Authentic learning and Web 2.0 – Completing the equation

Vickel Narayan
Centre for Learning and Teaching (CfLAT)
Auckland University of Technology

Chris Lovegrove
Faculty of Transport and Built Environment
Unitec Institute of Technology

While new technologies are explored as a way of creating authentic learning environments for the learner, for example, creating simulations and web-quest, there is little research on the potential use and application of Web 2.0 tools and technologies in enhancing the learning process in an authentic environment. The participatory nature of Web 2.0 tools, amplified by portable mobile technologies, empowers users by enabling the ability to create, co-create, collaborate and communicate, and has the potential to bridge the gap between authentic learning activities and the learner's interaction with the surroundings (context), self (cognitive and meta-cognitive) and peers. This paper outlines the findings of a one-year-long project where authentic learning formed the underlining platform for learning and teaching in a Boat Building course (Certificate in Applied Technology, Level 4) where Web 2.0 tools and learner owned mobile devices were integrated to enhance the learning process.

Keywords: Authentic learning, Web 2.0, social constructivism, student-centred, pedagogy 2.0, portable mobile devices

Background

The Certificate in Applied Technology (Boat Building, Levels 3 and 4) courses at Unitec Institute of Technology were always taught within an authentic context. The authenticity of the tasks students completed and the context within which it happened were driven by two main student learning activities over two semesters. In this year-long course, the students build (i) a small dinghy in the first semester and (ii) a medium sized racing yacht in the second semester. While the authentic learning environment offered plenty of opportunity for learner-centred learning and teaching, the role of the lecturer and students in the process however proved to be the main obstacle in capitalising on the opportunities that arose.

The lecturer played the role of spoon-feeding the students at every step of the process with information and knowledge he thought was appropriate for his learners to have prior to starting any stage of boat construction. While the authentic learning environment was productive, the apparent "transfer of knowledge" model limited student ownership of boat building and their own learning.

The students in the course submitted a portfolio at the end of every semester that outlined the boat building techniques learnt, elements of teamwork and collaboration, and their weekly reflections. The students used a book to keep a log of the events that transpired during each day of the week. The lecturer assessed this logbook at the end of the semester and the peers in the class provided feedback on the collaborative aspect in the course by filling out a peer assessment form. An outline of the old marking schedule is available at: https://docs.google.com/document/d/1O-cpTCfPwwP16C7o0M5apyCntOxKAWwFKgKV6o7snOE/edit

Literature

Authentic learning typically focuses on real-world, complex problems and their solutions, using role-playing exercises, problem-based activities, case studies, and participation in virtual communities of practice (Lombardi & Oblinger, 2007, p. 2).

In a teacher-centred environment, activities students undertake as a part of their learning are seen as a way to clarify and practice, with an assumption that if these activities are designed and structured well, effective

learning will take place. They are designed to measure competence and to assess whether the student has gained the skills and content knowledge, or not (Reeves, Herrington, & Oliver, 2002). In a student-centred constructivist-learning environment, learning activities are designed to allow students to plan a project or task from start to finish. The course is not designed in a linear fashion, rather it is taught to students in small 'chunks' to 'give a purpose and meaning to the learning that will occur without predetermining and limiting the scope and sequence of the inquiry' (Reeves, et al., 2002, p. 563). Because the learner is taking charge of their own learning, the role of the teacher in providing feedback and guidance in the process is extremely important. Even more important is the collaboration between students to make the task achievable and engaging (A. Herrington & Herrington, 2007; J. Herrington, 2006; Reeves, et al., 2002). Herrington (2006) espouses that authentic learning is at the heart of situated learning (Lave & Wenger, 1991) and that it revolves around collaborative social learning thus making interaction between the learners a critical element in the process. Herrington (2006), in outlining the characteristics of authentic learning states,

> problems are set within an authentic and realistic context, they are ill- defined and complex, they require a significant investment of time and intellectual resources, problems require examination from multiple perspectives, they require collaboration and reflection, they are integrated with assessment, and supported by scaffolding (p. 5).

