Introduction of wikis to foster collaboration in health professional education

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Abstract

Background: In order to facilitate learning that prepares students for future media-rich, collaborative, professional practice, a wiki-based assignment was introduced to a professional physiotherapy program. The aim of this study was to explore learning experience with wikis from the student's perspective.

Methods: Over a 12-week semester, 57 Year 3, BSc Physiotherapy students worked in groups to create and collectively contribute to a wiki regarding exercise for specific clinical populations. Each student then documented their progressive wiki experience in an online reflective journal. Data from a random sample (n = 10) of the students' journals were analysed for common themes using a framework analysis method.

Results: Three predominant themes emerged from the online journal data regarding the student experience: (1) using a novel learning platform, (2) teamwork and collaboration and (3) enhanced learning opportunities. Wikis facilitated achievement of learning outcomes, including collaborative team skills and evidence review, synthesis and presentation. Themes identified from the students' journals have led to the development of a framework for the integration of an enhanced social collaborative environment in a health professional program. A greater level of student orientation to wikis is advocated, and it is important that the wiki platform chosen has a user friendly interface and ideally is developed as an open learning resource.

Conclusion: Wikis were found to be a valuable tool for facilitating collaboration and enhancing learning, important for future professional practice of these health professional students. A framework for integrating such social collaborative environments into health professional programs has been presented.

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Introduction

Bruns and Humphreys (2005) asserted, "If work requires people to be actively creative, to collaborate, to understand the shape of project work and to be willing to learn continuously, then educational environments need to model environments in which students can learn to do so" (p. 27). Today's university graduates will work in a knowledge based, networked world that is not wholly reflected by traditional models of higher education, which are often focused on lectures and tutorials. Indeed, the European Union-supported Competences in Education Project (CoRE) emphasises the importance of programs having student-centred learning approaches that focus on achievement of competences rather than merely the completion of a degree (Lokhoff et al., 2014). So, all degree programs should aim to develop graduate competences, which for health professional programs will usually map to those of the relevant professional body. For physiotherapists, the World Confederation for Physical Therapy key professional competences include collaborative work, critical appraisal of literature and reflective practice (WCPT, 2011)

Web 2.0 software has the ability to provide new possibilities for collaborative networked learning in health and healthcare (Boulos & Wheeler, 2007) in a way that reflects the working world but also requires a sound pedagogy (Rowe, 2012). The collaborative learning approach is known to enhance learning through increasing student engagement with subject matter (Schaffert et al., 2006) and creating social learning environments where group interaction and group learning may be more fruitful than the sum of individual efforts (Thompson & Ku, 2006). Web 2.0 educational technologies can facilitate the creation of such social learning environments.

A wiki is a communication and collaboration tool that can be used to engage students in learning with others within a collaborative online environment (Parker and Chao, 2007; Rouissonos & Athanassios, 2013; Schaffert et al., 2006). Wikis are socially oriented and enable free cross-platform editing and redistribution of original content (Buffa & Gandon, 2006), thus involving learners in their own construction of knowledge (Jonassen, Peck, & Wilson, 1999; Mejias, 2006). There is evidence that user-created content software encourages deeper engagement with learning, through the act of authoring, because an awareness of an audience encourages more thoughtful construction of writing (Jacobs, 2003). Students know their work will be viewed and evaluated by others, and this may give them a greater sense of responsibility towards their work (Papinczak, Young, & Groves, 2007). Wikis are therefore generally regarded as supporting the collaborative and social constructivist learning paradigms (Bruns & Humphreys, 2005; Parker & Chao, 2007). Even though wikis have been around for a while and have a lot of early adopters in higher education, research regarding their use in health professional education is limited (Brulet, Llorca, & Letrilliart, 2015; Zitzelsberger, Campbell, Service, & Sanchez, 2015), and they have yet to be used to their full potential for learning.

The BSc Physiotherapy program at University College Dublin is a four-year health professional degree program with a philosophy of encouraging evidence-based, reflective practice and a commitment to life-long learning (see http://www.ucd.ie/). The program includes a series of aligned exercise modules leading to a clinical exercise module in Stage 3 that focuses on devising evidence-based exercise programs for clinical populations.

