development of the code structure with an organizing framework based on the themes researched for the initial codes (Miles & Huberman, 1994) supplemented by emerging themes that came out through the reading and re-reading of the transcripts. All transcripts were coded individually by the two researchers before being compared and recoded where necessary.

Concurrent to the faculty interviews two one and a half hour long focus groups were carried out by the researchers themselves. Students at the HES-SO Valais Business School were invited to participate in a focus group discussion on the use of Web 2.0 tools in course delivery. The sample (n=17) comprised students majoring in business administration (n=5), computer science (n=8) and tourism (n=4). The focus groups were both recorded and videoed with the students’ permission. The focus groups were conducted as an open exchange with a series of questions meant to steer the discussion being put forth by the focus group leader. Sample questions are shown in Table 2. Full transcripts were made following the meetings and subject to content analysis.

What Web 2.0 tools do you use for learning?
What Web 2.0 tools do you use with you peers?
What Web 2.0 toots do you use with your teachers?
What instructional style do you prefer?

What suggestions concerning instructional style would you like to make?

Table 2: Sample questions from the focus groups

The compiled faculty / students findings provided the basis for the next stage of this project. The option of using action research was chosen in order to allow for the trialling of alternative instructional design and course delivery. The reason for this was two-fold; in the first instance to respond to issues raised in the exploratory research and in the second instance to purposefully design the course around the elements of information searching, collaboration and self-regulation in order to ground it clearly in a pedagogical framework and to go past just the trying out of new faddish practices that seemed to be of interest.

Accordingly a learner-centered, semester-long, classroom intervention was piloted. The course chosen for redesign was the first semester marketing course held at the HES-SO Valais Business School and delivered by one of the researchers on the project. The course was completely revised, going from the more traditional delivery to a learner-centred course developed around the use of Web 2.0 tools.

During the semester class observation was conducted and student feedback encouraged. At the end of the semester a self-report questionnaire using a translation of Lee and Tsai's (2011) PPI-IvT questionnaire was used to gather data on student perceptions of both traditional and alternative methods of course delivery. The original questionnaire which is in English, was translated into French and then back-translated into English before finalizing the French version. The questionnaire consists of 21 statements grouped under three headings: information-seeking, collaboration and self-regulation. "For example, "sharing classnotes or learning materials with peers" is an item for the collaboration aspect. "Learn at my own pace" is a sample statement for the SRL aspect, and "trying different searching approaches for finding new learning materials" is an example for the IS aspect" (Lee & Tsais, 2011, p.907). For each question respondents are asked to mark their perception on a five-point Likert scale. Each question is scored on three dimensions: capability, experience and interest. At this stage we are interested in how the student perceptions of the traditional versus the experimental Web 2.0 classroom. The same statements were thus repeated twice, once for each situation. For comparison purposes students, who have a course-load consisting of between six and eight different courses, were asked to refer to one of their other more "traditional" courses.

The sample (n=85) comprised 1st-year Bachelor degree students studying business at the University of Applied Sciences of Western Switzerland. The respondents were 36% male and 64% female having an average age of 22 years.

Having a sample made up of a single population which provided responses in terms of capability, experience and interest, about two different types of course delivery: traditional and the Web 2.0 classroom it was not possible to analyze the data using an ANOVA. As an alternative the following statistical tests were applied.

- Principal Component Analysis (PCA) followed by an analysis of the factorial design
- Hierarchical clustering (Euclidean distance and Ward's method) in order to determine the optimal number of classes
- K-mean calculation in order to minimize classification error of the individuals
- Discriminant analysis to check for the robustness of the classes

The reason for this data-mining approach (Larose, 2014) is that it allows for the construction of clusters which clearly show the regularity between the students. These results are discussed in the following section.