Web 2.0 is defined as:

> a second generation, or more personalised, communicative form of the world wide web that emphasises active participation, connectivity, collaboration, and sharing of knowledge and ideas among users (McLoughlin & Lee, 2007, p. 665).

According to Churchill (2005), 'technology amplifies our intellectual and physical capacity' (p. 347) and thus has the potential to support higher order learning. However, technology is being used to recreate the same pedagogical practices present in current classrooms that date back to the nineteenth century (J. Herrington & Kervin, 2007; McLoughlin & Lee, 2007). The transmission of content (using PowerPoint, PDF and Word files) to students is seen as effective practice for emerging technologies. Herrington (2006) states that rather than using new technologies as a medium to transfer content to the students, 'technologies can be used by students as intellectual partners, and as tools to analyze and interpret their understanding' (p. 219). While new technologies are explored as a way of creating authentic learning environments for the learner, for example, creating simulations and web-quest, there seems to be little research on the potential use and application of Web 2.0 tools in enhancing the learning process in an authentic environment (A. Herrington & Herrington, 2007). The participatory nature of Web 2.0 tools, means user empowerment such as the ability to create, collaborate and communicate has the potential to bridge the gap between the authentic learning activity and the learners' interaction with the surround (context), self (cognitive and meta-cognitive) and peers (Dunlap & Lowenthal, 2010). Vygotsky (1978, 1986) espoused the zone of proximal development (ZPD), where he outlined the development the learner can undergo by him/herself and further development is made possible by providing appropriate scaffolding by a person with higher expertise. In a collaborative environment augmented by Web 2.0 tools, the scaffolding in the ZPD can be provided by peers in class, the teacher, or any other expert from around the world (Borthick, Jones, & Wakai, 2003). Borthink and Co (2003) suggests that peers working collaboratively on a problem are able to create a higher level of intelligence in the process. The Web 2.0 tools can amplify the rate of interaction between the learners and thus the enhance exchange of ideas. In the process of exploring each others' ideas, exchanging tacit knowledge (know-how) and explicit (know-what) (Brown, 2006), and by comparing experiences and disputing the differences between them, the learners create higher levels of meaning and understanding that benefits the ZPD of all involved in the process (Borthick, et al., 2003; Hansen, Dirckinck-Holmfeld, Lewis, & Rigelj, 1999).

Design

The design of the project took into consideration the context in which the learning was already situated. The students over the duration of this one-year-long course were to build two boats. In the first semester, the task was to build a small dinghy and in the second semester a racing yacht. In other words, the learning

was structured around students completing authentic learning tasks such as planning and building boats, and working in teams throughout the course, with access to experts in the field for advice and support. While the course itself and learning were underpinned by appropriate pedagogies, the learning process and facilitation however were embedded in traditional teaching practices, hence negating the benefits of authentic learning. The design of the project (Figure 1) aimed at shifting the facilitation towards learner-centred approaches through the use of learning technologies situated within the authentic learning tasks of building boats.

The researcher started a collaborative project with the lecturer teaching the course in the second semester of 2010. By negotiation, a Netbook computer was made a minimum course requirement; students were given a choice of buying any other device as long as it had a camera and was WiFi capable. The students who could not afford to buy a Netbook computer or similar due to financial difficulties had the option of borrowing a device for the duration of the course from the institutional pool.

The students in the class were introduced to Google applications, mainly YouTube, Picasa, Google Docs and Blogger. As a part of course orientation, students were taken through the steps of creating a Google account and setting up a blog using Blogger. All the students in the class were provided hands-on tutorials on how to use these tools on the computer and on their mobile devices. A departmental flip camera was also made available to the students for use in class when needed.

To improve learner engagement in the learning process and to transform the learner role into being a 'content creator' from a 'content consumer', learner-generated content was made an explicit course outcome. The students were to use their blog as an eportfolio for the course to collate all the digital artefacts (pictures, videos, posts and conversations) they had created in the process. It was envisaged the ecology of tools surrounding the creation of an eportfolio, for example, Blogger, YouTube, Picasa and Google Docs would help create a dynamic and an interactive platform for the lecturer and other peers in class. The lecturer also established a blog to drive the learning, model effective practice and provide feedback to the students by posting comments on the student blogs.

