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Table of Contents – August 2013

Return to Table of Contents

Editorial

Natural learning

Donald G. Perrin

The 1960s was an exciting decade in the development of instructional technology and instructional design. After Sputnik, federal funds flowed freely for curriculum and instructional improvements. Results of many of these projects were integrated into a series of Occasional papers published by the Technological Development Project of the National Education Association.

Small publishing houses like Fearon put out a series of innovative titles such as *Objectives – Tool for Change* by Peter Pipe; *Preparing Instructional Objectives* (1962) by Robert F. Mager, Management by Objectives by George S. Osborne, and *Instructional Systems* by Bela H. Benathy. Benjamin Bloom, Robert Diamond, Norman Crowder, Robert Gagne, B.F. Skinner and scores of other writers and researchers enriched this decade with research and theories that became the foundations of instructional technology and instructional design. At the end of the decade, Bowker published *To Improve Learning: An evaluation of Instructional technology* edited by Sydney G. Tickton. This included the report of the Commission on Instructional Technology accompanied by selected working papers.

If we watch little children as they explore their universe, we see that learning is the result of experience with much trial-and-error. Left alone, children accomplish much learning by themselves. They also benefit from approval as with BF Skinner's operant conditioning - stimulus-response-reward. From the research we see extraordinary feats, like a three-year old learning a 1,000 word vocabulary using a "teaching machine".

As we work with older children and adults, we look for more structured learning opportunities. Behavioral-, or more recently performance-objectives become the blueprint for learning. Mager used a description of the desired (terminal) behavior as the objective, qualified by the level of achievement required (criterion) and the conditions under which success would be demonstrated. See Writing Learning *Objectives*: Beginning With The End In Mind

Mager also noted that if the objective was stated in clear and precise terms, many students could accomplish learning with little or no assistance. Sugata Mitra, in his talk on ted.com took this one step further. He provided a "hole-in-the-wall" learning environment for street children in India. By following their curiosity, and by working together, the children set up and successfully achieved their own learning objectives. Mitra discusses factors in traditional education that inhibit learning. http://www.ted.com/talks/sugata_mitra_build_a_school_in_the_cloud.html.

In this era of exploding technologies and socio-economic change, we need to revisit the learning architecture, especially methods of teaching, used in schools and colleges. Perhaps the educational system, in its effort to stimulate learning, has become too controlling and actually stifled curiosity, creativity, and our natural ability to learn?

Return to Table of Contents

Return to Table of Contents

Editor's Note: Even in primary schools, students are more competent than their classroom teachers in use of new technologies. Over the generations, students helped teachers to use motion picture projectors, video recorders, and computers in the classroom. Even today's teachers, drawn from a technology savvy culture, are still discovering how to use WEB 2.0 tools to support teaching and learning. This study provides valuable data on social networking tools used by students and their potential value for education.

Social media use among pre-service primary teachers

Wendy Nielsen, Rachel Moll, Teresa Farrell, Nicole McDaid and Garry Hoban
Australia and Canada

Abstract

This research explores preservice science teachers' social media practices as a first step in considering how to better utilize these tools in preservice teacher education. This is an important issue as these teachers will work with the next generation of students, who are likely to be even more connected through technology tools. We report data from a survey called the *Social Media and Science Learning Survey* that collects information about proficiencies and frequencies of use for a variety of social media tools for learning science. Results are from a cohort of 119 Australian primary teacher-education students in the context of their first year science methods subject. Results suggest social media behavior is different between use for everyday and their science methods subject in preservice teacher education. These differences may offer insight into how to prompt preservice teachers to more effectively utilize social media tools for connected learning and ultimately as instructional technology tools in their own classrooms.

Keywords: Social media, Primary teacher education, Science teacher education, Science learning, Web 2.0 tools, Educational technology

Introduction

This research explores how preservice primary teachers in a science methods subject use social media resources to learn science content. Our interest in the topic stems from our experience in teaching science across a variety of contexts and our desire to build from our students' experience to engage learners with 21st century technologies. We see this engagement as significant for preservice teachers' learning science, but also for their skill and knowledge development as future primary school teachers who will be expected to effectively utilize instructional technologies in their classroom practice.

Perspectives

Social media technologies have become ubiquitous, connecting learners to each other and information and leading to a worldwide shift in how knowledge is created, stored and shared. We adopt Kaplan and Haenlein's (2010) definition of social media as software and web-based technologies that facilitate interactive dialogues and connectivity using the capabilities of Web 2.0 technology that allow for the creation and exchange of user-generated content. Examples include video sharing platforms (e.g., You Tube), photo sharing sites (e.g., Flickr) and social networking sites (e.g., Facebook, Twitter).

Historically the development of new technologies (e.g., language, mass production of books) facilitated humans to cohere into grander unities with emergent behaviour (i.e., cultural groups). In order to examine social media use as a 21st century technological phenomenon, we adopted Bunge's (1999) perspective that technology defines a culture in terms of its methods, theories and practices, In Attwell and Hughes' (2010) literature review of pedagogic approaches to using technology, a wide range of learning theories were summarized; however, their application in the area of creating pedagogies for learning with technology were not offered, perhaps because the

examples did not yet exist. Bates (2011) acknowledged "Web 2.0 tools are so relatively new to education that educators have yet to find new designs for teaching and learning that fully exploit such tools" (p. 26). We draw on these perspectives to position our work in preservice teacher education and how our students will be expected to adapt Web 2.0 tools and technologies in their teaching practices to engage the next generation of 21st century learners.

Social media will play a key role in education reforms to implement 21st century learning (Howard & Carceller, 2010; Rice, Thomas & O'Toole, 2009) and as teacher educators, we need to understand our students' current practices in using social media in order to profit from the widespread availability of such tools. Applying a critical lens is important too, as suggested by this Journal's editors: "Facebook…deserves intense and critical analysis" (Editor's note, Blattner & Fiori, 2009) and as teacher educators who work with 21st century learners, the current article offers grounding for this sort of analysis.

While Web 2.0 tools are currently being promoted to engage 21st century learners in science learning, research literature has shown that students in primary education generally study very little science in high school (see for example, Bennett, 2001; Tytler, 2008). We can also question the degree to which preservice teachers are technically proficient or competent in their use of Web 2.0 tools. Teacher educators and teacher education programs can potentially benefit from enhanced understanding of how preservice teachers use Web 2.0 tools for science learning in their degree programs. Thus, we ask the following research question: *What are preservice primary science teachers' social media practices?*

Methods and data sources

This study administered a survey called the *Social Media and Science Learning Survey* (Author, 2013), which asks students to rate themselves on their use of social media tools according to their perceived levels of proficiency (e.g. such as 'non-user', 'novice', 'competent' or 'proficient') in the context of learning science in their first year science methods subject and for everyday use. The survey is organized into several sections including quantitative (everyday use; science learning use in the methods subject) and qualitative (open-ended questions about media practices and science learning more generally). The survey defines levels of proficiency as follows:

Non-user: "Never heard of it or never used it"

Novice: "I've used it once or twice"

Competent: "I've got an account and I use it to mostly read content"

Proficient: "I frequently use this application to both read content and to contribute content"

Demographic questions seek basic information regarding age group, gender and internet access. The survey was developed as part of an international collaboration where focus groups in Canada asked physics students about the kinds of social media tools that they used and how they used them to support their physics learning (Author, 2013; Moll & Hengstler, 2012). We adapted this survey for use with preservice teachers studying a science methods subject to compare university and everyday use of social media tools. The potential gap between these uses may offer guidance about how teacher education programs could better utilize capacities and proficiencies of these students for university learning.

The survey was administered to a cohort of 150 preservice primary education students present at the weekly lecture in October of the Spring term in a subject called K-6 Science & Technology: Curriculum and Instruction. Instructors in the subject are part of the author team for this paper. Survey administration was in accord with the university's ethics protocols and 119 surveys were returned completed, representing a 79.3% return rate. All data were entered into SPSS, which was used to conduct descriptive analyses.

Results

Data and analysis from the survey where preservice teachers offers a glimpse into their use of social media tools and techniques as they learn science in the context of their science methods subject during the Bachelor of Education degree program. This section begins with a summary of demographic information and then presents survey results on students' perceived levels of proficiency and frequency of use for various social media applications. The second section considers how these students reported using the social media tools for everyday use. In synthesizing these results, we discuss usage patterns for this group of learners, which could help us as teacher educators to understand both these students' science learning needs and how to help develop technical proficiencies into pedagogies for teaching in their future classrooms.

Demographics

Demographic questions on the survey asked for gender, age range and devices that participants used to connect to the internet. Table 1 shows age range and gender data for this cohort of first year students.

Table 1
Participant Age Range and Gender Data Summary

Age (yrs)	<19	19-25	26-35	>35	Total (%)
Participants	35	68	12	4	119
(%)	(29.4)	(57.1)	(10.1)	(3.4)	(100)
Female	28	56	8	4	96 (80.6)
Male	7	12	4	0	23 (19.3)
2012 Cohort	99	105	24	5	232
(%)	(42.7)	(45.2)	(10.3)	(2.2)	(100)
Female	83	87	16	4	189 (81.5)
Male	16	18	8	1	43 (18.5)
Australia	116534	131816	27700	23748	299 801
N=299 801	(38.9%)	(43.9%)	(9.2%)	(7.9%)	(100)
Female	(a)				168788 (56.3)
Male					131013 (43.7)

(a) Note: Data were extracted from census reports and do not include gender breakdown across age ranges (Commonwealth of Australia, 2012). Age distribution data are from the Australia-wide cohort of university entrant students in 2012.

Participants include 96 female (80.6%) and 23 male (19.3%). The female to male ratio of this cohort is very nearly the same as the program's 5-year average for first year intake (81.4% female, 18.6% male), slightly different from the entire first year cohort at the University of Wollongong, and noticeably different from the Australia-wide population of first year university students. The category of Under 19 students is underrepresented in the participant sample, while the category of 19-25 year olds is slightly overrepresented in the study sample. Anecdotally we are aware that Under-19 students are the ones most likely to miss lectures, and thus would not have been present during survey administration.

In addition to basic demographic data, the survey asked participants to indicate which of the listed devices were used to connect to the internet. Most students reported multiple devices and Table 2 presents these data. Results show that students utilize multiple tools to connect to the internet, with laptop computers and smartphones used most commonly. The survey does not ask respondents to specify where each of these devices are predominantly used, although some conclusions can be drawn from the particular device (e.g. desktop computers are used at home; campus computers are available in the university library). Other devices included: 'normal phone', mobile phone and 'PS3.'

Table 2
Numbers of participants and ways they connect to the internet (N=119)

Device	n	Device	n	Device	n
Smartphone	98	laptop	111	desktop/home computer	60
iPad/tablet	31	iPod	37	on-campus computer	62
other	3				

Proficient/competent use of social media tools in university science learning

In this section, we present data on students' reported levels of proficiency in using social media tools and discuss how the tools were used. Table 3 reports data across the quantitative sections of the *Social Media and Science Learning Survey* for our participating first year Primary Education students. Despite the wide research literature that suggests the 'net generation' are digitally savvy and learn in different ways because of their high levels of connectivity (Prensky, 2001a, b), we were surprised by the overall limited use by our preservice teachers of social media tools for learning in this science methods subject. We see this by way of comparison to these students' use of social media tools in everyday life, analyses that are offered in the next section. Survey results are presented in Table 3 as a percentage of participants who reported either 'proficient' or 'competent' use for each of the tools surveyed for either university science learning or everyday use.

Data presented in Table 3 demonstrates that preservice teachers felt most capable with social networking (SN, 59%), videosharing (VID, 47%) and the Learning Management System (LMS, 38%) for science learning. Students reported they felt less competent with document management tools, such as Google docs or Dropbox (DOC, 22%), wikis (W, 19%) and communications tools, such as MSN Chat (COMM, 18%). Table 3 also reports the mean values on the competence scale along with standard deviations. We note the high SD values for many of the social media tools and thus participant responses are highly variable. Recall that the competence levels for each application were indicated on a 4-point Likert scale that we converted to numeric values for analysis (0=never used it; 1=novice; 2=competent; 3=proficient).

Social networking (e.g. Facebook) was the application that had the highest number of preservice teachers reporting proficient or competent use for science learning (59%, mean=1.75, SD=1.14). This is a fairly high level of proficiency that perhaps should not be surprising. However, with the ubiquitous nature of Facebook and close to 100% using social media for everyday use, (98%, mean=2.75, SD=0.51) we wonder why just over half of our students reported such a level for science learning. Because this value is just over half of the students, we are led to wonder if most students do not use Facebook as a learning tool because they do not know how.

Of the 63 preservice teachers who commented on the open-ended questions asking how they used social networking tools for science learning, comments like this were typical: "We have a Facebook group with *primary ed* people and we ask each other questions" or "[I] ask friends for information on the assignments." We note that 56 students did not offer a response to this question, which suggests that Facebook (FB) (or other sites for social networking) are only used in a limited way (if at all) for science learning. Further, there were at least two FB Groups that our B.Ed. students joined in relation to their university studies: the primary year-group B.Ed. Facebook Group (to which the quotes refer) and a subject-based FB group that was set up at the beginning of the term by the instructors in the science methods subject at the center of this research.