Specific module learning outcomes include critique and synthesis of literature and application of evidence in practice through competent prescription and delivery of appropriate exercise programs. Emphasis is placed on students learning to use frameworks and principles for exercise prescription that can be applied across populations but allow for special considerations and precautions. Previously, the module strove to meet these learning objectives via a series of lectures, tutorials and practical exercise sessions, with both a written assignment and an objective structured clinical exam (OSCE) (Harden, Stevenson, Downie, & Wilson, 1975) for assessment. Students worked alone on the written assignment and did not usually access any of their peers' work. However, such an isolated work approach is not reflective of professional physiotherapy practice, where accessing and sharing knowledge with peers is commonplace and regarded as best practice.

Introducing wikis represented a new way of promoting this practice by providing an interactive, collaborative learning environment, and as with any teaching innovation, capturing the student experience was deemed important.

This study, therefore, aimed to evaluate physiotherapy students' experience of developing a wiki regarding exercise for a specific clinical population.

Methods

All 57 Stage 3 BSc Physiotherapy professional program students (mean age 20; 75% female), who were registered in the clinical exercise module at University College Dublin (UCD) participated. All were provided with written information regarding the project and written consent of all students was obtained, with students free to exclude themselves. This study was approved by University College Dublin Human Research Ethics committee.

Blackboard (Learn 9.1 Service Pack 5) is the institutional virtual learning environment at UCD and, thus, provided the platform for a student assignment that required students to work in groups of five to develop and contribute to a wiki over a 12-week university semester. Study data were generated by students contributing to a concurrent online Blackboard journal, documenting their reflections on the use of group wikis as a learning tool over the course of the semester. A series of criteria for the wiki, and journal content and journal prompts, were posted in Blackboard for the students. The combined wiki–journal assignment was valued at 50% of the overall module grade, equivalent to the previous written assignment's weighting, with the remaining 50% awarded for practical exercise prescription assessments.

A series of marking criteria for the wiki content and journal prompts were posted in Blackboard. A minimum number of five contributions to the journal was stipulated. Students were advised that the wiki should not be greater than a standard scientific paper and could be much shorter provided that navigation to relevant information (e.g., web links) was explicit and user friendly.

Students worked within groups to create and contribute to a wiki regarding clinical population-specific exercise topics (e.g., cancer, diabetes). Wiki content mapped to the module's learning outcomes, including review, synthesis and application of evidence in clinical practice. In addition, the production of an online resource that would support the students and their peers whilst on clinical work placement was emphasised.

An overview of the process and timeline is given in Table 1. This included a wiki orientation session on Day 1 in class with additional, dedicated class time for wiki-related group work and instructor feedback over the semester. To further support student learning, lectures were delivered throughout the semester regarding the wiki topics. During the wiki development phase, students were given access to their own group wiki, and later access to all class wikis was enabled.

Table 1
Overview of Wiki and Journal Process Over 12-Week Semester

Timeline	Wiki Assignment	Online Reflective Journal
Week 1 pre class	Students randomly allocated to project teams (n = 5) with specific project topic using Blackboard (Learn 9.1 Service Pack 5)	Students documented their experiences of the overall assignment and the accompanying processes (e.g., reaction to assignment, introduction to a wiki, peer group work)
Week 1 class	Group task set: To develop a wiki that will act as a useful evidence-based learning resource for peers going on clinical work placement/ working as a new physiotherapy graduate. Student induction: Concept of wiki explained, including wiki functionality and etiquette. Students came together in their project groups (facetime), discussed topic and planned their work and the structure of the wiki. Wiki facilitator available	
Weeks 3, 5, 7 classes	Team meetings during class time, with wiki facilitator available	
Week 9 class	Wiki completion deadline. "Tour of wiki" presentation—student presentation of wiki content to peers. Access to all wikis granted to all class members.	
Weeks 10–12 classes	Feedback and group discussion re project topics and wiki experience	

Wiki content was graded in relation to the agreed assignment's criteria, and a grade was awarded for the online journal based on criteria developed from Hatton and Smith's (1995) levels of reflection. In addition, students were advised that marks would be awarded based on their level of online journal engagement.