Methodology

A participatory action research (PAR) method was used in this study (Kemmis & McTaggart, 1988). The participatory (collaborative and communicative) nature (McNiff, 1988) of PAR helped build a community with the students and staff over the duration of the course. This allowed the researcher to provide pedagogical and technological support to the lecturer within the context of the study and technological support to all the students on a weekly basis. The participatory nature of the research also afforded the researcher to collect relevant data on a weekly basis and also provided an opportunity to consider the feedback given by the lecturer and students on elements that needed improvement. The feedback from the students, and the lecturer's own reflections, informed the approach for the following week as part of an action research cycle. The students and the lecturer signed a consent form to participate in this research. The institute's research committee granted ethics approval for this research.

Data collection

The data for the study was collected via a voluntary pre-project survey. Data was also elicited from student and staff blogs. The researcher also kept a log of feedback and observations from the weekly meetings with the students and staff for the duration of the study. A post-project focus group was held with voluntary students and at the end of the course an interview was conducted with the teaching staff. The pre-project survey was administered to ascertain the types of devices the students had access to, the web tools students had used and what they were using them for.
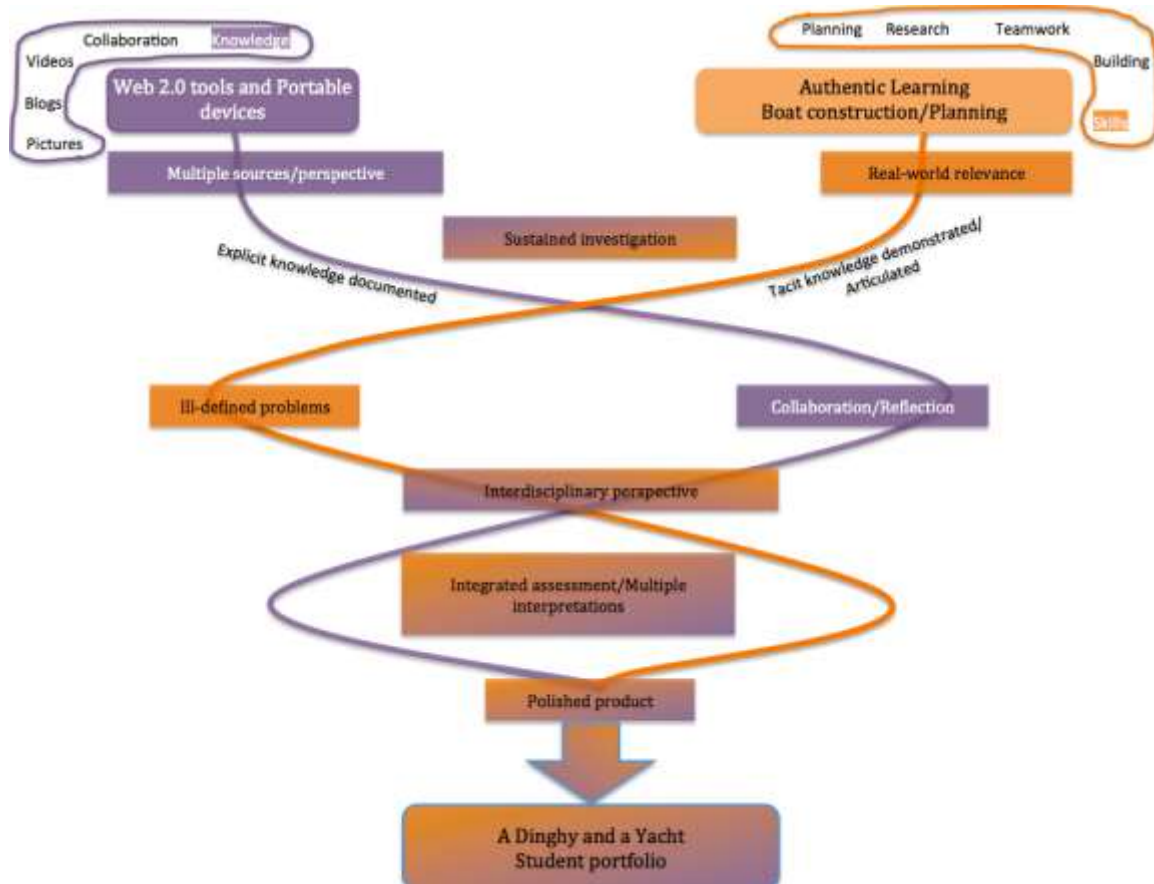
Figure 1: Concept map of the use of Web 2.0 tools in Authentic learning

