Development and Evaluation of a Shared Learning Wiki in an an Inter-professional Context

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Abstract

This paper discusses the use of a wiki for student radiographers and nurses building on an inter-professional learning experience in the context of Problem Based Learning. The aim of the wiki was to facilitate an on-going learning environment for students who had met once and would not be meeting again. 120 third-year nursing diploma students and 50 second-year radiography undergraduates were provided with a PBL trigger related to a patient with acute stroke. The students met once, in five mixed-discipline groups, following one week of working individually on the PBL outcomes for the trigger. The meeting included discussion around the role of the professions and the outcomes for the trigger. Further learning was enabled through the provision of one wiki for each of the five groups. The students had four weeks to complete their wikis during which time no group could see or edit the other groups' wikis. At the end of this period the wikis were made visible to all students for group peer assessment. Wiki editing skills were provided through the use of peer 'wiki champions' who cascaded training to the rest of their group. Validated and published wiki evaluation models are sparse. We therefore developed a qualitative and quantitative evaluation tool looking at process (student contribution) and outcome (the value, to the students, of the wiki pages produced) based around our aims and the underpinning pedagogies of constructivist and inter-professional learning.

Interprofessional Education

Alan Bennet (1998) understood the value of interprofessional working when he wrote about an eavesdropping experience of two Lancashire housewives' discussing their experiences of interprofessional care. "He was going….they gave him the last rites, but then ten minutes later, they came along and resuscitated him, I mean that's the trouble with hospitals. No Liaison." It is acknowledged that modern-day health and social care is delivered by numerous professionals and support workers (Masterson, 2002) and during an episode of care a patient / client will spend time and discuss their care, with more than one of them (Headrick *et al.* 1998). Whether this care is to a high standard depends on how well the health and social care professionals in a team work together (Carter *et al.* 2003).

In today's health and social care environments the focus on interprofessional education and practice has never been more strongly promoted. Documents such as The National Health Service

Community Care Act (Department of Health, 1990), the New NHS Modern and Dependable (DH, 1997), A First Class Service: Quality in the NHS (DH, 1998) Clinical Governance: Quality in the NHS (NHS Executive, 1999), A Health Service of All the Talents (DH, 2000) and the National Service Frameworks (DH, 2001 onwards) to name but a few, all advocate collaboration across professional boundaries for the benefit of patients or clients.

Although there may be visible changes in DH documents, a systematic review of the literature (Howarth et al, 2004), a review of the literature by the RCN (2006), a longitudinal quantitative study (Pollard et al, 2006) and enquiry reports (Laming, 2003 and Kennedy, 2001) still indicate that for care to be delivered effectively, positive perceptions of professional relationships and collaboration and partnership is essential. The philosophy that underpins these practices is that those working in the fields of health and social care should replace competitiveness with co-operation and partnership, tackle elitism and concentration of power, focus on holistic, humanistic, compassionate and co-operative care and embrace collective responsibility (Wilcock and Headrick, 2000).

Such measures would result in meaningful and effective care for patients and clients (McPherson *et al.* 2001), but also bring together models of good practice (Headrick *et al.* 1998) and a motivated, adaptable and flexible team (Robinson and Cottrell, 2005), who in terms of investment for the future of the NHS are worth developing, as set out in the National Occupational Standards (DH, 2002) and the NHS Knowledge and Skills Framework (DH, 2003).
A way of achieving this is by allowing undergraduate healthcare professionals to work and learn together (Priest and Robert, 2006, DH, Health Professions Council, Universities UK, GMC and NMC, 2003). This can either be 'interprofessionally' or 'multiprofessionally', Parsell and Bigh (1998) suggest that 'interprofessional' is learning involving two professions and 'multiprofessional' is learning between three or more. Whichever definition is chosen, each involves activities of learning between differing healthcare disciplines (Barr, 2005) and allows for the dilution of fears relating to professional identity, power and status(Paice *et al.* 2002) improved communication (Priest and Roberts, 2006) and improved collaboration and care of patients and clients (Wilcock and Headrick, 2000).