Data collection

Students recorded their wiki learning experience over the semester, using a concurrent online reflective journal. Students were familiar with the concept of "reflective writing", as the BSc Physiotherapy program includes specific reflective writing instruction, which is required for a number of modules. Only the student and module instructor had access to this journal in order to assure confidentiality and to foster more honest opinions regarding group work. Journal data, thus, comprised of student reflections, allowing students to express their own insights in their own words.

The data from a random sample (n = 10) of these journals were anonymised and transcribed for analysis.

Data analysis

Sampled journal data were analysed using a framework analysis method (Gale, Heath, Cameron, Rashid, & Redwood, 2013). This form of analysis provides five systematic and visible stages to the analysis process, and although the general approach is inductive, it allows for the inclusion of *a priori* as well as emergent concepts when coding. After coding the first few transcripts, we (CC & GOD) met to compare the labels we applied and agreed on a set of codes to apply to all subsequent transcripts. Codes were grouped into categories, which formed the analytical framework. Some new codes emerged as we continued to review transcripts, and these were included in a final agreed framework. The working analytical framework was then applied by indexing subsequent transcripts using the existing categories and codes. Inter-rater reliability of the categories and codes were determined and found to be acceptable (> 90% agreement) using the method described by Miles and Huberman (1994). Finally, we discussed our findings, how they should be interpreted and their implications for practice.

Results

The online reflective journals mapped the progressive experiences of an undergraduate cohort with wikis and reflect the learning experience. The depth of the online reflective journal writing varied considerably between students, but all students made six to seven journal postings and produced a mean of words (range 1280 to 1875) of journal data each.

The results from the analysis of these journal data are presented according to the three predominant emergent themes: (1) using a novel learning platform, (2) teamwork and collaboration and (3) enhanced learning opportunities. Under each predominant theme, subthemes were also identified (Table 2). All findings are supported by verbatim student quotes to illustrate these, and citations are followed by a number code that corresponds to an individual student.

Table 2
Results of the Framework Analysis From Student Journals

Key Themes	Sub-themes
Student experience of using a novel educational platform	Initial apprehension Issues with wiki software Reluctance to edit wiki Focus on "perfect" end product rather than process Need to meet outside wiki Wiki as a learning tool
Teamwork and collaboration	Preference for individual work Communication important—need to learn skills Need for leadership
Enhanced learning opportunities	Learning resource Learn from different approaches

Student experience of using a novel educational platform

In the initial reflective feedback, a number of students expressed apprehension in relation to using the wiki as a platform. Many were concerned that they would not be able to use it competently and that it would be a difficult process.

"Initially, my reaction was an internal moan. A wiki? Sounded complicated." (102)

"I hadn't a clue what a wiki even was, never mind how to go about designing one!" (111)

Concern was also expressed when it came to editing other people's work. A high proportion of students reported that they did not feel happy editing their colleagues' entries.

"I don't feel comfortable with changing someone else's work because I don't think that I know the subject any better than them so why should I change their entry." (104)

In addition, students felt the need to meet in person to agree on wiki content and edits rather than communicating via the wiki only.

"Also our group had a tendency to email and meet up rather than leave comments on the wiki." (107)

The reluctance to edit and need for regular meetings are also reflective of the students' expressed preference for working towards a final "perfect" end product rather than making regular entries and communicating and editing online.

"We are all I think in the mindset of perfecting our work before publicising it." (105)

Many students found the software frustrating but this became easier as they became more accustomed to it.

"One criticism I have is that we don't receive notifications if someone within the group creates a new page, edits a page or even comments on a page." (102)

Problems students reported included difficulty navigating pages, failure of posted material to save and the slow response of the software, rendering the editing process more time consuming.

> *"If wiki were to be used again, some of the software glitches would need to be fixed or an alternative software found."* (108)

Once the students had completed and were no longer registered to the module, access to the wiki was denied, precluding the use of wiki content as a longer-term, open learning resource. Despite concerns expressed, students became more confident using the software over the course of the semester and the wikis produced demonstrated good mastery of the various wiki functions.

Teamwork and collaboration

The wiki work required students to collaborate with the members of their group. However, some students continued to express a preference for individual work.

> *"I know that group work may not always go to plan, and personally I prefer to work on my own where assignments are concerned."* (103)

> *"I am the kind of person who likes doing things myself."* (105)

The expressed preference for individual work may in part be due to the definite concerns expressed regarding the variance in contribution between various group members.