Results

Pre Project Survey

A voluntary pre-project survey in semester one elicited data from the students on the type of technology and web tools they had access to and had used prior to starting the course. A total of ten students (n=19) participated in the survey. Figure 2 provides an overview of the types of web tools students had used. While the students had accessed a variety of tools, the use was mainly driven by the need to access data. The students were mainly content consumers, not producers. For example, only two students had used an online document editing service while almost all students who took part indicated that they read a blog or viewed a YouTube video. Only one student out of the participating 10 had an active blog. All students in the class (including those who did not take part in the pre-project survey) indicated they had a laptop with wireless capability and three indicated they had a Smartphone.
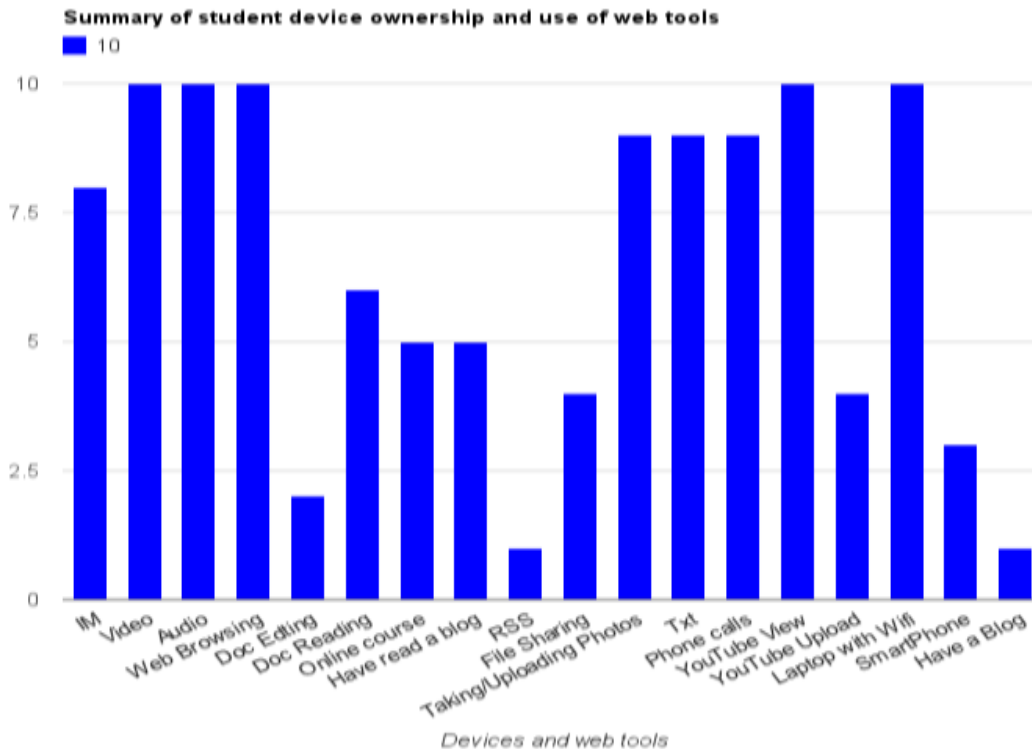
Summary of student device ownership and use of web tools