Table 3
Social Media Proficiency Data Summary:
Use in University and Everyday Contexts

	University Science use			Everyday use		
Social Media	Comp	Prof/ mean	SD	Comp	Prof/ mean	SD
Social networking (SN)	59%	1.75	1.14	98%	2.75	0.51
Communications (COMM)	18%	0.54	1.00	47%	1.41	1.00
Blogs (BL)	7%	0.20	0.61	19%	0.72	0.11
Microblogs (MBL)	4%	0.13	0.48	14%	0.56	0.96
Document mgmt (DOC)	22%	0.66	1.07	34%	1.10	1.10
Soc bookmarking (SB)	6%	0.17	0.54	7%	0.27	0.66
Social news (NEWS)	3%	0.13	0.46	9%	0.37	0.75
Wikis (W)	19%	0.93	0.99	57%	1.63	0.93
Videosharing (VID)	47%	1.39	1.12	78%	2.07	0.88
Livecast (LIVE)	11%	0.32	0.79	51%	1.49	1.16
Music sharing (MUS)	5%	0.18	0.53	24%	0.80	1.01
Photo sharing (PH)	7%	0.24	0.65	21%	0.74	1.03
Discussion forum (FOR)	16%	0.50	0.85	32%	1.06	0.99
Learning Mgmt Sys (LMS)	38%	1.08	1.24	n/a	n/a	n/a

Competent: "I've got an account and I use it to mostly read content"

Proficient: "I frequently use this application to both read content and to contribute content"

In describing how they used social networking for science learning, some participating students made reference to the subject's Facebook group: "Info for assessments has been put onto the Facebook page." All students in the subject were invited to join the subject group (and about half did). The instruction team used the subject's Facebook Group to share information, events, photos and resources with students. We monitored the site, made regular contributions and invited students to do the same. By the end of the term, 120 (of 215 enrolled students) had joined the subject-based group. Some students shared resources they had found or posted videos of their weekly lab activities on the subject's Facebook site. Other students asked questions and hoped their classmates would answer them. Many of the questions were logistical regarding dates and

times for events or meetings, interpretations of assignment criteria, or working on a group project together. Interestingly, the other Facebook group for the first-year cohort was more widely subscribed than the subject-based one, and it should be noted that the instructors were not invited to be part of this group.

About half of our preservice teachers reported proficient or competent use of videosharing sites such as YouTube (47%). With a mean competency reported at 1.39 (SD=1.12), competency is also highly variable. Participating preservice teachers commonly used videosharing sites to search for ideas or examples for assignments or to try to understand a science concept (for example, density or 'how things work'). This was a similar finding to what Moll, McDaid and Linder (2012) reported with their university physics learners. A small number of the current study's participants reported posting their own videos on YouTube, and one student used YouTube to store a video under construction for an assignment.

The university's learning management system (LMS) was included on the *Social Media and Science Learning Survey* because it includes a discussion board, document management tools, information posts, lecture notes and assignment details and thus can be used in Web 2.0 ways like other social media applications. Students reported accessing the university's LMS for a variety of uses, but most of these were for gathering information about the course rather than 'learning' activity, per se. We were surprised by the small percentage of students (38%) who admitted proficiency or competence with the Learning Management System given that all course materials were posted electronically. The mean of 1.08 (SD=1.24) suggests that many students reported competence levels as 'novice.' This may not be surprising given that the population for this study is first year university students. However, this is the system wherein students register for courses and subjects, check their university email and view their student records and marks, as well as log in to collect lecture notes and study resources. Further, administering the survey in Week 10 (Spring term, early October) meant these students were nearing the end of their first year of university studies. Every student should have accessed the LMS at least twice for this subject, thus, more students should have identified a level above 'novice' ("I've used it once or twice") depending, of course, on how they interpreted the survey item: "Have you used this application to support your science learning in the subject?"

It may be that the students used Facebook in the way that they should have been using the LMS. It appears that the students used the cohort FB group (and not the subject-based FB group) to communicate with one another about subject-specific information. The possible problem may be that in relying on each others' interpretations of course materials or events, there may be misinterpretations or incorrect information promoted. In a way, this is a power struggle between course instructors and students: students prefer to use FB as a communication tool. However, it is not the official university channel for communication and instructors are rightfully reluctant to post everything in two places (one official and one unofficial). And, not all students subscribe to Facebook (or take up the invitation to join a group). Changing (or promoting) student behavior consistent with university policy is another matter. This seems to represent a tension similar to that reported by Watkins (2009) that young adults do not use email, and so, despite a university expectation that students regularly access the university email ("SOLS" or Student On-Line System, specified in the Acceptable Use Agreement as the official channel for communications with students at the university), our data suggest that they do not. The communication tools on the university LMS may be treated similarly to the way young adults consider email: old-fashioned or out-moded (Clark, Logan, Luckin, Mee & Oliver, 2009; Watkins, 2009). The LMS also has document management tools to which students have access, but no students accessed these for the current subject.

A portion of participating students reported proficient or competent levels of use for web-based document management applications such as 'Google Docs' (22%). According to the mean and

standard deviation (mean=0.66; SD=1.07) for these social media tools, competence is again highly variable, but lower overall than for other social media tools. Students also reported how they used document management tools for university science learning. The common uses reported were "sharing" and "editing" for group assignments, which suggests some use of social media tools for learning activities. Interestingly, the science methods subject includes a final task that is a group task, but this had not yet been assigned, thus students would likely not have started work on the group assignment when the survey was completed. Thus, the students were likely reporting document management tool use for university subjects other than science.

A total of 19% of our participating students considered themselves to be proficient or competent using wikis to support their science learning. Again, from the mean and standard deviation (mean=0.93; SD=0.99), competence levels are highly variable and mostly low-level. Most commonly, students visited Wikipedia to look up 'quick facts', definitions, background information or to gather ideas for assignments. It is interesting to note that although Wikipedia and wikis are intended to be social tools for collective knowledge generation, none of the participating students said that they had contributed content to a wiki. This suggests that they more often used this social media tool in a Web 1.0 or passive, conventional way, rather than in a connected way that takes advantage of the technology to build collective knowledge. This is perhaps not surprising, but from this we can justifiably ask about student knowledge of the tools, including what the tools are intended for, how learners position themselves within a community of learners, how they imagine possibilities for tool use, or how they use the tools effectively for personal learning activity.

Comparisons to everyday use

The *Social Media and Science Learning Survey* also asks respondents to identify their levels of proficiency with the same range of social media tools in everyday use (refer to Table 3). In this section, we offer comparisons to our participating students' reported levels of proficiency for university science learning. While we saw only medium levels (at best) of proficiency or competence on the social media tools among our preservice teachers for university science learning, participants reported much higher levels of proficiency or competence with the same social media tools in their everyday lives. For example, 98% of the students reported proficient or competent use with social networking tools such as Facebook (mean=2.75; SD=0.51). Recall that 59% of participants reported proficient or competent levels of use for university science learning with Facebook. Reported proficiency levels for other tools were likewise higher than for university science learning and perhaps suggest a similar lack of understanding of their possible use in science/university learning: videosharing (78% vs. 47%), document management (34% vs. 22%), wikis (57% vs. 19%), livecasting (51% vs. 11%) and communications (47% vs. 18%). Across the entire range of social media tools included in the *Social Media and Science Learning Survey*, our students reported more competent everyday use as compared to that for science learning in university. We also note somewhat less variability in competence levels reported in means and standard deviations for these tools in everyday use.

Consistent with reports of Web 2.0 tool use in the research literature, these results suggest that individuals use a wide array of social media tools, but only in limited ways when it comes to learning (Clark et al., 2009; Watkins, 2009). This difference likely reflects a personal preference for a particular range of preferred applications and that individuals choose to utilize particular applications for reasons beyond science learning, possibilities that we are exploring in further correlational studies.

Synthesis

Participating students will be primary teachers at the end of their Bachelor of Education degree. As a group, they are often characterized by their limited science content knowledge (Davis,

Petish, & Smithey, 2006; Goodrum, Hackling, & Rennie, 2001) and our efforts as science methods subject instructors in preservice teacher education are key to building background knowledge to support them to be science teachers (Appleton, 2006). Further, while we may imagine that our preservice teachers are 'digital natives,' their use of Web 2.0 technologies for science learning are limited as noted in this study, which confirms the claim by Bennett and Maton (2010) that we cannot assume our students are digital natives. Participating students in the current study are clearly fluent with a number of social media tools, as demonstrated by the results around their everyday use. And, as we noted in the demographic section, if anything, our data underrepresents the youngest of our preservice teachers who have come to university directly from high school. Thus, we can surmise that levels of everyday proficiency among our sample population are underestimates of the larger population of first year teacher education students. We believe that the patterns noted in this paper lead to some implications for our work as teacher educators.

Untapped Potential

From the many social media tools considered in this study, we have seen our students' everyday proficiencies of use range from novice to competent, which was a large difference to how our students view their proficiency levels with these same media tools for their science learning. It may be as Mendez et al. (2009) reported, that even though social media use continues to grow, university students prefer to use these tools for social communication purposes rather than interactions with instructors or each other as learners. This limited use and/or engagement with social media tools for learning science represents an untapped potential for utilizing these tools as pedagogical resources in teaching. Further, the tools could be utilized more for sharing resources for teaching and developing understanding. Because virtually all learners are proficient or competent to perform basic functions on a wide range of social media tools using a wide range of internet-accessible devices, teacher educators should attend to these levels of potentiality.

Affordances for Tasks and Assignments

While preservice teachers are learners in a university degree program, there is opportunity for instructors to utilize social media tools in tasks and assignments. There is opportunity to develop creative tasks and assignments that require students to utilize the connectivity of, for example, document sharing tools such as Google Docs or videosharing sites such as YouTube. Document sharing sites offer collaborative tools that enable groups of learners to work asynchronously or synchronously toward a group product (and some of these tools have been used for many years in distance learning settings). We suggest that models exist for the types of tasks that could be integrated into teacher education in face-to-face settings that utilize the affordances of social media tools given the students' fluency with and access to Web 2.0 technologies and applications.

Conclusion

As teacher educators and researchers, we are confident in the claim that a majority of our participating preservice teachers were limited in their ability to use social media tools to support their science learning. Further, this suggests that there is a window of opportunity within teacher education to develop the learning potential of social media tools in our teacher education programs. This could readily take the form of designing tasks and assignments that require students to work with the affordances of various tools. This could help them develop the technical and pedagogical proficiency to utilize more of the potential offered by the variety and ubiquity of social media tools for learning.

We could lament the slow and/or limited uptake of the connected possibilities of Web 2.0 technologies for learning in science and science education, but there is a long history of teacher education programs (and education systems more generally) being slow to respond to societal

changes (Beck & Kosnick, 2002). We suggest that instructors must develop creative responses to the ubiquity of the new technologies, and instead of worrying over whether our students are 'digital natives' or not (or what they can or cannot do), we should 'return to the basics' of pedagogy: model teaching practice and strategies, build authentic assessment tasks and continue to develop our understandings of our students as learners in this 21st century world. In other words, teacher educators need to scaffold the kinds of uses of social media tools that help our preservice teachers bridge their social and learning worlds. By extension, classroom teachers likewise must adopt changes in their own practices to both understand their students and utilize the potential of social media applications as tools for learning in the 21st century.

While young adults commonly use social media for basic communications in a social sense, we see great potential in building a bridge between social use of social media applications and deliberate attention to learning science. Further, these young adults will be teaching the next generation of children, whose digital proficiencies are likely to be even greater, thus attention at the program level in teacher education will have far-reaching consequences.

Educational importance of the study

This study provides an initial exploration of the social media practices of our preservice science teachers. Information about their practices can help us to support their learning science content in science methods subjects. We know that they extensively use social media for staying connected in terms of social interactions, but they are also beginning to use the variety of available tools for collaborating on assignments and discussing challenges within their university learning environments. We would like to know more about how to harness the connectedness possible with social media tools to foster the kinds of learning behaviors among our students that help them deepen their understanding of concepts, but also for these teachers' future use as primary classroom teachers who will teach science, technology and a range of other subjects. Along with policy recommendations, such as those from the OECD (2012), we see this as significant for preparing them to teach in the 21st century. Our own research will continue to examine how, as instructors in teacher education, we can better utilize the learning potential represented by the social connections that Web 2.0 technologies enable. Others in similar contexts would also be advised to consider how to be more deliberate in efforts to teach and support students to build and harness this important social connectedness for learning.

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Return to Table of Contents

Return to Table of Contents

Editor's Note: This study is about training teachers to make optimal use of information and communication technologies (ICT) in conjunction with face-to-face and traditional method of teaching. It found a need for strong support systems for the trainee teaches to effectively blend the new technologies.

The facilitation and support of a blended elearning course for science educators in a rural setting, South Africa

Juliet Stoltenkamp, Martha Kabaka, Norina Braaf
South Africa

Abstract

This research paper presents findings of a qualitative and quantitative case study of implementation of a blended eLearning course for Science educators in Eastern Cape, Mthatha. The Centre for Innovative Educational and Communication Technologies (CIECT) at University of the Western Cape (UWC) designed and developed a course, "Designing an Instructional Event", registered with the South African Quality Authority (SAQA) at a National Qualification Framework (NQF), Level 6. This course was offered in collaboration with the Education Faculty, for the Bachelor of Education Honours Programme **(**BEd Hons); specifically Science Education. The researchers highlight the importance of extensive facilitation and support provided by the CIECT team to motivate educators (full-time working professionals) to become self-directed learners. The educators were expected to complete activities and design an online environment to enhance their Science instruction. Considerable challenges were faced by the facilitators and educators due to limited infrastructure and a lack of commitment by some participants.