Online Learning

The Internet landscape has drastically changed over the last few years and there has been the introduction of many new technologies that are being embraced by Higher Education Institutions (Godwin-Jones, 2003). Many tools are now household names, such as email, discussion boards, chat rooms and forums. Contemporary advancements are blogs, wikis and RSS feeds, based on the technology of extensible mark-up language, which allows the separation of content from format and supports the use of meta data and machine processing of Internet documents (Fisher and Baird, 2005). By allowing this link to documents, articles, posts and edits, new collaborative opportunities are being developed such as the 5th Dictionary of Epidemiology (Porta, 2007) and their use in teaching and learning in primary, secondary, further and higher education (Pereira and Soares, 2007, Long, 2006, Rafaeli, 2006, Lamb, 2006).

According to Ferdig and Trammell (2004) online learning resources help students become subject matter experts as they increase interest and ownership in a topic. Pick (2005) and Ganley (2004) also found that technologies such as wikis and blogs can give a voice to the quieter members of a group of students and that on a wiki or blog these students can have an opinion and are not scared to contribute to the topic because of personal confidence and worrying about embarrassing themselves. Their postings often increase their social status in class and therefore improve their role in the classroom community. In turn this increases group cohesiveness and motivation (Heafner, 2004).
Brownstein and Klein (2006) are keen to acknowledge how wikis and blogs support the varying learning styles (such as Honey and Mumford, 1982). Not all students are good at reading, listening or verbalising their thoughts and ideas and wikis and blogs may accommodate these varied approaches to learning. This also aids the lecturer who, in a world of ever-increasing student diversity, has to consider a range of educational background and learning styles (Snelgrove, 2004). Wikis and blogs have also been said to allow deep learning as learners can stand back from an experience, seek out connections and therefore relate theory to practice (Rosie, 2000).

Second Generation tools (so-called web 2 tools such as wikis and blogs) which also allow for a democratic approach to creating and developing learning (Long, 2006), are seen by students as an added dimension to their own learning and reflecting processes (McAlpine and Weston, 2000) and should be considered as a "hive brain" – a network of connective intelligence (Levy, 2001) which Lamb (2006) suggests

should be focused around a project, piece of research or assessment. A study by Fisher and Baird (2005) suggests that online learning fosters student support, self regulation and retention. However this piece of work was only carried out at Pepperdine University and cannot be generalised to the wider population.

A drawback to online learning is the need for access to a computer, however newer technology permits the use of mobile phones, games consoles and television. Additional pressures include other coursework and clinical practice commitments as well as inputting online (Keegan and Stephens, 2007) and the need for appropriate IT skills. However according to Wallace (1996) online learning is motivating in itself as it can be carried out during 'free-time' and by inputting their own work the student develops confidence in IT.

Combining Interprofessional Education and Online Learning Design

For the last five years, undergraduate Radiography and Nursing students at the University of Salford have been formally provided with interprofessional shared learning opportunities. Traditionally, these were one day events which included breaking down of stereotype activities and a problem based trigger based on real life patient scenarios, which according to Barr (2002) are the most effective strategies for IPE. This provided participants with the opportunity to share tasks, facilitated peer-learning and increased self-awareness (Tiberius, 1990). It also reflects Tajfel's (1981) 'Contact hypothesis' theory whereby spending time learning about each other improves any poor attitudes held about the other health or social care students. These sessions are always evaluated well by the students who request similar activities.

Due to timetabling issues, interprofessional sessions were still only achievable for one day events. However it was thought that the group should have extra time to work and learn together even though they were apart for both theory and practice. It was therefore decided to explore the use of information technology to provide the students with the chance to re-engage with the subject topic and each other beyond the single day event. The lecturers involved in developing the shared learning one day programmes also had experience of developing and using IT-enhanced methods through other collaborations (Keegan and Stephens, 2007, Robinson and Newton-Hughes 2005, 2006). It was agreed that not only would there be the traditional one day event, but also a wiki which would allow the students to input all their shared

learning onto 1 site and would be used by the radiography students as a way of revising for their examinations.