Figure 2: Tools students had access to and had used before

Student blogs and observations

Student blogs – student-generated content
In the length of the course, in excess of 81 videos were created by all the students in the class (n=19). This number excludes videos that were kept private or where students had disenabled embedding. The playlist of all public or accessible videos created by the students is accessible at:

http://www.youtube.com/playlist?list=PLE62CEEE97758F29E. While students used videos frequently to enhance their portfolios, pictures were more common. Almost every single student blog post had made use of pictures to inform the writing process. An average of 23 blog posts were made by the remaining fifteen students of the nineteen that started the course; the highest being forty blog posts and the lowest, seven. The class blog bundle can be accessed here:

http://www.google.co.nz/reader/bundle/user%2F04444936209981325189%2Fbundle%2FMarine_2010.

The videos created by the students documented the process of boat building for both of the boats. Upon analysis, the videos could be broadly categorised in four groups, (i) brainstorming and planning, (ii) documentary and evidence, (iii) reflection and (iv) mixing and remixing of existing videos. The videos under the brainstorming and planning category outlined collaboration between students. The collaboration included brainstorming and conversations between groups and individuals, in order to validate and plan for the task ahead, in the presence of the lecturer for feedback and guidance. The documentary and evidence category includes videos that captured footage of students discussing the agreed ideas and techniques and then applying them to complete a task. The reflective category captured the outcome of the processes and the reflections on what went according to plan and what processes needed improvement. The mixing and remixing category is where the student(s) edited multiple videos to tell a story for learning purposes. These videos, when used by the students to compose blog posts, were complimented by an in-depth narration of the processes and outcomes. At times, when appropriate, the students also used pictures to inform the narrative passage and process outcomes.

Researcher observations

To begin with, the students were skeptical of the approach even when the rationale behind the design was explained. Some students voiced their concern that building a boat and gaining that knowledge was their priority, not blogging. However, after a couple of weeks having used the tools in the process the students started to see the value. An early observation in the class was the early shift in preferred choice of device for use in class from a laptop to student owned mobile devices. Over the duration of the course the number of smart devices (tablets and Smartphones) slowly grew to a point where almost every student had one. They were frequently using these devices to capture pictures, videos and to upload them to appropriate hosting services such as YouTube and Picasa. The students preferred to work on their blogs in their own time, mostly overnight and at home.

The students seemed highly motivated and engaged in the process, taking control of the situation when needed, collectively coming up with solutions, supporting each other and taking control of the learning space. For brainstorming and planning sessions, the students took charge of the blackboard, pinned pieces of paper on tabletops for drawing and made use of the lecturer's computer while searching for information and resources. Some advanced learners mentored and guided the students who needed help. One advanced learner created a set of instructional videos and uploaded them on his blog as a scaffold for other students who needed help with computer drawing. Almost every student's blog had a unique feel and look to it. The students customised their blogs with pictures (mostly boats), added additional structure to their blog to make posts more visible and easier to access, and kept their profiles updated. While the blog posts did not trigger a lot of conversations online (commenting on blog posts), they did create lots of face-to-face discussions and conversations in class. The atmosphere in the class was one of openness and collaboration. The students welcomed questions from others and were willing to help peers when approached.

The lecturer initially needed guidance and support to make the transition and to make sense of the Web 2.0 tools. However, after four weeks of being engaged in the project, he started to see results and began to actively seek resources and information on effective use of Web 2.0 tools in learning and underpinning pedagogies. As a result, he explored and blogged about social constructivism, authentic learning and Laurrilard's conversational model (Laurillard, 2007) for learning and teaching. The lecturer's role in the process was observed to have changed to a facilitator and a guide that students called up when they needed advice. The lecturer was observed to have moved from computer-based applications to cloud-based collaborative services.