Keywords: blended-learning; self-directed learning; professional development; facilitation, online support

Introduction

The blended learning course, "Designing an Instructional Event", aimed at contributing to the Professional Development (PD) of a group of Science educators (full-time working professionals) within the Eastern Cape, Mthatha. Research indicates that, many South African class rooms lack quality teaching skills; therefore there is a need for PD that should be "linked to subject content and pedagogy as the key to improve learners' performance" (South Africa, 2007 as cited by Steyn, 2010:212-213). The South African teachers' skills situation is characterised as lacking "the necessary knowledge, skills and expertise to understand and assist learners, which causes frustration, demotivation and serious feelings of inadequacy, which disrupts effective teaching and successful learning" (Walker, Clover & Ramsey, 1995; Silberg & Kluft, 1998; Nissen, 2000; Sethosa, 2001 as cited in Prinsloo, 2006; 346).

Furthermore, the Ministerial Committee on Rural Education report (2005) identified that teacher-educators faced challenges in the area of PD, which continues to hinder their teaching methodologies. Issues related to PD are acknowledged in the South African Government National policy framework for teacher education. This policy focuses on the "need for suitably qualified teachers across the country", to ensure continuous and sustainable PD Programmes (South Africa, 2007; Steyn, 2010:212-213).

This research focuses on PD, specifically the integration of eTools within Science Education. The design course was offered as part of the BEd Hons Module, Computer Based Education. Hence, the design course broadly aimed to: explain the current trends in eLearning and how they affect the teaching practice; and understand the educational philosophies that could inform the online teaching/learning/instructional practices. Therefore, PD directly links to the available comprehensive literature on the roles of Information Communication Technology (ICT) in Education as discussed under literature review.

Review of relevant literature

ICT in education

ICTs are transforming peoples' ways of lives; for example, the manner in which businesses are conducted, information and services are accessed, entertainment and communication is occurring across societies (Hennessy., Onguko.,Harrison., Ang'ondi., Namalefe., Naseem & Wamakote , 2010:6). The role of ICT in education has continued to receive attention across the globe. Acknowledgement of the benefits of ICT are made by various researchers, such as North Central Regional Education Laboratory (NCREL, Undated), which indicated that "studies of the impact of technology on teaching and learning conclude that technology has an important role to play in education at all school levels from Grade 0 to Grade 12". Marshall (2002:1) likewise indicates that "research both historical and contemporary, suggests that technology-based instruction can and does result in learning".

It's evident that, efforts are being made by governments to ensure that their national policies incorporate ICT's frameworks' to enhance teaching and learning in a general perspective. The white paper on e-Education in South Africa (2003:3) is a good example as it acknowledges ICT as one of the drivers of positive change in education. The white paper states that ICT provides "new learning opportunities and access to educational resources opportunities" needed to support traditional forms of teaching. Other researchers have supported the opinion that ICT plays a positive role in fostering change in education at all levels. Thus, educators should embrace available technologies to support their traditional forms of teaching and help the learners become computer literate.

School management processes also benefit from opportunities provided by ICT (Ferrari, Cachia & Punie, 2009; Condie., Munro., Seagraves & Kenesson, 2007:3). Therefore, any government that capitalises on educational ICT would positively impact the economic and social development of a country; the United States (US) is an example where the government has invested in ICT and "there are many more computers per 1, 000 people than in the less developed countries such as those in Africa". This particular research acknowledges that ICT development in terms of distribution in South Africa is lacking; hence, need for a balanced distribution between urban and rural areas (South African Institute for Distance Education , 2010:13).

There are many challenges to effective and efficient adoption of ICT for education in developing countries' like South Africa. These include among others: high cost, lack of trained staff, and lack of infrastructure and support. (Fundmen, 2010). The specific Programme in this study has played a major part in enhancing educators ICT skills, specifically eSkills. It is commonly agreed that South Africa has the best policies in the world to support these programs, but it is lacking when it comes to implementation these policies on the ground. Existence of a policy does not imply automatic execution. It also results in low adoption of ICT's in poorer parts of the country including teacher-education programs.

According to International Forum of Educational Technology & Society (2005), **"**educators should aim to use technology to enhance individual learning as well as to achieve widespread education and expect the technology to blend with their individual approach to instruction". This may include an eLearning blended-learning course to enhance traditional face-to-face instruction; a course that can be marketed to other South African educators especially across rural-areas. Therefore, educators' efforts to acquire relevant ICT skills need be supported; and generalisation that adult-educators are self-directed learners must be avoided. The literature has shown that adult learners need online support to become self-directed learners, as discussed below.

Online facilitation promotes self-directed learning in the adoption of ICT skills

Every learner, young or adult, is expected to take control of his or her own learning, in both ttraditional and online modes, to promote effective instruction and achievement of set goals. This statement emphasises the need for a "paradigm shift from instructor-led to learner-centred instruction". Traditional modes of instruction alone are no longer adequate to impart new skills to learners (Grace, 2009:3; Collins & O'Brien, 2003). Traditional modes of instruction can be enhanced with online instruction. Online interactions have substantiated their relevance to learners by providing a platform for sharing ideas among course participants, a forum for discussing issues, opportunities for collaboration in solving problems, and facilitating interaction between instructor and learners. It is "the most essential component of any successful web-based course", cited by Lim (1998) in (Grace, 2009:3). Thurmond & Wambach (2004). Who views online interaction "as key to the success of distance learning".

The researchers of this paper advocate that consistent interaction creates a strong support component to encourage self-directed learning, especially when dealing with adult learners whose interest in technology is limited when compared to younger generations. Interaction among learners and facilitators in this research Programme entailed what Thurmond (2003) called "the learner's engagement with the course content, and technological medium used in the course, which results in reciprocal exchange of information", (Thurmond and Wambach, 2004). Constant facilitation and support is also relevant as Lai (2011:98) maintains that online learning still remains a "relatively new domain of adult education practice and its advanced and unique features require adult learners to have some preparations and skills beforehand". Though adult learners are described as more motived to learn as compared to younger generations, having been "away from formal learning and having to adapt to the online learning environment can be quite challenging even for the most motivated and intelligent students" (Kelly, 2012). Therefore, adult learners need relevant motivation and support to become self-directed learners (SDL). Support is needed even more by those who have limited or no previous basic ICT skills, specifically in the application of relevant eTools.

The participants in this research had very limited basic eSkills which required the facilitators to commit to supporting them throughout the 3 phases. Such support enabled most of them to complete their course, though more time had to be added as majority had failed to meet the deadlines. Every course designer must acknowledge that "online learning support is an essential part of the online learning process in guiding learners and providing feedback" as cited by Coomey & Stephenson, 2001; Oliver, 2001, in (Grace, 2009:4). Consequently, assumptions must not be made and generalised that every adult student is SDL; therefore those in charge need to investigate and make decisions on key Pedagogical concerns of the target course participants for example; adult learners' fluency and perception in using (ICT), basic literacy skills in ICT, and commitment to learning or Self-Directed Learning Readiness (SDLR). This will lead to success and effectiveness in online learning environments and face-to-face interactions (Lai 2011:98).

Methodology

This research entailed a case study of 29 Science teacher-educators (full-time working professionals) within the Bachelor of Education (Honours) Degree Programme, at UWC. These educators had to engage in a Computer-Based Education module; specifically the eLearning Design course, where they were expected to engage in the integration and use of eTools to enhance teaching-and-learning. The course was designed and structured into three (3) phases whereby each participant underwent two face-to-face training interventions (1 week each); and four (4) weeks active participation within an online environment.

Both qualitative and quantitative inquiry design were applied. Data was collected through distributing questionnaires prior to, during and after the face-to-face eLearning Design workshop.

In addition, feedback from discussion forums related to the online phase of the course were analysed and documented.

Questionnaires were distributed and 29 participants responded to each. These questionnaires focused on: access to resources; resources and time management; skills/eSkills; competencies and attitudes; team work; institutional ICT capacity and teachers' previous professional development. Retrieved information was valuable as facilitators gained a better understanding of participants' skills and course expectations; as well as the benefits of the eTools for teaching-and-learning.

During the online phase, an environment was created whereby the participants were expected to engage and submit formal tasks, respond to 11 discussion topics, develop an instructional strategy and planning document, and create a small online instructional event. The researchers analysed and reported on the responses and submission of tasks.

Lastly, the researchers reported on the participants' presentations which were recorded on the final day of phase 3. Educators were expected to demonstrate affordances of the use of various eTools in relation to specific subject-matter.

The following discussions reflect the findings of the extensive facilitation and support of this blended eLearning Design Course that encouraged and motivated working educators to become self-directed learners and complete the course.

Discussions

The discussion below highlights five main categories, with related themes which are aligned to an existing body of literature. The structure of the blended eLearning course is discussed in detail to highlight a scaffolding support methodology which enabled the participants to complete and attain certification. The researchers identified the following themes:

(i) structure: scaffolding approach for working educators;

(ii) linkage between access to resources vs. time management, face-to-face interactions, competencies and skills, and team/group work relations;

(iii) ICT capacity and previous teacher Professional Development (PD);

(iv) communication and support; and (v) constant monitoring and evaluation.

Structure: Scaffolding approach for working educators

The course was designed and structured into three (3) phases whereby each participant underwent two face-to-face training interventions (1 week each); and four (4) weeks active participation within an online environment. This structure enabled the working participants to complete related tasks and inevitably attain certification. Scaffolding approach in course structuring were one way to ensure authentic learning tasks to enable students to engage and "improve their learning experiences as cited by Herrington & Oliver 2000 in (Abraham, A. & Jones, H. J, 2008:1).

Phase 1: Familiarisation and support

During phase 1, the facilitators focused on preparation and support of the educators to enable them to engage within an eLearning platform and within Personal Learning environments (PLEs). Educators were expected to complete digital components to be integrated into their online classrooms, namely: a picture collage, digital photostory and an edited video (formative assessment tasks).

Despite a lack of internet connectivity during this phase, sixteen (16) participants completed online tasks within the institutional eLearning platform, SAKAI (iKamva) using their mobile phones and 3G cards. All participants managed to complete their offline digital components.

Phase 2: Substantive online engagement and support

During this phase, facilitators focused on the creation of a scaffolding learning pathway which included discussion topics and practical tasks. This enabled educators to complete incremental milestones (assessment tasks) and complete their formal assessment task. The 'Creation of a small online teaching/instructional event', focused on application of eTools for their specific subject matter. Adult learners taking an online course may be very motivated, but this exercise faced many challenges and needed constant support (Kelly, 2012).

Phase 3: Application and support

In the final phase, facilitators assisted participants extensively in completion of their 'small learning interventions', as most were not completed as expected during online phase 2. Facilitators supported educators during this face-to-face workshop in order for them to structure course content/learning material into manageable units of work, add relevant articles/reading material into online course resource folder, link relevant reading material to content pages, and embed digital media components (relevant graphics, videos, digital poster and digital story). The online classroom had to include relevant discussion topics and assessment tasks.

Furthermore, the facilitators had to assist the participants with their final presentations for the last day of the face-to-face workshop. This assistance included the creation of narrated PowerPoints, video and digital stories. These final presentations were video-recorded; and contributed to their overall performance.

Relevance of designing a scaffolding learning pathway

Facilitators used a scaffolding approach to create a learning pathway with incremental milestones (completion of assessment tasks). The goal of these milestones was to encourage the working educators to achieve certification for design of an online classroom. Vygotsky defined scaffolding as "role of teachers and others in supporting the learner's development and providing support structures to get to that next stage or level" Raymond, 2000, cited in (Van Der Stuyf, 2002: 6).

Learning Pathway 2A: Creation and application of collages and digital stories

This learning pathway included four (4) discussion topics and related practical tasks, which aimed to assist educators to complete components that would be integrated into the final assessment task. "Learning pathways" refers to what and how students learn as they move towards their learning and career goals. The subjects they choose include key competencies and the ability to manage learning and career choices" (New Zealand Curriculum, 2011:1).

The facilitators expected that the learning pathway would enable the educators to complete their components without difficulties. However, only 64% of participants responded to discussion topics; and submitted related tasks. Figure 1 represents the participation in learning pathway 2A.

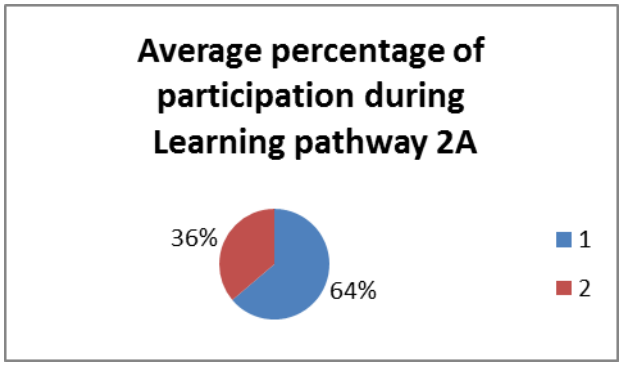

Figure 1: Participation during learning pathway 2A

Learning pathway 2B: Completing your final assessment task

This learning pathway included 7 discussion topics and related practical tasks, which were also aimed at the completion of an interactive online classroom. It should be noted that even though the facilitators enhanced the pathway with instructional material (screen captures); only 71% responded to discussion topics and submitted related tasks. Figure 2 represents the participation in learning pathway 2B.