> *"Mainly two people within our group have been doing the majority of work."* (102)

In addition, concerns regarding the award of a group grade were expressed.

> *"I believe group work can be unfair and a group grade generally doesn't reflect the hard work of individuals."* (102)

Student reflections included an acknowledgement of the value in gaining group work experience that mimics real working life.

> *"As we will have to work on a team for our careers, I think group work is very important."* (103)

Experience of learning to recognise and manage differing opinions was illustrated by student comments.

> *"Since there are five individuals in our group, it can become difficult to reach an agreement since we all hold our own opinions and sometimes conflicting ideas."* (102)

> *"There was a lot of communication of ideas in our group which was really positive."* (105)

The difficulty of lack of leadership when conducting group work and recognition of the benefits of having a leader in a group were reflected in a number of the journals.

> *"The biggest issue in our group was the reluctance of anyone to take the lead and therefore there was a lack of direction."* (106)

Students also stated the importance of good communication.

> *"Another aspect which may have caused our work to be put up late is poor communication."* (102)

> *"Without doubt, communication is key."* (101)

Overall, student reflections on the wiki project demonstrated experience and recognition of many of the challenges of teamwork, important given the need for collaboration as future health professionals. Their reflections also demonstrated how group work can enhance learning opportunities.

Enhanced learning opportunities

One of the most prevalent journal themes was that of recognising the valuable learning resource that each wiki represented and students indicating that they would utilise the wikis in the future.

> *"I know I will definitely be availing of these wiki's while on placement if/when dealing with the wide spectrum of patients with various pathologies and age groups."* (102)

> *"It would be great if we could have these online somewhere to access at other times."* (108)

Students also recognised the value of group work in enhancing learning, by bringing differing opinions and knowledge to the assignment.

> *"I feel your mind opens up when you're talking to other people about topics."* (108)

> *"I think a group dynamic is a massive benefit in this regard as each person brings unique thoughts to the brainstorming stage."* (107)

The students, thus, collectively constructed knowledge that they believe will act as a useful open learning resource, one that was enhanced by the various student inputs.

Discussion

Integration of wikis into health professional education has been successful with this student cohort, and showed good student engagement with the process and learning outcomes being met, as evidenced by the quality of the wiki content itself. Student journals have given valuable insights into the use of wikis to facilitate collaboration and the challenges this presents. Themes identified in the analysis of these journal data have been discussed and have informed the development of a framework for integration of social collaborative web environments into health professional education.

Student experience of using a novel educational platform

It was interesting that this young population, who are regular ICT users, demonstrated apprehension at the introduction of a new technological tool and hesitance to communicate online, with many preferring to meet up in person. Apprehension switched to frustration at some aspects of the software, and perhaps these "Net Generation" students have, through use of technology such as Facebook, developed

high expectations as to how Web 2.0 technologies should look and operate (Guo & Stevens, 2011). Setting expectations regarding wiki technology may be necessary, but wiki software is generally regarded as intuitive (Otter, Whittaker, & Spriggs, 2009). Use of the next iteration of Blackboard or other publicly available wiki platforms should be explored, with public platforms having the added advantage of acting as an ongoing learning resource beyond module completion.

Many students focused on the end product, whereas wikis should be regarded as "work in progress" evolving over time (Wheeler, Yeomans, & Wheeler, 2008). Perhaps, having a predetermined outcome, in this case the assignment criteria and deadline, was not easily reconciled with the ethos of a wiki as social software (Elgort, 2007). Students were uncomfortable editing others' work, and as previously found (Otter, 2009), some students felt they didn't have sufficient expertise and did not wish to offend. Editing of content is, however, a natural and discursive feature of wikis, with collaborative learning requiring negotiation of meaning and frank exchange of ideas (Wheeler et al., 2008), and overall, the students did become more comfortable with editing over the course of the semester. This reflects professional life, where differences in opinion exist and professionals often produce and share written materials at draft stages.

As with any technology introduced into the educational system, utilisation requires thoughtful and deliberate planning, instructor creativity, enthusiasm (Ferris &Wilder, 2006) and skills to fix problems quickly and efficiently (Reinhold & Abawi, 2006).