Student focus group

The feedback from the focus group with five volunteering students indicated that the use of Web 2.0 tools in the learning process benefitted them in various ways. According to the students in the class, the integration of Web 2.0 tools and mobile technologies did not pose a steep learning curve. They were already using the tools but lacked focus for use in their learning. The students also highlighted the fact that the approach certainly provided them with flexibility:

> ….. the concept of Web 2.0 initially sounded complicated or specialized however this new educational approach actually uses daily computer software and program, online applications and resources, and other IT technologies we use everyday, such as 3G network on our mobile, recording video and taking pictures with camera or smart phone, etc. (Student W)

The students also commented that the design of the course and use of the Web 2.0 tools made them more responsible for their own learning. It provided them with the opportunity to 'write down what they had done, what they were thinking, and what kind of help they needed' (Student T). The setup created a collaborative environment where peers in class could read a blog post and comment on it. At the same time, it provided the lecturer with a mechanism to assess the students' current knowledge and provide additional support and guidance when needed. The combined effect of Web 2.0 tools and mobile devices provided students with an opportunity to access information, and to network with each other at any time. This also provided continuous connectedness and an opportunity to create a context for their own learning, because learning was no longer situated within the four walls of the classroom:

> … it improved communication between students and tutors with little or no limitation to time and place. When compared with face-to-face meeting and communication, students and tutors now can communicate online. You can post your ideas, thoughts, suggestions or comments at anytime, anywhere. You do not have to be in the workshop in order to discuss with your peers and the tutor. (Student C)

> The tutor was able see how each student was doing throughout the course. This gave the tutor an opportunity to make more comprehensive and flexible assessment of the student on the basis of their learning and not only on the basis of the final outcome. (Student W)

When the students were asked to reflect on their experience on the course and if it was motivating and engaging they stated that when compared to other courses they had enrolled in, their personal experience and observations of the peers was that they drove the learning as the learner. Because of this they were willing to put in the extra effort when needed.

> I think my colleagues in class and I myself were motivated. Well for me as a student, if your assessment and portfolio will be based on what you put on your blog it makes you pay more attention to your daily study. Moreover, you can also help other students if they posted any questions on their blog and made comments on your work. And remember, other students can do the same for you. (Student T)

The students also reflected on the artefacts they had created, the process and how it helped them and peers in class. For them it was a collection of resources that they could refer to when looking for information but to also use it for reflecting on their role in the process 'you can log what you are doing and you can go back and look at yourself' (Student C). The collection of artefacts also became a scaffold for other students who needed help 'And it kept helping not just me but other people as well and vice versa' (Student Y). A collection of student reflections is accessible at: http://www.youtube.com/watch?v=oqo3lx0zAd0.

Staff Interview

The lecturer, reflecting on his journey argued his role in the process and agreed that feeding information to the students was not an effective pedagogical practice in an authentic learning environment. When questioned what had changed when compared to the old setup, he stated:

> Probably me more than anything, I am more inclined towards student-centred learning rather than teacher-centred teaching as before. I am a learner with my students and where possible I try and model the use of Web 2.0 tools for learning.

> During this time I was transforming myself, with the aid of my students and the support staff. The transformation was from being an objectivist to becoming a constructivist. As I read papers and books on journeys others had taken along this path, I resonated them. I really enjoy conversations with students and in most cases the topics are in context with learning, so, when I came across Diana Laurillard's conversational model, the lights turned on even more. This pedagogical approach was to become my main model for teaching/learning.

The lecturer reflects on the impact this change has had on student learning:

> The students took more responsibility for their learning in the process meaning they were responsible for the quantity and quality of the output for themselves and others in class.

According to the lecturer, the students were more communicative in the course and they asked more questions when compared with other times he had taught this course. The students also demanded help when they needed it. "I think they asked a lot more questions and demanded help from me right then.' The Web 2.0 tools enabled student-generated content and allowed the lecturer to work with students at a deeper level:

The student content enabled me to see the things they were working on. In the past, this was like a concept in the students' brain. Before, I was not able to see what the students were thinking about but now I can watch their videos, read their blogs, look at their reflections and comments and this gives me an idea for where the student is. I can now support the student in the process by making a comment on their blog or discussing it with them in class.