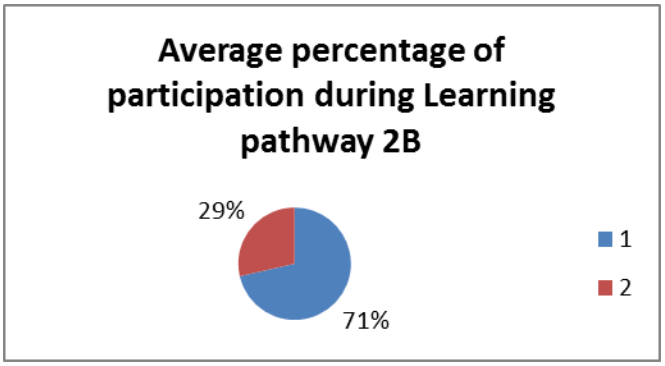

Figure 2: Participation during learning pathway 2B

The researchers highlight that the overall online participation was a success, as 71% managed to respond within discussion topics and submit related tasks. Moreover the facilitators observed that through the provision of a scaffolding support approach, the participants were able to commit and complete tasks.

4.2 Relating themes

This section demonstrates how the following themes relate to each other and influence participant commitment: access to resources vs. time management; skills and competencies; face-to-face interactions; and team/group work relations.

Access to resources vs. time management

The availability of resources had a direct impact on time management and commitment to online course participation. The prior-learner questionnaire reflected on ICT capacity. Eighteen (18) respondents had internet-connected computers at home; while ten (10) participants had home computers with no internet access. It should be noted that only one (1) participant stated that he/she had no access to a computer and internet.

In addition, the prior-learner questionnaire reflected on issues related to time-management. Seventeen (17) respondents made effort to meet submission deadlines; whilst twelve (12) respondents stated that they could not manage their time optimally.

Furthermore, the availability for personal study time was addressed. Twenty-six (26) respondents indicated that they were able to commit between 0 - 7 hours per week; whilst three (3) respondents indicate eight (8) or more hours per week However, the post-questionnaire confirmed the observations made by the facilitators, indicating that most participants were only able to commit 2 - 4 hours per week.

A lack of resources also had a direct impact on the competencies and skills of the participants.

Skills and competencies

The prior-questionnaire indicated that 98 % of the participants were able to make use of basic word processer functionalities. However, only fourteen (14) responded that they were able to upload files (basic word processing skill).

Additionally the prior-questionnaire indicated that only four (4) respondents were able to take on troubleshooting issues. Twenty-two (22) participants indicated that they would need assistance. Requested to comment on the quality of their reading skills, twelve (12) respondents indicated that they had good reading skills; sixteen (16) respondents described themselves as fair readers; whilst one (1) respondent described him/her as a poor reader.

If educators have the necessary ICT competencies and skills, their teaching methodologies will be enhanced, as ICT is seen as an important component in "the future of education (Bingimlas, 2009:1). Hence, "during the teaching and learning process, that means blend it in education, not put it at the centre of education" (Trucano, 2012). Moreover, Torgesen (Undated) reflected on the importance of good reading skills for adult learners.

A lack of necessary competencies and basic skills impacts the face-to-face interaction and facilitation.

Face-to-face interaction

Participants' prior-learner questionnaire established that twenty-four (24) respondents considered face-to-face interaction to be relevant. They stated that face-to-face interaction always has a place during learning interactions. As a result during the face-to-face phases, facilitators reported that 100% of the participants sought assistance/support from the facilitation team to complete milestones.

> Face-to-face interaction has for a long time received positive responses by different course participants in different regions across the globe, for example research carried in the University of Melbourne, in the department of Informing Science Institute, students interviewed emphasised on relevance of face-to-face communication as the most motivating reason when it comes to selecting preferable program model (Miliszewska, 2007:1; Shackelford and Maxwell, 2012).

Face-to-face interaction offers participants' opportunity for group relations.

Team / work group relations

Twenty (20) respondents indicated that they preferred working in groups as it provides an opportunity for sharing of ideas. On the other hand nine (9) respondents preferred working independently. A team is defined as a work group or unit that aims at working "with a common purpose through which members develop mutual relationships for the achievement of goals/tasks" as discussed by Harris and Harris (1996) cited in (Luca & Tarricone, 2001:369).

Working in groups might not directly mean experiencing good relations. As a result, participants were also asked to comment on how they relate with their colleagues. Twenty-eight (28) respondents reported that they value good working relations with others colleagues. Evaluation reports indicated that, the facilitators observed high levels of participants' work-relations during face-to-face phases.

The above discussions have demonstrated the linkage between: access to resources vs. time management; competencies and skills; face-to-face interactions; and team/group work relations relate to each other and influence a participant's commitment. Figure (3) below is a graphical summary of the responses.

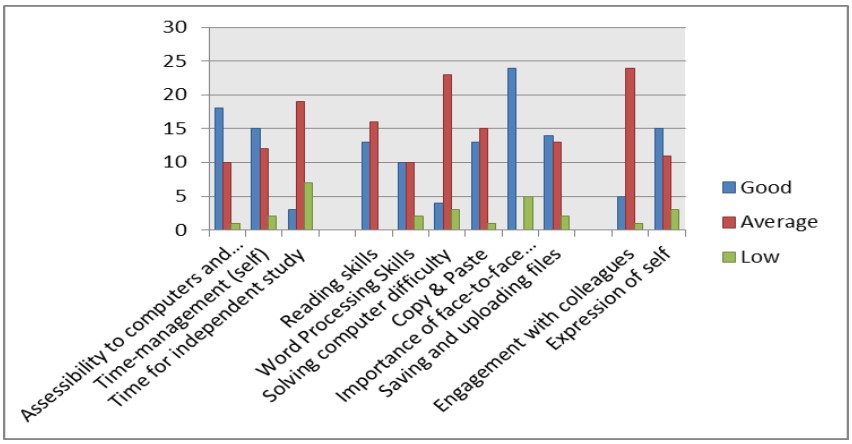

Figure 3: Graphical presentation of responses.

ICT capacity and previous teacher Professional Development (PD)

Participants were from 21 different secondary schools in Mthatha such as, St. James Senior, Mcobohoho, Khanya Naledi Combined School, Ntukayi Senior, Nomaka Mbeki Senior, Badi Senior and Msobomvu. These educators had access to various ICT resources (refer to Table 1).

ICT Resource	Available?	Not Available
Desktop/laptop computer for work use	21	5
Personal email account	25	1
School intranet	3	23
Internet	9	17
Printer	24	2
Digital cameras	9	17
Technical support	9	19
Digital projectors/interactive whiteboards	7	19
Desktop computers for student use in your classroom	17	20
Desktop computers for student use elsewhere at school (e.g. computer lab)	6	13
Laptop computers for student use	2	24

Table 1: ICT resources available within schools

The table points to a minimal state of ICT resources within the secondary schools. However, this blended eLearning Programme provided the educators with a basket of Open Source eTools, making them less dependent on the school resources. The eTools and attained eSkills enabled the creation of teaching-and-learning objects to enhance their face-to-face instruction. Moreover, these eTools also enable the educators to effectively conduct administrative and reporting duties; for example "new innovative technologies can help schools' improve the quality of administrative activities and processes" (infoDev, 2010:8).

In addition, the educators had been engaged in various PD Programmes. However, none of the participants had engaged in an eLearning design course, focusing on the infusion of ICTs. Instead, 80% of the respondents indicated they had been exposed to basic computer literacy skills Programmes, funded by the Department of Basic Education or self-funded initiatives.

According to Harwell (2003), PD should not be a once-off activity, rather entail continuous events. Thus the lack of ICT resources did not hinder this PD Programme. The provision of Open Source eTools by the CIECT team enabled the participant to achieve milestones independently (i.e. not dependent on school resources).

Communication and support

Constant communication and support was maintained throughout the Programme through various modes of delivery such as uploaded instructional manuals. discussion forums. telephonic support and emails. For example, regular emails were sent on a weekly basis to remind participants about submissions. These also entailed instructional manuals related to the completion of specific practical tasks.

> *"Dear educators we are currently in the sixth (6) week of the Design an Online Teaching/Instructional Event online phase. By now you should have submitted your posters and digital photo stories and we thank those who have contributed in the discussion forum thus far. We would like to encourage you to continue to visit the iKamva site (http://ikamva.uwc.ac.za) in order for you to complete the final assessment task".*

Providing appropriate support for participants was critical, especially during the online phase, as they were expected to work independently. Sims, 2000 (cited in Sims , Dobbs & Hand, 2002:515), maintains that "in addition to the typical help systems, announcements and guides, a more explicit support is required to bring the learners' into the online environment, especially by eliminating assumptions that learners' will know what to do and why they are doing it".

Constant communication and support encouraged the participants to achieve milestones; and moreover demonstrate they could achieve this independently (working online within their specific environments).

Constant monitoring and evaluation

Facilitators continuously monitored and tracked the progress of each participant as they proceeded through the learning pathways (1 - 3). An average result of 58% was recorded for the completion and submission of practical tasks, online engagement and oral presentation during the final face-to-face session. However, three (3) participants did not complete the Programme, due to one (1) participant only engaging in the final face-to-face session; and the others only engaged in some online activities. Most (99%) participants created online environments, which included elements of structure and lesson plans. It should be noted that only eight (8) participants managed to create relevant links to resources; only nine (9) participants setup online assessment activities; and only four (4) participants managed to setup an online discussion environment with relevant topics linked to subject matter.

According to the analysis of the evaluation questionnaires, respondents indicated that the basket of eTools received during the Programme would benefit these educators. eTools within the LMS and PLEs (picture collage, digital photostory, and narrated PowerPoint and youtube videos) were acknowledged as very beneficial for the enhancement of face-to-face teaching.

Continuous monitoring and evaluation entailed extensive support processes by the CIECT team, which motivated the participants in completion of their milestones. The goal of monitoring and evaluation is to observe progress and explain change (Wholey, Hatry & Newcomer, 2010).

The above discussions reflect on the continuous monitoring and communication which entailed considerable commitment and support by the CIECT team, motivating these educators (full-time working professionals) to complete tasks and enabling them to become self-directed learners within interactive online environments.

Programme challenges

Both participants and facilitators faced challenges during the training Programme phases. During the face-to-face phases, the lack of internet connectivity impacted largely on the interactive participation. Even though, the participants were expected to bring along necessary resources (3G cards, laptops, flash-drives and relevant content related to their subject-matter); only a few participants could access and create online environments during this phase. Hence, the workshop was described by participants as very costly as they had to purchase data-bundles in order to access the online environment via their mobile cellphones.

It should be noted that the main challenges that impacted the Programme were experienced during the online phase, as the participants were expected to engage in discussion topics and submit tasks. Despite the facilitators continuously supporting the educators through various modes of delivery (uploaded instructional manuals; discussions forums; telephone support and emails), most of them failed to meet submission deadlines. This led to the extension of the time-frame of the Programme; and added to the extensive support by the CIECT team.

Also if a participant was not computer literate, it impacted on the attainment of advanced eSkills (creation and embedding of digital stories; posters; podcasts; videos into an online environment). Thus, the participant required extensive assistance with basic functionalities, such as copying, pasting and downloading instructional materials.

Conclusion and programme recommendations

The research paper has reflected on the relevance, impact and lessons learnt of the blended eLearning course, 'Designing an Instructional Event' for educators (full-time working professionals). The successful completion rate of the course is highlighted due to the extensive facilitation, motivation and support by the CIECT team. Additionally, a scaffolding support methodology further enhanced the participants to actively engage in both the face-to-face and online phases of the Programme. The Programme was aligned to PD for educators (full-time working professionals) and structured to enable them to become self-directed learners.

The researchers recommend that more time should be allocated to the face-to-face training phase as it requires extensive facilitation and support methodologies. Furthermore, a dedicated support team is required to follow-through from conceptualisation to delivery of the Programme. In addition, there is a need for continuous Professional Development (PD) to support infusion of ICTs into the curriculum. This will enable educators that are full-time working professionals, to attain eSkills; and apply the effective use of eTools to enhance teaching-and-learning.

It is important that the Government, in collaboration with other stakeholders (Civil Society, Business and HEIs), invest optimally in ICT infrastructure and relevant PD training Programmes. Hence, this research paper will be followed by a comparative research study, focusing on the delivery of the blended eLearning Programme, in an urban and rural setting.

The researchers stressed that through the effective design and implementation of a blended eLearning Programme; educators that are full-time working professionals will be able to select relevant eTools for effective teaching-and-learning within their various disciplines.

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Return to Table of Contents

Return to Table of Contents

Editor's Note: This is a simple and effective approach to democratize the scoring of student performance.

Post-and-Vote Online Peer Assessment

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Abstract

This paper reports on a method and formula for assessing student work online called "post-and-vote". Two tests of validity of the post-and-vote method of online peer assessment and formula were conducted with undergraduate education students (pre-service teachers) on post and vote and formula. Validity was determined by calculating a Pearson product-moment correlation and corresponding coefficient of determination that compared the average grade assigned by the pre-service teachers with the grade assigned independently by the course instructor. Results of both studies showed that the method and formula were valid with these groups. Findings from these studies may be applicable to undergraduate classes engaged in similar tasks.