Findings

Qualitative findings

The initial exploratory research set out to “take the temperature” so to speak, amongst colleagues with respect to the use of Web 2.0 tools in the classroom to positively impact the learning experience. One thing that came across was a lack of understanding, especially on the part of the educators of what Web 2.0 implies. It became clear through the interviews that despite the collaborative nature of Web 2.0 and the possibilities available to the educators that most were using the Web 2.0 technology in just a static a manner as Web 1.0. Rather than taking advantage of the interactive component of Web 2.0 to promote information-seeking on the part of the students for example, faculty seemed to look negatively upon the intrusion of this tool and the dearth of information now available to the students. Rather than pushing students to take on more responsibility for their learning faculty seemed puzzled about how to react. There was, however, consensus that things seem to be changing and that students seem to be more demanding than previously. Much of what came out in the interviews, despite the small number, is in line with other published research (Armstrong & Franklin, 2008; Campion, Nalda, & Rivilla, 2012; Conole & Alevizou, 2010; Roblyer, McDaniel, Webb, Herman, & Witty, 2010) among others, which suggests that a real change in expectations, practices and how learning is seen by both students and faculty is indeed operating.

Selected findings related to the theme of “changing style of instruction” are shown below, illustrated with exemplars taken from the transcripts.

Changing style of instruction

All of the faculty came out with statements to suggest that the role of the teacher today should be in a supporting role and more like that of a coach and felt challenged by what they perceived to be a shortened attention-span on the part of the students, and the intrusion of technology in the classroom. Sample comments were:

Before it was enough to have good course documents and slides and that worked very well, today students no longer find this acceptable practice.

They (students) are not looking for straight information but for an interpretation, for an understanding of the information.

You need to vary your teaching. Their (the students) capacity to concentrate and be attentive has changed considerably, previously, one could spend 90 minutes on a subject. Today they do lots of things at the same time as they are listening to you.

(The computer) is just another added distraction. It's much more difficult to pay attention in so far as there is always something happening on the computer screen.

You have to know what to do with this competition rather than always letting them escape.

When you used to have group work the students stayed together and worked on the documents together. Now they get together, dispatch the work the work and each one works individually with their machine.

Even when they (the students) work in groups, very often, we see that they work separately before putting the information together.

During this same period several exploratory focus groups were carried out with undergraduate students at the HES-SO Valais business school (n=17 students). Exemplars taken from the focus group transcripts give an indication of the student point of view on the same theme as above.

Style of instruction

There was considerable agreement on the part of the students that faculty should be adapting their style of instruction to a changing, connected environment where information can be accessed easily and at great speed. Their expectations are far from the edutainment ones that one might expect but are more in line with a request for something that will add real value to their learning.

The teacher has the potential to make a subject interesting so that we quit internet. At the same time it's a challenge for them to have internet opposite them, it's a bit like their competition.

Change the way that classes are given for example with student presentations during the course so that we learn rather than just throwing the information at us.

If the teacher speaks about his experience and if he includes current affairs that would be interesting for the students.

I don't want a teacher who comes to class to tell me face-to-face what I can read on my own. Sitting in classroom to waste my time bothers me. Suggest areas of research and we'll talk about it afterwards.

There are classes where we are physically present but that's all. In actual fact we work more at home and review the subject matter if there is a project to work on.

Some classes are just not adapted, like when the teacher reads his slides and we waste an hour listening

Today we collaborate a lot on Facebook and also on Google Docs where several people can work together, we know who is doing what, have access to the different versions and everyone is present virtually and it also depends on the urgency and whether someone wants an immediate response.

The above findings informed the redesign of the marketing course. On the one hand it was seen as important to explore how, through instructional design, faculty can take up the challenge of today's student encouraging information-seeking, collaboration and contributing to the development of self-regulation and show that this could indeed be done. On the other hand the course redesign was seen as an answer to what students seemed to be asking for. Throughout the semester the students were observed and encouraged to give feed-back on the changes by the researcher delivering the redesigned marketing course. Student response was varied running the whole gamut from very positive to extremely negative and included not only informal oral feedback but also written e-mails in which one student took a very clear stance by asking that the course delivery changed back to the traditional style. The work done by the students was of good quality and the students were, overall, very participative. Despite the variation, the overall impression given by the students seemed positive. In order to have something more than passing conversations the distribution the PPI-IvT (Lee & Tsai, 2011) questionnaire at the end of the semester provides some interesting insight on the student's perception of the Web 2.0 versus the traditional course.

Multivariate analysis results

From a purely statistical point of view all three analyses carried out (information-seeking, collaboration and self-regulation) the scree plot is very diluted as seen in Figures 1, 2 and 3. This shows that there is in fact no consensus among the students with regard to the two methods of course delivery. The analyses are, however, statistically acceptable. Table 3 indicates the factor criteria for the PCA.