When asked about what he had observed with the students in the class with regards to student portfolio and student-generated content, he reflected;

It was exciting for them because it is them, it is theirs. In the past we used to give them workbooks and it was all ours. I could see how boring it was for the students. The portfolio is theirs and they are putting a lot more into it, a lot more energy and a lot more emotion. They had a sense of ownership over it because they knew they were going out of here with it. It gave them a sense of pride and confidence. I could sense that they were not interested in their grades so much as they were more interested in what they had created and what they owned.

The content created by the students helped almost every time. It encouraged collaboration and reflection. The video and pictures taken by the students in the process were uploaded and shared with others in the class. Other students made use of the same resources, however they used it to compare and reflect on their own learning. This gave the students an opportunity to improve on their understanding and knowledge. The interview video is accessible on YouTube at http://www.youtube.com/watch?v=qoJEggkvygw&NR=1

Discussion

Learner-driven scaffolding for enhanced learning

The videos and pictures taken by students, coupled with reflective blog posts and other student-generated content, formed the base for embedded assessment that effectively took the form of an eportfolio. In order for the learner to develop, scaffold within the learners ZPD is seen as a critical ingredient. In this study, the student-generated artefacts (videos, reflective videos posts, blog and pictures) were found to be effective scaffolds within the ZPD that the students and lecturer found useful. This was not necessarily limited to these artefacts. The conversations that followed online and offline among the students and between the lecturer and students added further benefits. The students who used their own smart devices appreciated the fact that they were able to create a context conducive to their own learning that was further enhanced by connectedness, ubiquitous access and collaboration. While traditional scaffolding methods are seen as the learner seeking help or support from the 'knowledgeable others' (peers, the lecturer or any other expert) in order to grow its own understanding and knowledge. The pedagogical use of Web 2.0 tools and mobile devices in this study provided the students a platform to collectively negotiate ideas and disagreements; in the process creating new understanding and knowledge that benefitted all the participating parties (Borthick, et al., 2003; Brown, 2006; Luckin, 2008). The mixing and re-mixing of videos and pictures by students to suit their needs or the team's need, the reflections in groups and as individuals on a method or process, and collaboration between the students online and offline all resulted in a scaffolding ecology; a learning ecology that was driven and nurtured by the students and benefitted all who participated beyond the limitations of time and geographical location. The teacher in this process acted as a facilitator or a guide, stepping in when requested by the students or when there was a need.

The underpinning Web 2.0 tools and mobile devices that the students used to create, update and maintain their eportfolios encouraged students to articulate their explicit knowledge in relation to the tacit knowledge. The artefacts captured by the students while carrying out a task/activity and uploaded as a blog post along with reflective narrative enabled the students to bridge the two elements 'knowing' and 'doing' which enhanced understanding. This also allowed the teacher an opportunity to continuously assess the understanding and growth of a student. This change outlines the pedagogical transition from assessment of learning to assessment for learning when compared to teaching practice prior to this project.

Authentic learning and Web 2.0

The integration of Web 2.0 tools and mobile devices in this study was observed to have 'gelled' the characteristics of authentic learning. The linkages between the characteristics were enforced by the collaborative, communicative and participatory nature of the Web 2.0 tools. The mobile devices further enhanced the process by enabling learning-generated content, connectedness and ubiquitous access to resources and information. These factors combined gave the students a sense ownership in the process and enabled them to take charge of the process and their own learning.

Prior to this project the students were still engaging in authentic tasks and context, but the learning process and student role were arguably different. More importantly, in the previous model, the context even when it was authentic (students were still building boats) did not ensure effective learning. In this study the teacher's ability to craft the environment to enable student engagement, openness and participation through the use of appropriate tools, was found to be the key.