Keywords: post and vote, peer evaluation, peer assessment, validity.

Post and vote

Post-and-vote is a method of collecting and analyzing student performance data using the features provided in off-the-shelf Web tools. Post-and-vote emerged in the late-1990s, at a time when colleges, universities and training organizations had already adopted a Web-based training platform and were becoming acquainted with the features provided in the Web tools (Mann, 1999). Neither the method nor the formula required knowledge of computer programming, adding patches, add-ons, or third party software. Figure 1 shows the formula for calculating a final grade using post and vote.

$$\text{Student Grade} = \frac{\text{Instructor or T.A.} + \frac{S1+S2+S3+S4}{4}}{2}$$

Figure 1. Formula for calculating a student's final grade on their online submission

Three types of validity were considered: face, construct and content. Face validity is concerned with how the measure or procedure appeared. Did post and vote and formula seem like a reasonable way to gain assessment information? Construct validity was a measure of agreement between the theoretical concept under investigation and the specific measuring device or procedure. Content validity was the extent to which the measurement reflected the intended content domain. The content domain in this research was limited to "the process of developing a student-developed Website" (study 1), and "student verbalizations and demonstration of the process of developing websites captured on Explorer video" (study 2).

Study 1: Methods

Participants

Participants were pre-service teachers (n=39) enrolled in a core course on the Bachelor of Education (Primary/Elementary) program at the largest Canadian university in the Atlantic region. The program was designed to prepare K-6 teachers in a specific discipline as well as pedagogy courses over five years. A core course on this program was called "Computers and Learning Resources for Primary/Elementary Teachers" with the purpose of teaching pre-service

teachers how to integrate computer software and other learning resources into their teaching. Laboratory components were scheduled so that students would learn how to use and implement communications, applications and curricular software.

Materials

These students used modern computing facilities over a high-speed network designed to maximize their computing experiences. A learning resources library provided students with the textual and supplementary materials they required for their course work, including current school texts as well as teacher's curriculum guides, children's literature, resource books and educational software. Students also had access to a variety of media equipment, educational videos and multimedia kits. This teacher preparation program encouraged examination and discussion of significant educational issues within a framework of critical reflection and analytical practice. Under these conditions, each participant was required to develop an educational Website consisting of five Web pages in accordance with two sample educational Websites, and the course instructor's rubric.

Research design

In this study, a correlation pre-experimental *ex post facto* research design described in Cohen, Manion and Morrison (2000) was implemented to test the validity of post and vote with pre-service teachers. Validity was determined by Pearson product-moment correlations and corresponding coefficients of determination. Working from a rubric, each student developed a paper-based mock-up for an educational Website, then a five-page online prototype from the mock-up, followed by four peer assessments of other student-made Websites. Post and vote was tested with peer assessments of the student-made Websites.

Instrumentation

The instrument for collecting data was a class assignment completed by students as part of their regular course work. The students' used a rubric for peer assessment of student-developed Websites developed from other rubrics that had been designed for a similar purpose (Schrock, 2004). Students were asked to score four of their peer's Websites using this rubric out of a maximum score of 30: content and ideas (/10), organization (/5), language use (/5), presentation (/5), technical (/5). Student-assessors were required to use the survey tool to enter their peer assessments. Student-assessors were made "accountable", told in advance that the instructor would grade the quality of their peer assessments, and that this grade would be counted toward their final mark.

Procedure

The procedure in study 1 lasted just under 6 weeks, and was conceptualized in three distinct steps, namely:

1) the paper-based mock-up;
2) the five-page online prototype from the mock-up; and,
3) peer assessment.

Step 1) Paper-based mock-up

Each student created a "paper-based mock-up" of an educational Website, essentially Web page frames on paper, as outlined in Brown and Mann (2001). These paper frames were intended to help them think through their educational Website design, to provide a platform for active discussion and debate about the content. A "Web page frame" is the appropriate chunk of information for presentation to their students at one time. In the computer lab, students were shown how to make the opening frame for their educational Website, add Web page frames, each

one with a title zone, a graphic zone, a text zone, a zone of hypertext links, and a mail zone. Students were advised that the "name, title zone" of their educational Website should attract and hold their student's attention. They were encouraged to include an interesting picture or drawing to evoke curiosity in their students.

A "picture or drawing zone" should appear at the top or side of the screen, far above the need to scroll. An "instructional content zone" also called "task-oriented directions zone" should provide a goal, learning objective, or challenge for their students. Students were told that it was very important that their educational Website include a zone for "hints, fault-free questions or partial answers" to one or two questions, that their "links zone" should contain only one idea that required the student to click to get a partial answer. And the "email or chat zone" should get their students sharing information about the content or task with one another in class or from home.

Step 2) Online prototype from the mock-up

Students were required to transform their paper mock-up into a "five-page online prototype from the mock-up" by developing html documents from paper frames, and uploading them to the Web. At this point, students could access the Bulletin Board and type-in questions and comments about the assignment and try-out preliminary ideas for possible submission. Contribution or "participation" grades were also assigned at this stage of the process. Student postings to online conferences were evaluated using the widely-used content analysis model by Henri (1992). Then, each student uploaded his or her submission for peer assessment. Most LMSs support individual student uploads and allow the designer to designate group membership. Once all submissions were uploaded into a public viewing area, students were requested to read the submissions of their classmates.

Step 3) Web-based peer assessment

Each student was required to assess four of their colleague's educational Websites working from a rubric that was adapted from the university regulations,

Excellent performance with clear evidence of: comprehensive knowledge of the subject matter and principles treated in the course, a high degree of originality and independence of thought, a superior ability to organize and analyze ideas, and an outstanding ability to communicate. (Sec 8.2 Regulations, University Calendar, 2011)

Using a survey tool, each peer scored and commented anonymously on four peer submissions. To clarify - scoring in this sense, meant "assigned a mark". Similarly, the course instructor independently assigned a mark and justifying comment to each submission using the "Survey" tool. Again, everyone was anonymous; peer assessors and students being assessed, their names replaced by numbers. Student-assessors were also accountable; told in advance that the quality of their peer assessments would be graded by the course instructor, and their grade counted toward their final mark. Students were informed of their peer's grades and comments in a word file attached to an email from the course instructor. Using the "Compile" feature, the Course instructor concatenates individual student's scores and justifying comments. The Course instructor pastes the entire results page for each submission (i.e., the final mark and justifying comment) into a word processor, and attaches it to student's email.

Data collection and analysis

In Study 1, survey data were generated from individual students clicking on the Web-based survey tool and entering a grade and comments for four classmates. Their student ID number identified them as peer assessor and the student being assessed, so that the assessor and the assessed were unknown to one another (in the context of peer-assessment). All students in the

study were told that the course instructor would grade their assessments on the quality of feedback on the students' assignment. Figure 1 above shows the formula for calculating a final grade for a student's educational Website based on the course instructor's and students' peer assessments.

Results

Results of the analysis of study 1 are shown in a summary table 1. The correlations between the course instructor's scores and the average student peer assessment scores of educational Websites (n=39) was very high, at $r = 0.745$, p . = .000, with almost 56% of shared variance explained.

Table 1
Correlations of course instructor and average peer assessments

Assessment Content	Assessment Rubric	Course Level & Sample	Agreement and shared variance
Educational Website development	Course instructor's rubic	B.Ed (Pre-service Teachers) Fall 2010 Sec04, n=39	$r = 0.745$** $r^2 = 0.555$

Inter-rater reliability between the course instructor and an independent coder was assessed by Pearson Product Moment correlation and found to be significant with the course instructor's at r= 0.961, p=.000. Coding reliability was determined by having a different coder trained to the coding rubric, and then independently code 25.6% of educational Websites. The rater was a Fellow of the School Graduate Studies whose thesis in peer assessment had won a College Teachers Scholarship.

Most researchers report one of four different methods of determining inter-rater reliability, either: Cohen's Kappa, Kendall's coefficient of concordance, the intra-class correlation, or the Pearson product-moment correlation (Huck, 2004, p. 84). Rourke, Anderson, Garrison and Archer (2001) for example, make an argument for using the Cohen's Kappa chance-corrected measure of inter-rater reliability, over other statistics. Cohen's Kappa would be a good choice for analysis of the nominal data in Step 1 of post and vote and formula, where raters would have to classify each bulletin board discussion into one of Henri's (1992) five key categories of online discussion, either: participative, interactive, social, cognitive or meta-cognitive.

At Step 4 of post and vote and formula however, the judges' ratings are all raw scores, from 0 to 30, and therefore best analyzed by the Pearson product-moment correlation, "the most frequently used correlational procedure" (Huck, 2004, p. 62). Reliability is a necessary, but insufficient condition for validity. Validity refers to the degree to which the research accurately reflects or assesses the specific concept that the researcher is attempting to measure.

Study 2

Participants

The participants were an entire class (n=66) from the same population of pre-service teachers enrolled in a Teacher Education program in Study 1.

Materials

The materials given to participants in Study 2 were similar to those in Study 1, in that these studies were given the same sample educational Websites, and the same course instructor's rubric. In Study 2 however, they were also given two sample Explorer videos to screen. The task

in this study was more challenging than Study 1 because in addition to developing an educational Website consisting of five Web pages, each student had to explain how they developed their Website on Explorer video.

Research design and instrumentation

Study 2 used the same research design that was implemented in Study 1, except that students assessed one another's verbalizations about how they were developing their educational Websites. Working from an instructor-made rubric, each student assessed four of their colleague's Explorer videos, according to the procedure recommended in Mann (1998). An "Explorer video" is the raw footage taken by a student as they learn a process that requires a computer. Explorer videos are made in an Explorer Centre, a video teaching and analysis suite wherein pre-recorded examples can be played, and then the procedure attempted and the process recorded. Explorer Centres have a microphone and video capture software or a videotape recorder linked to the computer through a conversion box. Explorer Centres offer: (1) playable demos of the desired learning behaviour; (2) an easy method of recording the appropriate learning behavior, and (3) a record from which to assess each user's verbalizations about the learning process. In course work involving individual Web-based tasks, Explorer Centres were found less intrusive than individual workstations and the playable videos a means of collecting verbal protocols in the absence of an investigator.

Procedure

Study 2 lasted 8 weeks and was conceptualized in three distinct steps, namely: 1) the paper-based mock-up; 2) the five-page online prototype from the mock-up; and, 3) student-videotaped verbal explanations and demonstrations of how they had developed their educational Website. 4) peer assessment. In step 3, students could screen the Explorer videos either on-campus, or on their vicar's at home. Then, using a survey tool in the LMS, each peer scored and commented anonymously on four peer submissions. Student-assessors were also accountable; told in advance that the quality of their peer assessments would be graded by the course instructor, and that their grade counted toward their final mark.

Data collection and analysis

In Study 2, as in the first study, survey data were generated from individual students clicking on the Web-based survey tool and entering a grade and comments for four classmates. Their student ID number identified them as peer assessor and the student being assessed, so that the assessor and the assessed were unknown to one another (in the context of peer-assessment).

Results

Summary results of the analysis of study 2 are shown in table 2. Analysis of the data revealed that the strength of agreement between course instructor's scores and student peer assessment scores of the Explorer videos (n=66), was highly significant, at $r = 0.701$, $p. = .000$, with over 49% of shared variance explained.

Table 2
Correlations of course instructor and average peer assessments

Assessment Content	Assessment rubric	Course Level & Sample	Agreement and shared variance
Explorer video of verbalizations	Course instructor's rubric.	B.Ed (Pre-service Teachers) Fall 2009, n=66	$r = 0.701$** $r^2 = 0.491$

Discussion

Three types of validity were considered in this research – face, construct, and content validity. Face validity is concerned with how the measure or procedure appears. Did post and vote and formula seem like a reasonable way to gain assessment information? As a data collector, post and vote and its formula provided lots of information for analysis, which appears to answer the call in Schuttler and Burdick (2006) for a faculty model that promotes a facilitative relationship, and interactive environment for students to enable a sense of closeness that supercedes distance. Post and vote and the formula also seems to satisfy the request from Morgan and O'Reilly (2006) for a model that provides for student input and negotiation in assessing products and processes. Finally it seems that post and vote *is* consistent with Popham's (2004) view of assessment as "a formal attempt to determine student status with respect to educational variables of interest" (p. 6). "Student status" in this context, was the ability to peer assess their classmates online in the same way they would in a classroom setting "to make structured judgments about the quality of the work produced by members of your own peer group (such as classmates) and, through raised awareness, increase their ability to self-assess" (Blumhof & Stallibrass, 1994, p. 4).

The construct validity was also good in both studies. Construct validity is the agreement between the theoretical concept under investigation and the specific measuring device or procedure. In study 1, the theoretical concept was "the student-developed Website", web pages completed by students as part of their regular course work, following a procedure published in Brown and Mann (2001). Website development occurred at steps 1 and 2 of post and vote and formula (see figure 1). As an educational activity, developing Websites are among the most constructivist activities that learners can be engaged in, primarily because of the ownership that students feel about their products and the publishing effect (Jonassen, Peck & Wilson, 1999). The specific measuring device used by students at step 2 of post and vote and formula was a rubric for assessing student-developed Websites that was developed from other rubrics that had been designed for a similar purpose (e.g., Schrock, 2004). In Study 2, the theoretical concept was the student verbalizations self-recorded on

Explorer videos, and Explorer Centres the specific measuring device or procedure. Explorer Centres are to be less intrusive than individual workstations and a means of collecting verbal protocols in the absence of the investigator's tape recorder, and more accurate than conventional transcriptions of observations (Mann, 1998).