	Bartlett's sphericity test	KMO values
PCA 1	<0.0001	0.837
PCA 2	<0.0001	0.817
PCA 3	<0.0001	0.818

Table 3: Principal Components Analysis factor criteria

Clustering through PCA indicates that three to five groups allow for the best classification. For each of the scree plots shown below an accompanying Confusion Matrix is presented which validates the robustness of the classification

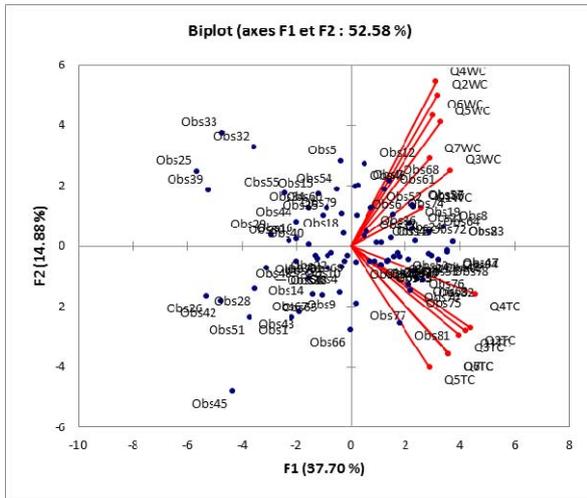


Figure 1: Biplot of the “collaboration” data (quest. 1-7)

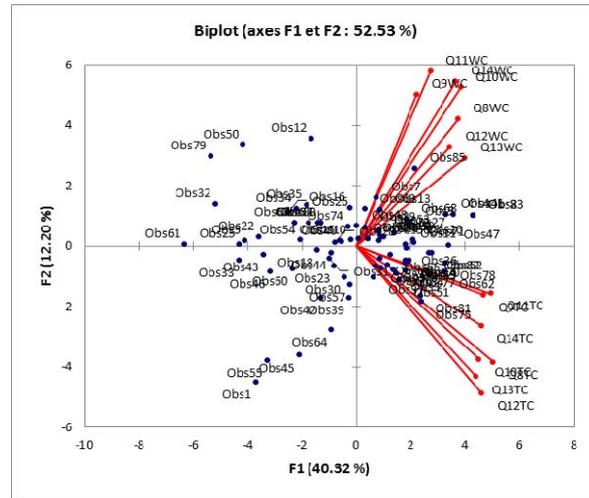


Figure 2: Biplot of the “SRL” data (quest. 8-14)

de \ Vers	1	2	3	4	Total	% correct
1	17	1	0	0	18	94.44%
2	0	36	0	2	38	94.74%
3	1	0	17	0	18	94.44%
4	1	0	0	10	11	90.91%
Total	19	37	17	12	85	94.12%

Table 4 : Confusion Matrix (quest. 1-7)

de \ Vers	1	2	3	4	Total	% correct
1	5	0	0	0	5	100.00%
2	0	45	0	0	45	100.00%
3	0	0	15	0	15	100.00%
4	0	1	0	19	20	95.00%
Total	5	46	15	19	85	98.82%

Table 5 : Confusion Matrix (quest. 8-14)

One can see that the classification is very high at 94.12% with only 5 of the 85 individuals not situated in the correct class. On the table 5, the classification is extremely high at 98.82% with only 1 of the 85 individuals not situated in the correct class.

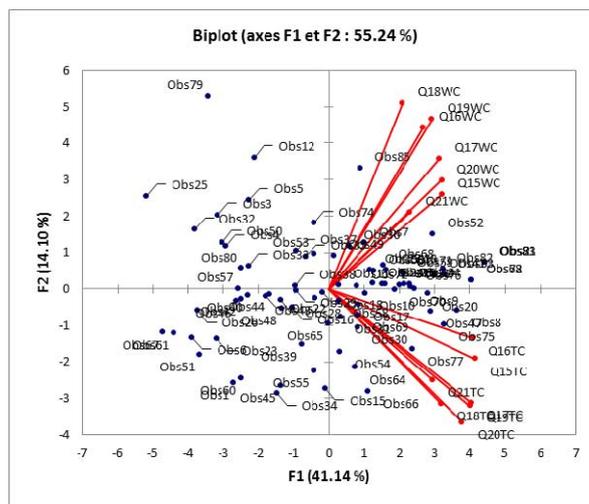


Figure 3: Biplot of the “information seeking” data (quest. 15-21)

de \ Vers	1	2	3	4	Total	% correct
1	19	1	0	0	20	95.00%
2	0	38	0	0	38	100.00%
3	0	1	12	0	13	92.31%
4	0	0	0	14	14	100.00%
Total	19	40	12	14	85	97.65%