Conclusion

This study outlines the important relationship between authentic learning, Web 2.0 tools and portable mobile devices. Authentic learning is at the heart of situated learning and Web 2.0 tools and mobile devices enhance the social, participatory and active engagement aspects of the approach. By augmenting the authentic learning environment with Web 2.0 tools and mobile devices, the learning process was enhanced as it gave learners choice and flexibility over their own learning and also acted as a pedagogical change agent. The use of Web 2.0 tools and mobile devices in this project promoted learner-generated content, context and a participatory and collaborative environment that made the core elements of authentic learning function as a single unit, hence the title Authentic learning and Web 2.0 - Completing the equation.

References

Borthick, A. F., Jones, D. R., & Wakai, S. (2003). Designing learning experiences within the learners' zones of proximal development (ZPDs): Enabling collaborative learning on-site and online. *Journal of Information Systems, 17*(1), 107-134.

Brown, J. S. (2006). Growing up digital: How the web changes work, education and the ways people learn. *USDLA Journal, 16*(2), 11-20.

Churchill, D. (2005). Learning objects: An interactive representation and a mediating tool in a learning activity. *Educational Media International, 42*(4), 333-349.

Dunlap, J. C., & Lowenthal, P. R. (2010). Learning, unlearning, and relearning: Using Web 2.0 technologies to support the development of lifelong learning skills. In G. D. Magoulas (Ed.), *E-infrastructures and technologies for lifelong learning: Next generation environments*. Hershey, PA: IGI Global.

Hansen, T., Dirckinck-Holmfeld, L., Lewis, R., & Rigelj, J. (1999). Using telematics for collaborative knowledge construction. In P. Dillenbourg (Ed.), *Collaborative learning: Cognitive and computational approaches*. Amsterdam, Netherlands: Pergamon.

Herrington, A., & Herrington, J. (2007). Authentic mobile learning in higher education. In P. L. Jeffery (Ed.), *International Educational Research Conference*. Frementle, Australia: AARE.

Herrington, J. (2006). Authentic e-learning in higher education: Design principles for authentic learning enviornments and tasks. In T. Reeves & S. Yamashita (Eds.), *World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*. Chesapeake, VA: AACE.

Herrington, J., & Kervin, L. (2007). Authentic learning supported by technology: 10 suggestions and cases of integration in classroom. *Educational Media International, 44*(3), 219-236.

Herrington, J., Reeves, T. C., & Oliver, R. (2010). *A guide to authentic e-learning (connecting with e-learning)*. New York: Routledge.

Kemmis, S., & McTaggart, R. (1988). *The action research planner* (3rd ed.). Geelong: Deakin University.

Laurillard, D. (2007). Pedagogical forms of mobile learning: Framing research questions. In N. Pachler (Ed.), *Mobile learning: Towards a research agenda* (Vol. 1, pp. 33-54). London: WLE Centre, Institute of Education.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral perticipation*. Cambridge: Cambridge Press.

Lombardi, M. M. (2007). Authentic learning for the 21st century: an overview. *EDUCAUSE*. Retrieved from http://alicechristie.org/classes/530/EduCause.pdf

Luckin, R. (2008). The learner centric ecology fo resources: A framework for using technology to scaffold learning. *Computers & Education, 50*, 449-462.

McLoughlin, C., & Lee, M. J. W. (2007). *Social software and participatory learning: Pedagogical choices with technology affordances in the Web 2.0 era.* Paper presented at the ASCILITE, Singapore.

McNiff, J. (1988). *Action research: Principles and practice*. London: MacMillan Education.

Reeves, T. C., Herrington, J., & Oliver, R. (2002). *Authentic activities and online learning.* Paper presented at the HERDSA, Perth, Australia.

Vygotsky, L. S. (1978). *Mind and society: The development of higher psychological processes*. Cambridge: Harvard University Press.

Vygotsky, L. S. (1986). *Thought and language*. Cambridge: MA:MIT Press.

Author contact details:

Vickel Narayan, vnarayan@unitec.ac.nz

Please cite as: Narayan, V., & Lovegrove, C. (2012) Authentic learning and Web 2.0: Completing the equation. In M. Brown, M. Hartnett & T. Stewart (Eds.), Future challenges, sustainable futures. Proceedings ascilite Wellington 2012. (pp.708-717).