Finally, content validity was assured. Content validity is the extent to which the measurement reflects he intended content domain. The content domain in this research was limited to "the process of developing a student-developed Website" (study 1), and "student verbalizations and demonstration of the process of developing websites captured on Explorer video" in Study 2.The result has been high validity of student assessment, and as a consequence, a sense of democratization of the assessment process was felt by all.

Limitations

Approaches to the online peer assessment could not be compared directly. Therefore no claims are made about post and vote relative to any other approaches to assessment or learning. Quantitative studies should look at "grading-over-time intra-rater agreement", the relationship between the grades and the comments assigned by a peer on a student's assignment, while carrying out non-anonymous peer-assessment. Qualitative studies could explore "comment-grade intra-rater agreement", the relationship between the grades and the comments assigned by a peer on a student's assignment, while carrying out anonymous peer-assessment.

Conclusion

Results of the two studies indicate that used together, post and vote and its formula is a direct way of using generic web tools suited to the tasks for which they were designed, with the result of high validity of student assessment, and democratization of the assessment process. These results are consistent where post-and-vote and its formula were applied to Australian Aboriginal students' unique way of learning knowledge and skills that had not been adequately assessed (Mann 1999), and when it was used as an arbitration tool for expert-peer online assessment by applying the formula to make the bargaining conditions more even (Mann, 2009). The advent of evolving hardware and software may provide more adaptive and nonlinear interactions, and require the capacity for ever more sophisticated Web-supported assessment.

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Return to Table of Contents

Editor's Note: As with the horseless carriage, new technologies are used like traditional technologies in the early stages. This implementation of Interactive White Boards was designed to facilitate pedagogical advantages of the new technology.

Interactive white board and knowledge building in class

Filomena Faiella
Italy

Abstract

This paper reports experiences carried out by the teachers of Secondo Circolo Didattico of Eboli (SA) in conjunction with the Department of Education (now called the Department of Human, Philosophic and Education Sciences) of the University of Salerno (Southern Italy). The project was one of six funded in the Campania region by the Department of Innovation and Technology, of the Presidency of the Council of Ministers, under the initiative "InnovaScuola primaria". It equipped four primary school classrooms with an IWB (Interactive White Board), projector and a laptop. The teachers received training and support was provided by the Department of Education[1] team for producing resources with pupils in the classes.

The first part of the paper presents theoretical and epistemological considerations that guided the methodological choices. In the first part, the affordances of IWB will be identified to discuss if IWBs are able to promote the process of innovation in teaching, in combination with the other factors which may improve learning in class. Above all, an analysis will be developed on role of teachers, their specific training in IWB technology and produced resources, and competencies necessary and indispensable for the effectiveness integration of IWBs in daily teaching activities.

The second part presents the activities carried out in the classes with IWB, with special reference to the study of human digestive system. This part offers a framework for defining the relationship between teacher, students, and technology in which learning is anchored in active, constructive, authentic, and collaborative experiences. The affordances of IWB, if used properly, can facilitate processes of knowledge building externalizing cognitive activity, making it public, negotiable, and accessible to collective reflection.

Keywords: knowledge building, interactive white board (IWB), education technology, e-book, learning.

Introduction

Recent policy initiatives in Italy have launched a plan for dissemination of IWBs.

The Ministerial Projects "Digiscuola", "Innovascuola" and "Scuola Digitale" are deploying thousands of IWBs in various classrooms of all level schools. Thus, Italy has commenced the process of computerization of one of the more traditional tools of learning. Blackboards were converted into interactive whiteboards.

IWB is the *acronym*/abbreviation of Interactive WhiteBoard, a large *interactive* display that connects to a computer and a projector. The projector transmits images from computer to board. On the screen of IWB you can move and animate objects, highlight text, save and retrieve your work, connect to the Internet, launch software and particular features of IWB software to write with special marker pens or with fingers.

This paper discusses experiences of teachers at Secondo Circolo Didattico of Eboli in agreement with the Department of Education of the University of Salerno. The project was one of six funded

[1] The members of the team were Filomena Faiella, Assistant Professor of Experimental Pedagogy, Anna Chiara Desiderio, Ph.D, and Valentino Vitale, manager of eLearning_Lab (www.eformazione.unisa.it).

in the Campania region by the Department of Innovation and Technology of the Presidency of the Council of Ministers, under the initiative "InnovaScuola primaria". It has four primary school classrooms equipped with an IWB, a projector and a laptop. The teachers received training and support was provided by a team from the Department of Education for producing resources with pupils of classes.

Our experience testifies to the importance of specific training for teachers.

We maintain that it is only when teachers recognize that there is a significant interaction associated with use of IWB, IWB becomes new form of support for "intersubjectivity" and improves the quality of learning.

Theoretical and epistemological considerations on affordances of IWB

An analysis of research studies and empirical evidences suggests that IWB is a powerful tool for learning and a great help for the teacher.

It makes multimedia, multisensory and multimodal lessons (Edwards et al., 2002; Smith et al., 2005), accommodates students' learning style preferences, facilitates comprehension of abstract concepts and complex content (Smith, 2001; Bell, 2002), enhances student motivation and engagement (Biondi, 2009; Walker, 2005), and meets the needs of all students including students with special educational needs (Somekh et al., 2007).

Moreover, the importance of the tactile nature of IWB is emphasized for development of sensory-motor skills (Bonaiuti, 2009), although case studies have shown that teachers rarely let students use IWB or because they believe it takes a long time or consider it not very effective for improvement of learning (Moss et al., 2007; Hennessy et al., 2007).

Other studies have shown that IWBs have the ability to augment reality and to create exciting opportunities for students to explore and manipulate models of reality, especially when digital resources are used, such as games, and simulation systems (Edwards et al., 2002; Walker, 2005; Kennewell, & Beauchamp, 2007; Smith et al., 2005).

IWB can significantly enhance the quality of teaching in a variety of ways. With IWB, the teacher reduces lesson preparation time and can save, store and reuse material presented in class (Kennewell, 2001).

Despite a great range of pedagogical possibilities, research suggests that IWB does not have a particular charge to transform teachers' established practices and to alter normal patterns of classroom interaction, because IWB integrates easily with existing practices and reinforces a traditional style of teaching (Moss et al., 2007; Somekh et al., 2006). Introducing new technology does not radically change teaching styles and does not affect teachers' choice to adopt nontraditional methods of teaching for improving student learning processes and outcomes (Niederhauser, & Stoddart, 2001; Olson, 2000; Hoadley, & Pea, 2002; Hennessy et al., 2007).

Research has shown that introducing new technology does not cause radical changes in methods. Teachers adopt technology according their pedagogical beliefs, their conceptions about teaching and learning, and use it for facilitating traditional teaching approaches, at least during the initial phase. In particular, IWB has no affordances that play a key role in improving teaching strategies and in creation of authentic and meaningful learning environments. It does not have a strong impact on classroom interactions when used to replicate and imitate old functions (Hakkarainen, 2009). Only when technology is fully integrated into teaching and learning process, when it is successfully used, and its interactive component is recognized, does it lead to positive change in teaching practice and intellectual and learning achievements are genuinely augmented.

The activities carried out in the project

The experience carried out by the teachers of Secondo Circolo Didattico of Eboli in agreement with the Department of Education of the University of Salerno was an interesting opportunity to test the affordances of IWBs in the classroom. The project, called "Innovative Education Processes with IWBs", was one of six funded in the Campania region by the Department of Innovation and Technology of the Presidency of the Italian Council of Ministers under the initiative "InnovaScuola primaria". Four classes of the primary school were involved and equipped with an IWB, a projector and a laptop. The teachers participated in a course to use IWB to improve teaching and learning. They also had support provided by a team of the Department of Education to produceg a digital book with the pupils of the classes.

The role of teachers and their specific training

The impact of IWBs will depend on the willingness of teachers to implrmrnt pedagogical changes and overcome the teacher-centered pedagogical style. As claimed by Glover and Miller (2001), teachers need to recognize, first, that there is a significant interaction associated with use of IWBs and, consequently, that choices on how to handle interactivity can transform technology into a catalyst for teacher-directed instruction and a more interactive approach to teaching and learning. Teachers and change agents need specific training that goes beyond technical skills and improves pedagogical competences for effective integration of IWBs in daily teaching practices. Otherwise, there is a risk that IWBs will be limited to chalkboard functions - to present important facts and principles, to make assignments and announcements, and to give examinations and tests, or worse, to reinforce a one-way communication model of teaching in which this technology is a multimedia teaching-tool that makes spectacular lectures.

For these reasons, a training course was developed for the teachers. The main focus of the course was to share a pedagogical reflection on affordances of IWBs to renew educational settings and move it towards more interactive and flexible teaching-learning processes (Smith et al., 2005; Calvani, 2009). According to the model of Keeney et al. (2002) for teacher education, it was adopted a methodology based on collaboration and confrontation. First, the teachers worked to acquire technical skills; in a second phase, they designed and developed digital resources as result of the active production of knowledge in the class.

The course for the teachers has had a dual function. First, it initiated a confrontation between practitioners to promote the acquisition of skills and overcome stereotypes or misconceptions about technology in classroom teaching. Furthermore, it created a community of practice around the shared interest of designing and implementing a digital book using the IWBs.

In classes, teachers were able to set up a learning environment to promote manipulation of meaningful concepts and ideas to complete a project that could be called authentic.

The activities carried out in classes with IWB

Interactive teaching with IWBs is possible with particular patterns of classroom interaction involving teacher, pupils and technology. Central to the model is the assumption that each participant's activity will comprise multiple actions directed towards some goals (Kennewell et al., 2008, p. 66). Students want to complete the task at hand; teacher want to develop students' knowledge and skills.

For achieving this objective, the teacher has to design lessons including, teaching materials and other relevant resources so that elements of the learning environment interact coherently with each other as tasks for students. IWB is one element of the learning environment.

When we speak of "patterns of classroom interaction", this is not limited to the relationship between members that discuss and reflect around object of knowledge in a constructivist learning

environment. It also refers to relationship with the learning tools that mediate activities and discourses.

Tools are products of culture and carriers of culture. They strongly influence behavior, thinking, and action (Vygotsky, 1987; Bruner, 1965 and 1996; Lave, & Wenger, 1991; Wertsch, 1991 and 1998; Jenkins, 2006). Within this vision, IWB is more than an aid to efficiency or an extension device (Glover, & Miller, 2001).

The products and project documentation

In the project "Innovative Education Processes with IWBs", the IWBs were used to design a digital book, as tangible product of the discussions made in class. The topic was the digestive system. In classes that adopted a collaborative knowledge-building approach, children have participated in an educational experience that builds the concept of knowledge as resource or knowledge as product, a concept that gives meaning to the work they do from day to day (Scardamalia, & Bereiter, 1999). Through processes of observation, research and formalization of concepts, teachers and students are engaged in manipulating knowledge to reach their learning goals. They process, summarize and reorganize knowledge as an authentic and meaningful task. They are not simply parroting authoritative sources. They are reconstructing what they have read or heard so that it makes sense in light of what they already know and reconstructing their prior knowledge in light of the new information (Scardamalia, & Bereiter, 1999).

The e-book tells the story of a morsel that walks in digestive system and solves riddles, rebus and crosswords to complete the journey undertaken. The IWB was used to ensure that all the children in the classes were stimulated and encouraged to formulate proposals, discuss and defend choices, draw on their knowledge of the subject, search for information on the Web, and read books and articles to make an e-book. The e-book was created with Didapages (http://www.didapages.com/) and was stored in "DigiScuola", the environment made available by the Department of Innovation and Technology of the Presidency of the Council of Ministers.

The experience of the Secondo Circolo Didattico of Eboli was documented in a book retrievable from http://www.ericksonlive.it/catalogo/didattica/processi-educativi-innovatici-con-la-lim/. The book also presents the data collected from the questionnaire given to the teachers after the school year with IWB in the classes, student views recorded using Bubble Dialogue, and an interview tool developed by McMahon and O'Neill (1992) which uses comics to represent a lesson in classroom.

Discussions and conclusions

The experience implemented by teachers of Secondo Circolo Didattico of Eboli used IWB as a tool for "interactive teaching" (Kennewell et al., 2008; Wood, & Ashfield, 2008; Smith et al., 2005). This approach improves the knowledge building process and facilitates the creation of a more authentic, immersive and engaging learning environment in which participants co-construct knowledge through social interactions.

When IWB is embedded in schooling practices, it becomes a new form of support for "intersubjectivity" (Hennessy et al., 2007) to facilitate negotiation of meanings and ideas, develop an authentic dialogue, prompt reflective thinking and enhance mutual understanding of social norms (Guimarães et al., 2000).

In this way, technology can improve the quality of a learning environment, foster deeper and meaningful learning, and achieve an active, constructive, collaborative, authentic and intentional teaching approach.

> Knowledge advancement is not just about putting students' ideas into the centre. It depends on transformation of social practices for working with knowledge. Creation of a

> culture which advances knowledge presupposes sustained efforts of teacher-practitioners, collaborating with students and researchers, aimed at iteratively transforming prevailing knowledge practices toward more innovative ones.
> (Hakkarainen, 2009: 231).