Table 6: Confusion Matrix (quest. 15-21)

One can see that the classification is extremely high at 97.65% with only 2 of the 85 individuals not situated in the correct class. Despite the scattered nature of the scree plots the use of the confusion matrices validates the robustness of the measure and allows conclusions to be drawn from it. These are presented in the following section.

Finally the quantitative results are of interest in that they seem to refute the focus group findings and at the same time are in line with the informal feedback received from the students throughout the semester. Generally in Principal Components Analysis (PCA) one would expect to find 65% of the plot concentrated along the F1 and F2 axes. In this case we only find between 52 and 56% of the total. This can be explained by the extremely diverse student profiles. It was, however, possible to group the respondents into four distinct classes validated by the very high confusion matrix percentages for the three.

In the cases of *collaboration* and *self-regulation learning* it is worth noting that a certain number of individuals are clustered in the center of the plot which shows that they do not have a strong opinion in either direction. To the right of the vertical F2 axis one sees the group of students not taking a clear stand for or against one or the other type of instruction (traditional, Web 2.0 based) which is why the plot is found dispersed amongst the two quadrants. To the left of the F2 axis one sees the students who do not appreciate a particular type of course delivery, however, here too one sees that opinions are very mixed. Taking Figure 1 “*collaboration*” one can clearly see that there are two sub-groups. The individual Obs45 represents the student most opposed at a Web 2.0 approach in the classroom and the individual Obs33 represents the student most opposed to the traditional classroom. Finally the plot that shows the most dispersion is that related to *information seeking* (Figure 3).

Discussion

The findings from the exploratory research all pointed towards a desire on the part of the students to have a classroom that they would find more stimulating and interesting and one in which they would be the actor. For their part, the faculty expressed interest about how to handle what they felt was a changing environment and how best to encourage learning in it. The challenge was how to respond to this input in a pedagogically sound manner. The redesigned Web 2.0 course aimed to increasing collaborative learning, push students to seek out increased information and to take on more responsibility for their own learning and thus develop their own self-regulation strategies in the process keeping in mind Järvelä et al’s (2007) suggestion that students be given specific opportunities to develop such skills. The class redesign also took up the challenge of integrating Web 2.0 tools in such a manner as to make them an asset and not just the competition. Finally the redesign was also in answer to what the students had made clear through the focus groups about how course delivery needed to change.

Based on the quantitative results one can only conclude that, despite the opinions expressed in the focus groups carried out during the exploratory phase of this project, students have very mixed opinions what type of course delivery they would actually prefer. Despite what seemed, on the surface, to be a positive in-class experience, one can only concur with Wynn (2013) that additional research is required on both instructional design and even more importantly on student perceptions. It seems clear that there are other factors operating here and that further research will be necessary to uncover what lies behind these results. The quantitative results suggest that it is neither the course delivery nor the instructional methods that are having an influence on the students but another factor, possibly related to the learning environment, which was not taken into account in this research.

For educators interested in course redesign to include Web 2.0 tools the lessons learned here are that this is an endeavor to undertake in full collaboration with the students. It is also of importance that specific objectives such as improving information seeking skills be formulated in order to take the pedagogically informed approach advocated by Brill and Park (2008).

Conclusions

One could say that societies today are undergoing a transformation analogous to that which occurred during the industrial revolution and that where “the real breakthrough of the industrial revolution occurred when machinery was used to produce machinery [...] the full scale transformation into a learning economy will have to await the systematic application of knowledge to the production of knowledge” (OECD, 2000, p. 12). In other words, putting our knowledge of how best to teach and how best students learn into practice is a challenge yet to be met.

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