Adequate training of students has been deemed essential to the success of projects that make use of social software, and a greater level of training, with guidance regarding online etiquette (Ramanau & Geng, 2009; Rowe, 2012) and use of scaffolding strategies (Jung & Suzuki, 2015) such as wiki exemplars (Otter, 2009; Sadler, 2002) at the outset, should prove valuable. As prior experience with wikis and other technological tools earlier in the program appears to provide a considerable advantage in how well wikis are used for group collaborative learning (Guo & Stevens, 2011), broader discussion at program level regarding integration of education technology is required.

Teamwork and collaboration

As teamwork and collaborative skills are essential for health professionals, creating group learning environments at university is advocated (Bruns & Humphreys, 2005). However, collaboration does not necessarily arise spontaneously with wiki work (Caple & Bogle, 2013; Elgort, 2007; Rowe, 2012), and greater and more consistent facilitation and the online presence of a teacher may be required (Garrison & Anderson, 2003). Student diaries illustrated the challenges and benefits of working as part of a team, with most focusing on the lack of contribution by some individuals and questioning the equity of a group grade. Some students remained firmly fixed in the preference for individual work, whereas others moved from a place of apprehension to actually enjoying the group learning experience. The need for a leader became apparent to some students, consistent with previous authors' reports that the presence of a leader

(Ramanau & Geng, 2009) or "editor in chief" (De Pedro & Riuerdevall, 2006) for wiki-based assignments benefits the group in terms of better coordinated activities and the periodic restructuring and synthesising of the collective information.

As the wiki assignment required students to construct content for their peers and to collaborate, plan and problem solve, aligning assessment with learning objectives (Biggs, 1999; Cannon & Newble, 2002; Davis, Kumtepe, & Aydeniz, 2007; van Hattum-Janssen & Lourenco, 2006) by utilising peer assessment would have enhanced the validity of the assessment process. Otter et al. (2009) used peer assessment of wikis with medical students and emphasised the need to give clear criteria to students as to what is expected of them. Developing a peer assessment rubric with students would allow students to internalise what's expected of them (Gibbs & Simpson, 2005), and students could then attribute marks for individual effort and other workload factors, perhaps allaying some of their concerns regarding equity. Peer assessment also maps well to necessary graduate attributes, which require students to have the ability to assess their own work as well as to assess the skills of other professionals and students (Boud & Falchikov, 2007; Snowball & Mostert, 2013; Topping, 2009).

Learning opportunities

Journal content illustrated that learning had occurred specific to existing module outcomes and also in relation to technology, collaboration and communication skills, all of which are important professional program graduate attributes (Lokhoff et al., 2014). Students recognised the potential of their wikis to become an open learning resource that could be further enhanced through module instructor and clinical specialist feedback whilst on work placements, thus facilitating transfer of theory into practice. From the outset, this was highlighted as a key reason for developing the wikis, and students and clinical tutors have since report accessing wikis on clinical work placement.

Further journal prompts could have facilitated greater reflection on the affordances and limitations (Elgort, 2007) of wikis for health professionals, including the development of communities of practice where acquisition of knowledge relies on the interaction between individual experiences and socially defined knowledge structures (Wenger, 2000) and collaboration becomes more powerful (Parker & Chao, 2007). Wikis and other Web 2.0 technologies allow communities of practice (Zheng, Niiya, & Warschauer, 2015) to develop, where finding or establishing face-to-face groups might be difficult or impossible (Boulos & Wheeler, 2007), and enable deeper connections between stakeholders, clinicians, clients and laypersons.

Framework for integrating social media into health professional practice

The ensuing framework is the culmination of the student experience analysis and the facilitators' practical experimentation. It proposes a series of connecting interventions that offer guidance and structure to the embedding of a social media (technological interface) in support of collaborative practice, practice that may be mirrored in a real-world environment.

INTRODUCTION OF WIKIS

Reflecting both curriculum and instructional design models (Biggs, 2003; D'Andrea, 2003; Reigeluth, 1999; Reiser, 2001; Roberts, 2004; Toohey, 1999), there is an inherent cyclical process to the framework that underpins the core concept. The intention and expectation is that one would reflect, review and amend the intervention(s) iteratively. Each modular cycle or activity provides data and direction to aid better implementation and engagement for the next.