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Return to Table of Contents

Editor's Note: Research seeking answers to how people learn is of particular interest and value to Instructional designers. The next challenge is to apply this knowledge to design more effective instructional materials.

Examining the role of gender differences in mobile English Learning

Rui-Ting Huang and Tzy-Wen Tang
Taiwan

Abstract

Although there is a growing interest in mobile learning studies, relatively little attention has been paid to the role of gender differences in mobile English learning factors and outcomes. Accordingly, the primary purpose of this study was to examine the relationship between key determinants and mobile English learning satisfaction (MELS), and further investigate the role of gender differences in mobile English learning. The study findings have revealed that perceived usefulness (PU), perceived playfulness (PP), and resistance to change (RTC) could play key role in determining MELS, and gender differences occur in the mobile English learning factors and outcome. With particular respect to language learning, it has been found that female learners are more likely to have higher PU, PP, MELS, and less RTC than male counterparts.

Introduction

Probably due to the key impacts of gender on learning effectiveness and efficiency, it is shown that gender differences have been one of the focal issues in previous studies (Sanchez and Wiley 2010). With particular respect to the role gender differences in the use of information and communication technology (ICT), relevant studies have suggested that boys could outperform girls in computer usage (Imhof, Vollmeyer and Beierlein 2007). Abbiss (2011) added that "Computers and computing have historically comprised highly gendered domains of practice, dominated and controlled by males in education and the workplace"(p.601). Nevertheless, another language learning report has indicated that females could have better language learning outcome than males especially in "verbal fluency and synonym-generation" (Kaushanskaya, Marian, and Yoo 2011, p24). Although previous studies have highly focused on the studies of gender differences, there is still a paucity of research investigating the role of gender differences in mobile English learning factors and outcome. Consequently, gender differences should merit further discussions in this study.

As mobile technology has gradually become a critical tool for learning, in order to improve mobile learning quality, it is necessary that more attention should be paid to evaluation of mobile learning. Hence, the primary purpose of this study was to examine the relationship between key determinants and mobile learning outcome, and further explore the role of gender differences in the mobile English learning components and outcome.

Theoretical Background and Hypothesis Development

Gender differences, learning satisfaction, and mobile technology

Due probably to the inborn differences between man and women, gender differences have received much attention in prior studies. For example, it has been found that boys are more likely to outperform girls in mental and spatial ability tests than girls (Flores, Coward, and Crooks 2010-2011). In a language learning study, Kaushanskaya, et al. (2011) has suggested that as compared to male learners, females could have better learning outcomes in "verbal fluency and synonym-generation" (p24). In terms of the influence of gender differences on mobile technology

usage and online learning acceptance, a mobile technology report by Rees and Noyes (2007) has demonstrated that although there are no gender differences in teenagers' mobile phone usage, male teenagers are more likely to have a higher level of computer and internet usage than female counterparts. Another recent study by Padilla-Meléndez, Aguila-and Obra and Garrido-Moreno (2013) has suggested that there are gender differences in using attitude and intentions in a blended learning environment.

With specific regard to the role of gender differences in learning satisfaction, it has been shown that previous study results are mixed. That is, some studies have revealed that gender differences did not exist in online learning satisfaction (Marks, Sibley, and Arbaugh 2005; Levy 2007; Kim, Kwon and Cho 2011; Padilla-Meléndez et al., in press), whereas others have indicated that there were gender differences in distance learning satisfaction (Chang and Smith 2008; Lu and Chiou 2010). Nevertheless, it is possible that the effect of gender differences on mobile learning satisfaction could occur in the mobile English learning environment, mainly owing to the differences between boys and girls in language learning (Kaushanskaya et al. 2011; Varol and Yilmaz 2010). Accordingly, this study proposes the following hypothesis.

H1: There are gender differences in the mobile English learning satisfaction.

Perceived playfulness (PP)

In previous research, it has been shown that perceived playfulness (PP), which refers to users' enjoyment and delights in using new information technology (Moon and Kim 2001), could have a key impact on users' satisfaction (Hsu and Chiu 2004; Kang et al. 2009; Kang and Lee 2010). According to Moon and Kim (2001), the perceived playfulness has been described as "the extent to which the individual (a) perceives that his or her attention is focused on the interaction with the WWW; (b) is curious during the interaction; and (c) finds the interaction intrinsically enjoyable or interesting" (p.219). Consequently, in the context of mobile learning, it is possible that the perceived playfulness of mobile learning could be closely linked to mobile learning satisfaction. Additionally, with regard to the impact of gender differences on PP, a latest report by Padilla-Meléndez, Aguila-Obra and Garrido-Moreno (2013) has shown that females could have higher PP than male counterparts. However, in a computer based assessment study, Terzis and Economides (2011) have indicated that males are likely to have stronger PP than females. Based on prior study suggestions, it is possible that learners with better PP will have higher mobile learning satisfaction, and the gender differences could be present in the PP. Thus, in mobile English learning environments, this study presents the following hypotheses.

H2a: PP could positively affect mobile English learning satisfaction.

H2b: There are gender differences in the PP.

Perceived usefulness (PU)

According to Technology Acceptance Model (TAM) (Davis, 1989), the perceived usefulness (PU) is described as users' perceived usefulness toward using mobile technology. The positive association between the PU and user satisfaction has been well documented in previous online learning studies (Arbaugh 2000; Roca, Chiu, and Martínez 2006; Sun, Tsai, Finger, Chen, and Yeh 2008). Moreover, with regard to the role of gender differences in PU, it has been found that gender differences were present in users' PU in latest mobile technology reports. For instance, in a mobile library search system research, Goh (2011) has demonstrated that male users could have a higher level of PU than female counterparts. In another mobile learning review, Lan and Huang (2012) have revealed that female students could experience higher PU compared with males. Based on previous study suggestions, consequently, this study offers the following hypotheses.

H3a: PU could positively affect mobile English learning satisfaction.

H3b: There are gender differences in PU.

Resistance to change (RTC)

There is evidence that resistance to change (RTC) is one of the key factors that could negatively affect people attitude toward the utilization of information technology (Al-Somali, Gholami, and Clegg 2009; Kim and Kankanhalli 2009; Manzoni and Angehrn 1997; Nov and Ye 2008). Hence, in mobile learning environments, it is assumed that the RTC, which refers to learners' resistance to new learning ways, could be negatively associated with mobile learning satisfaction. In addition, although a considerable number of studies are concerned about the effect of gender differences on learners' computer and information technology usage (Imhof, Vollmeyer and Beierlein 2007; Rees and Noyes 2007), relatively little effort has been devoted to the role of gender differences in users' RTC. In this regard, it is critical that more studies should be done to explore whether there are gender differences in the RTC in order to have better instructional designs, which could not only meet gender-specific needs, but also minimize barriers to effective teaching and learning. Because previous studies have demonstrated that gender differences were present in computer usage (Imhof et al. 2007), internet usage (Rees and Noyes 2007), online learning acceptance (Huang, Hood and Yoo 2013), and online shopping attitude (Hasan 2010), it is probable that gender differences could exist in the RTC. Hence, this study proffers the following hypotheses.

H4a: The RTC could negatively affect mobile English learning satisfaction.

H4b: There are gender differences in the RTC.

In summary, the primary goals of this study were not only to examine the connection between PP, PU, RTC and MELS, but also to investigate the role of gender differences in the mobile English learning components and outcome. According to previous reports, consequently, this study proposes the following research framework (see figure 1).

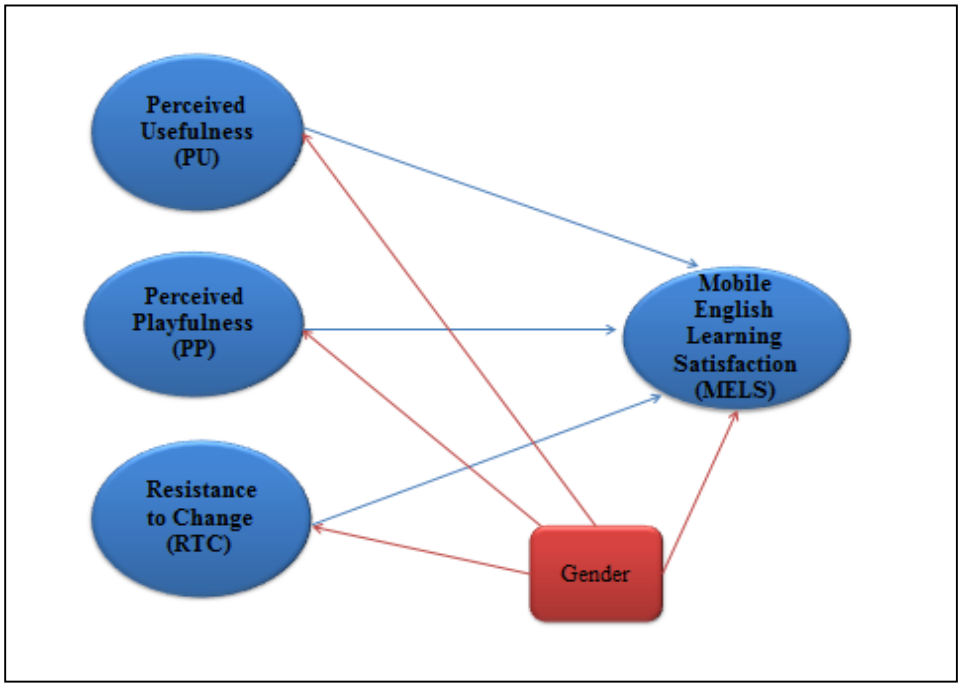

Figure 1. The research framework of MELS

Research methodology

Demographic data for respondents

345 undergraduate students in Taiwan took part in this study. Male and female participants were 157 and 184, respectively. It was found that the majority of participants were sophomore students, and most participants were business major students (see table 1).

Table 1
Demographic data for respondents

Demographics	Items	Number	Percentage of respondents
Gender	Male	157	46
	Female	184	54
	Missing data	4	1
Undergraduate Level	Freshman	132	38
	Sophomore	137	40
	Junior	41	12
	Senior	24	7
	Missing data	11	3
College Major	Social Sciences	69	20
	Science	45	13
	Arts and Humanities	53	15
	Business	138	40
	Engineering	40	12

Data Collection

The data were collected from several universities in Taiwan. The researchers of this study administered 400 paper-and-pencil surveys to undergraduate students that utilized handheld electronic dictionaries to learn English before. Final usable surveys were 345.

Measurement development

14 items were incorporated into the MELS questionnaire in this study. A seven-point Likert scale, with rank from "1=strongly disagree" to "7=strongly agree", was utilized to evaluate the MELS questionnaire. Three items of the PP construct were adopted from Ahn, Ryu, and Han (2007), and from Igbaria, Iivari and Maragahh (1995). Moreover, four items of RTC construct were taken from Al-Somali et al. (2009). Finally, MLS and PU items were adopted from Roca et al. (2006).

Data analysis and results

The exploratory factor analysis (EFA) was performed to in order to determine if the potential factors existed in this study. As shown in the table 2, the EFA indicated that four factors, explaining 76.97 % of total variance, were present in this study. It was shown that the factor

loading of variables in each construct was all above 0.8. Moreover, the Pearson correlation analysis, and stepwise multiple regression were carried out in order to determine the association between PU, PP, RTC, and MELS. In the table 3, it was found that PU, PP, RTC were all closely linked to MLS, and PU had the closest connection with MELS. However, RTC had a negative relationship with MELS. In the table 4, it was further revealed that PU and PP had a positive influence on MELS, whereas RTC had a negative influence on MELS. Compared with the PP, it was revealed that the MELS would be more likely to fall under the sway of PU. Finally, one way analysis of variance (ANOVA) was conducted to confirm whether there were gender differences in PU, PP, RTC, and MELS. In the table 5, it was found that gender differences existed in PU, PP, RTC, and MELS. More specifically, Female respondents had higher PU, PP, and MELS than male counterparts. Nevertheless, in terms of RTC, it was demonstrated that females had less RTC than males.

Table 2
Eigenvalues and Cronbach's Alpha of each construct

Item	Factor Loading			Eigenvalues	% of variance	Cronbach's Alpha	Mean	Standard Deviation
PU1.	.870							
PU2	.913							
PU3	.858							
PU4	.842							
PU				6.027	43.048	.895	5.357	.971
RTC1	.811							
RTC2	.803							
RTC3	.915							
RTC4	.847							
RTC				2.213	15.167	.866	3.205	1.2
PP1		.905						
PP2		.920						
PP3		.875						
PP				1.517	10.839	.885	4.453	1.08
MELS1.			.839					
MELS2			.918					
MELS3			.867					
MELS				1.108	7.917	.848	4.892	1.175

Note: PU, perceived usefulness; PP, perceived playfulness; RTC, resistance to change; MELS, mobile English learning satisfaction

Table 3
Pearson correlation between each factor and MELS

Item	PU	PP	RTC	MELS
Perceived Usefulness (PU)	-			
Perceived Playfulness (PP)	.425**	-		
Resistance to Change (RTC)	-.382**	-.233**	-	
Mobile English Learning Satisfaction (MELS)	.559**	.460**	-.399**	-

Note: ** $p < 0.01$

Table 4
Multiple regression of mobile English learning satisfaction (MELS)

Variable	β	Standard Error	t	p
Constant		.390	4.770	
Perceived Usefulness (PU)	.377	.059	7.730	.000
Perceive Playfulness (PP)	.254	.049	5.494	.000
Resistance to Change (RTC)	-.195	.044	-4.306	.000
R^2	.405			
Adjusted R^2	.400			

Table 5
Gender differences in the perceived usefulness, perceived playfulness, resistance to change, and mobile English learning satisfaction

Item	F-value	Mean
Perceived Usefulness	(F 1, 339=6.174; P=.013)	(Male=5.23; Female=5.45)
Perceived Playfulness	(F 1, 339=5.035; P=.025)	(Male=4.32; Female=4.56)
Resistance to change	(F 1, 339=12.466; P=.000)	(Male=3.41; Female=3.01)
Mobile English Learning Satisfaction	(F 1, 339=8.788; P=.003)	(Male=4.71; Female=5.03)

Discussions and implications

The primary purpose of this study was to examine the link between PP, PU, RTC and MELS, and further explore the role of gender differences in the mobile English learning factors and outcome. First, in accordance with previous research, it has been found that PU (Arbaugh 2000; Roca et al. 2006; Sun et al. 2008), PP (Hsu and Chiu 2004; Kang et al. 2009; Kang and Lee 2010), and RTC could be closely related to MELS (Al-Somali et al. 2009). Specifically speaking, PU and PP could positively affect MELS, whereas RTC has a negative influence on MELS. It is suggested

that if instructors would like to help mobile learners enhance the effectiveness and efficiency of mobile learning, more attention should be given to the PU and PP of mobile technology, and more efforts should be directed toward helping students pick up suitable mobile learning products. With particular respect to learners' RTC, it is important that more work should be done on minimizing this obstacle, mainly because it could be regarded as one of the critical success factors for mobile learning.

In addition, it has been demonstrated that the study results are in line with previous reports, which indicate that gender differences occur in PU (Goh 2011; Lan and Huang 2012), PP, (Padilla-Meléndez et al. 2013; Terzis and Economides 2011), RTC (Imhof et al. 2007; Hasan 2010; Huang et al. 2013; Rees and Noyes 2007), and MELS (Kaushanskaya et al., 2011; Varol and Yilmaz 2010). Moreover, it has been found that female students could have higher PU, PP, and MELS than males. It is implied that more focus should be put on mobile learning design that addresses gender specific needs, and more studies should be conducted on the effect of gender differences on mobile learning components and outcome.

Last but not least, with specific regard to the role of gender differences in RTC, it has been demonstrated that female learners could have less RTC than males. The study results are consistent with previous findings (Kaushanskaya et al. 2011; Varol and Yilmaz 2010), which suggest that particularly in language learning, women are more likely than men to have less RTC. Probably due to the innate differences between men and women, women could have not only better language learning performance, but also less RTC than men. It is hinted that more research should be done on the effect of gender differences on RTC, in order to minimize male RTC toward mobile English learning.

In conclusion, the study results have added to the body of knowledge in the gender and education field, which reveals that gender differences are likely to occur in mobile English learning factors and satisfaction. More specifically, it is possible that female mobile leaners could outperform males in mobile learning activities and satisfaction. As mobile learning has gradually become central to our continuing education, it is critical that more attention and research should be devoted to the effect of gender on mobile learning effectiveness and efficiency.

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Return to Table of Contents

Return to Table of Contents

Editor's Note: Here is a new tool to stimulate discussion of vocabulary and related concepts in your classes.

Wordling: using word clouds in teaching English language

Dara Tafazoli
Iran

Abstract

Wordle is a free word art tool that mixes any chunk of text in production of a visual representation of the content and creates word clouds from text Word clouds visually highlight the most often used words in the passage. The more frequently a word appears in the text, the larger its size in the visual design. The user can alter the colors, style and layout of the word collage. Wordle has so many advantages and benefits in many fields of study. This study aims to introduce Wordle.net as one of the most useful tools for English teachers. This paper presents different usages of wordling in teaching language skills – reading, writing, speaking and listening. Incorporating Wordle into English classes is quick and easy. The study also provides further recommendations for English teachers in using Wordle as a teaching tool.

Keywords: wordling, English language classrooms, English teaching, teaching language skills, teaching vocabulary.

Introduction

There are a large number of online tools that can be used for second/foreign language learning and teaching (Chapelle & Jamieson, 2008; Garrett, 2009; Godwin-Jones, 2009, 2010; Levy, 2009; Meskill & Anthony, 2010; Warschauer, 2010). The awareness of teachers about these tools is the necessity of education system. Wordle as a web 2.0 tool is one of the fruitful visualized teaching and learning tool. This paper is going to discuss the place and role of Wordle in CALL and present some techniques in foreign or second language teaching and learning classrooms.

Educational technology & language teaching

Using technology in education in general and in language teaching in particular has lots of benefits to students, classroom and community. Kargozari and Tafazoli (2011) in a study mentioned that "vodcast" is a valuable means of instruction. They believed that by using some tools such as vodcasts, "students have access to the material of instruction whenever and wherever they liked". Kulik, Kulik and Bangert-Downs (1991) and Kulik and Kulik (1991) claimed that "students in classes that use computer aided instruction outperformed their peers on standardized test of basic skills achievement by 30 percent on average".

Baron and Goldman (1994) mentioned that "student with access to technology learn how to organize complex information, recognize patterns, draw inferences, and communicate findings". "Studies of students with disabilities show that technology can expand access to educational resources and enhance students' ability to process and remember information" (Zorfass, Corley and Remz, 1994). David Dwyer (1994) in his article mentioned that "the use of technology in the classroom improves students' motivation and attitudes about themselves and about learning. Technology-rich schools report higher attendance and lower dropout rates than in the past." In psychological point of view, it is possible to say that, students who use technology, they benefit more from pride, confidence and self-esteem in their works. Integrating technology into classroom instruction had so many advantages for classrooms as well as students.

Tafazoli (2011) stated that "in classrooms integrated with technology, the role of a teacher changed from merely an authority or lecturer to a facilitator or coach". Tinzman (1998) believed that "technology use tends to foster collaboration among students in the classroom". Education without technology, in one hand, is: (1) passive, (2) formal, (3) instructor center, and (4) time dependent, and on the other hand, education with technology is: (1) active, (2) informal, (3) student center, and (4) time independent.

Web 2.0 is a term which is commonly associated with applications on the internet which facilitate interactive information sharing, collaboration and learning on the World Wide Web. Web 2.0 tools include wikis, web applications, social-networking sites, blogs, hosted services and many others are tools which give its users the ability to communicate with others in a virtual context. Wordle is a web application which is useful for language teaching and learning.

Wordle

Wordle is a kind of data visualization tool. Barret (2010) define data visualization tools as devices which use for representing information in the form of charts, maps, tag clouds, animation or any graphical means that make content easier to understand. Friendly (2008) mentioned that data visualization serves as a way to communicate information clearly and effectively through visual representation. These tools can help to make the understanding of complex thing easier because they provide data in multi aspects incorporating visual, textual animated input and etc.

Easy access to Web 2.0 tools on the internet by users without needing to know the technology leads to wide application of data visualization tools. Word clouds are one of the most popular forms of data visualization. You may heard text cloud or tag cloud instead of word cloud which is a representation of word frequency. The frequency of the words in a text determines the size of a word in a cloud. There are some tools on the internet to provide such word clouds such as Wordsift, Tagxedo, Tagul, Tag Crowd and Wordle. Wordle , created by IBM developer Jonathan Feinberg in 2009, is one of the most popular tools on the internet for generating word clouds. As mentioned in wordle.net, it is really easy to make word clouds you can (1) paste a bunch of text, (2) enter the URL of any blog, blog feed, or any other web page that has an Atom or RSS feed, and (3) enter a del.icio.us user name. The following figure shows a word cloud by using Wordle.

Figure 1: The paper abstract is converted by the author into word cloud by Wordle.net

Some researches have conducted on the base of word clouds. Ramsden and Bate (2008) mentioned that word clouds have some benefits to education. They stated that word

clouds can be used to examine teacher responses to a survey about podcasting in educational contexts. McNaught and Lam (2010), in a research which they used Wordle, argued that word clouds can be used as supplementary research tools for the triangulation of data. About Pendergast's (2010) research, Baralt, Pennestri and Selvandin (2011) stated that:

> Pendergast (2010) used "tag clouds" to perform an analysis of the most commonly used terms from documents published by the American Association for Family and Consumer Sciences (AAFCS), creating what she referred to as a "folksonomy" of texts. She showed that the clouds revealed a visual hierarchy of text, and concluded by suggesting that tag clouds be included on Websites next to the published documents. Pendergast argued that doing so would appeal to multiple generations, including the "millennials," who, according to her, are multiliterate and tend to prefer visual over textual information (p. 12)."

Baralt, Pennestri and Selvandin (op cit) conducted an action research using wordless to teach foreign language writing in which they mentioned Wordle can facilitate the teaching of foreign language writing within a dual coding theoretical framework.

Wordling & English language teaching

Wordle is fun, visual and entertaining. Wordle can be used for instructional purposes. These types of activities encourage students to react to topics or concepts and produce their own understanding based on that reaction. If we use only two pieces of hardware, a computer and a data projector, we can enlarge a Wordle picture on a screen or a white wall. This provides an opportunity for all students to benefit from projected picture. While overusing presentation software such as PowerPoint is not much more effective anymore, Wordle can be substitute as a teaching and learning medium instead.

In this section the author is going to provide some techniques for teaching different language skills and components in which teachers benefit from and use them in their classes.

Listening: For listening skill, teachers can use Wordle in pre-listening stage. This stage helps learners by focusing on the topic, activating knowledge they have about the topic and providing clear view of learners about what they are going to do. By wordling, teachers can (1) discuss topics with the learners, (2) help learners to develop their vocabulary related to the topic, (3) give learners information about the context, and (4) get the learners to predict what they will hear. By wordling listening text to word clouds and displaying it before task, we can reach the goals of pre-listening stage which Saetti (2009) mentioned the goals of pre-listening stage is "to activate the learners` linguistic knowledge and background information, the teacher expected to help the learners with unknown vocabulary and grammatical structures and to familiarize them with the topic of the input" (p.228).

Speaking: One of the crucial problems of students in speaking is the lack of vocabulary knowledge. Most of the time learners cannot remember the exact words about the topic, so they may stop and pause in their speeches and even try to refer to their mother tongue to remember the necessary words. To prevent this pauses and stops, providing word clouds before and during speaking can be beneficial. In this case, learners are benefits from provided vocabulary which are exactly relevant to the topic.

Reading: Word clouds can also be used as part of a reading. The pre-reading activities are designed to "set a task for the learners, help the learners prepare for the task and motivate the learners to read" (Lindsay and Knight, 2006). Pre-reading activities should help the learners to

achieve the aim of the reading activity such as: (1) stimulate what they already know about the topic, (2) provide them with background information that they need before they read, and (3) help them with words and phrases they will need to know before doing an activity.

Writing: In writing skill, Harmer (2004) mentioned that "writing process has four main elements: (1) planning, (2) drafting, (3) editing, and (4) final version. In planning stage or we can call it pre-writing stage we can use word clouds to brainstorm, providing some relevant vocabulary to trigger writing, in which learners prepare for what they will write. One of the main elements in writing is register, and one aspect of register is the choice of topic vocabulary. Wordling can provide such a topic vocabulary in which improves learners' performance in writing.

Teachers can use Wordle to improve their instruction performances. The incorporation of wordle into classroom act as an instructional tool which help students using more varied vocabulary in new style which is new to them. The author recommends using this new mixture of technology and teaching tool in English as foreign / second language classes. Some techniques are provided as follow:

For teaching word order and part of speech, scrambled questions and sentences are useful technique. Teacher can create a series of word clouds using individual questions or sentences. These word clouds can be printed or projected. The learners have to unscramble the words. Another use of word clouds is as simple vocabulary exercises. We can use word clouds for words that have to be joined together to form collocations.

Teachers can create a word cloud from a news article and use it to start a conversation. Students also may use visual word cloud to ask about new vocabulary which provides input to them. Before engaging students in speaking, by wordling key words teacher can increase the vocabulary knowledge of students about the conversation. In pre-reading stage, after teacher wordling key words of a reading text, students can talk about these new words and predict the content of reading. For teaching writing, brainstorming is one of the key techniques. Students can use word clouds to generate ideas for new writing topics and/or themes.
Baralt, Pennestri, and Selvandin (op cit) argued that word cloud also can be use as an assessment tool. They mentioned that "instructors can create word clouds from students' individual essays and use them for self-assessment purposes. Similar to the present study, the resulting word clouds as well as word frequency counts can show students' individual progress towards improving their vocabulary. The source of text could derive from blog posts as opposed to essays; this could be especially relevant for online classes. (p. 21)"

Conclusions

With the widespread use of the Internet, many online tools are increasingly available for use in educational and non-educational settings. In view of the need for CALL researchers and practitioners to find, choose, use and evaluate educational tools for further development and implementation of CALL, it should be fruitful to introduce new and useful tools that can be used for language learning and teaching. For this reason the author is decided to present Wordle.net as a useful web 2.0 tool for English for foreign or second language classes.

In this paper, the author has introduced the wordle.net. Our teachers should be well-equipped with new technologies and update themselves with new tools in language teaching. The researcher concluded that using wordle is a necessity in teaching all four skills and also language components. Teachers and students are benefit from in many ways.

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Return to Table of Contents