The innovation of the framework is in the provision and acknowledgement of the importance social media has on the interplay between a group of learners and consequently a team of professional peers in a practice-based environment. It capitalises on known issues impacting the pedagogic requirements (the need to employ instructional design approaches, ensure curriculum alignment, provide assessment for learning, etc.) and imbues these with the requisite competencies for professional collaborative practice (e.g., co-construction of knowledge, problem solving, critical analysis, teamwork).

There are three key phases within the framework. The first focuses on the technological platform, the second on the impact on professional competencies and the third on the interactions (work processes) and outputs (open educational resources). As may be seen, these map across the three thematic areas identified in the framework analysis of the student journals: experience of a novel platform, teamwork and collaboration and enhanced learning opportunities.
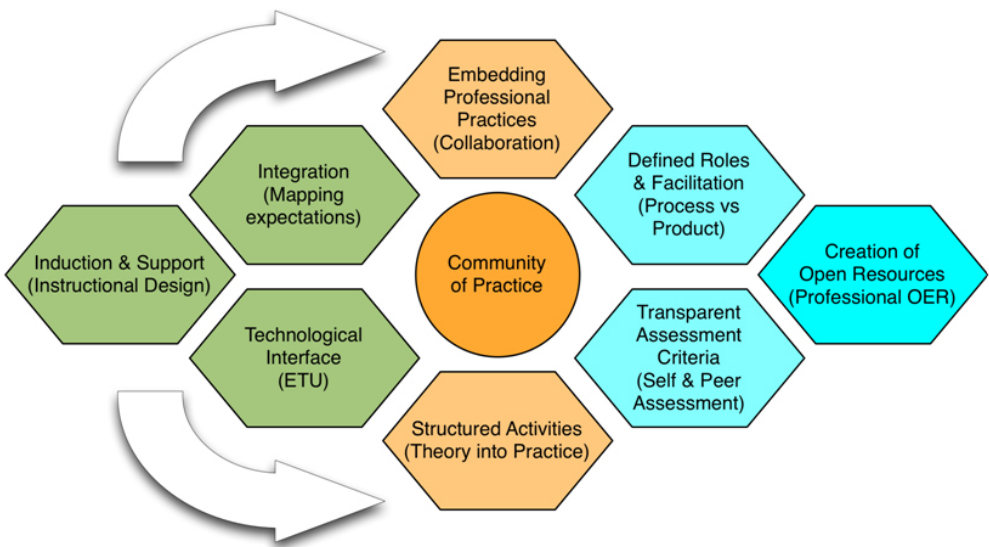

Figure 1. Framework for the integration of a social collaborative environment in health professional practice
ETU = easy to use

Implications for future practice and research

The student reflections on their group wiki experience and the quality of the wiki content produced demonstrated the valuable role of Web 2.0 technologies in health professional education. As for all reflective assignments that are summatively assessed, there is potential for positive bias in student journals, but students are educated on the importance of depth of reflective writing from the program outset, which is therefore likely to include negative comments and constructive criticisms at times. That said, more formal analysis of in-class discussions and feedback could yield additional insights but might inhibit the nature of the discourse that occurs.

In this instance, wikis have proved to be valuable for collaboration. In particular, the cross editing capability of a wiki (i.e., capturing co-constructed knowledge in action) provided an excellent process that could be integral to future professional collaborative practice.

The use of concurrent online journals during the wiki assignment represents a valuable means of capturing the evolving student experience when introducing teaching and learning innovations. Themes identified from the journal and within the context of current literature have informed the development of a framework for integration of social collaborative web environments in a health professional program, as wiki-supported collaborative learning cannot function without an effective learning design (Zheng et al., 2015).

This framework has already informed further iterations of this module, and key changes have been implemented, including a move to a public platform (wikispaces) to allow ongoing, password protected access to the wiki; more specific guidance on student contributions; peer assessment of student effort and wiki content; plus guidance regarding copyright issues and plagiarism. The framework outlined in this paper can form the basis for introducing social collaborative web environments to other health professional programs. Further research to test the framework's impact on student performance, student engagement and collaborative practices is warranted, especially given that collaboration is recognised as not being spontaneous with group wiki work (Caple & Bogle, 2013). In addition, future research is required to explore the validity of the student-created resources and their potential impact on professional practice.

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