What is a wiki?
According to wikipaedia, possibly the most widely-known wiki in the world, "a wiki is a collaborative website which can be directly edited by anyone with access to it" (wikipaedia 2007)

Method
Approximately 100 student nurses and 50 student radiographers participated in an inter-professional learning day designed to provide the students with the opportunity to learn from, and about, one another. The face-to-face session was centred around a Problem Based Learning trigger related to stroke and each discipline demonstrated their own unique perspective on managing the patient in the trigger scenario. Following the face-to-face session the students were expected to continue their learning on-line through the use of collaborative, multidisciplinary wikis made available through the Blackboard VLE. Five groups, each with a mixture of nurses and radiographers, were given their own wiki to edit. The wikis were semi-structured in that the headings were pre-set by the lecturers. Other than this, the staff had no input into the wikis and students were allowed to develop them as they wished. Each group could only see their own wiki site for four weeks after which time all wikis were opened for critical evaluation by both staff and students. The best wiki and the student with most edits received prizes. Students were sent an on-line evaluation tool to determine their opinions regarding the value of the activity. The following results detail students' perceptions of the experience, staff observation of the process based on a quantitative analysis using the Blackboard statistics tool and a description of the wiki-based resources created by the students

Results of On-Line Student Evaluation
Approximately 30% of students returned their questionnaire
The winning wiki won by more than 50% of the votes and was also the choice of the staff. Students were asked to justify their choice from a number of statements. The majority of students (48%) said it was because "the wiki showed good teamwork and worked well as a shared learning project". Students were asked to state their level of participation in the wiki. The majority of students (68%) said they had deposited information, 42% of students said they had also edited work whilst 20% of students said they had just looked at the wiki site.

In order to determine whether participation might be related to IT skills, students were asked how good they were at IT. 19% said very good, 71% said confident, and 10% said not confident. Nobody said they did not feel comfortable using IT. Students were asked whether they thought wikis were useful for this type of work. The majority (71%) either agreed or strongly agreed with the remainder neither agreeing nor disagreeing except one student who disagreed. More interesting were the qualitative comments which supported these responses.

There were 25 qualitative comments proffered by the students themselves and every one of these was positive regarding the concept of wikis as a learning method

> *"it is fun and I really enjoyed it"*
> *"I think a wiki is a great way to learn. It was fun to do and I enjoyed watching it build"*
> *"They are a great idea"*
> *"Overall I'm impressed"*

All students qualified their statements explaining why they enjoyed the wiki but also highlighting difficulties and problems. These positive and negative observations have been categorised as follows

Shared and Interprofessional Learning

Many students identified the benefit of the wiki as a tool for sharing learning

> *"because it's something that everyone can join in, someone might find information that you couldn't"*

Furthermore, as the context for our students was one of interprofessional working, many of the comments regarding shared learning reflected this theme too.

> *"It aided two individual groups to give their different ideas to each other in a way that was accessible"*
> *"I think is great for interdisciplinary collaboration, sharing of info and most importantly made us more aware of the nurses knowledge"*
> *"As this wiki was shared learning, I thought it helped me to understand the role of the radiographer."*

Teamwork

As mentioned above, the winning wiki was chosen because the students felt that it demonstrated good team-working. Clearly then, the theme of team-working figured strongly in the comments.

> *"Interesting… to work together as a team within your own group"*
> *"…it encourages on-line teamwork"*

There were, however some negative comments relating to lack of team-work.

> *"…it does give an opportunity for some people not to contribute"*
> *"The concept is a good one but not everyone participated"*
> *"The downside is people not sending you their work to add to the wiki as a few in my group didn't and then it affects the whole group."*

Student Engagement

One student gave an interesting insight into why students might not engage, referring to feelings of discomfort at showing work to other students,

> *"..not everyone would feel comfortable putting their work on to be viewed by other people. In my case I was adamant in case the information I found was incorrect"*

Whereas another student found that textual dissemination of their work was preferable to verbal communication,

> *"It was great…being able to share information without the pressure of being in a group discussion in uni"*

Another theme which might explain student engagement related to the additional workload students perceived the wiki was generating

> *"Would have been very good if there had not been so much other work to do!"*
> *"…it involved extra work on top of what we already do to put things on the wiki"*
> *"Found it a bit difficult to get the time to add things but it was a useful experience"*

There may have been a misconception of the work required. It should have been relatively simple for students to copy and paste their standard course work, being undertaken for the verbal feedback on the trigger, into the wiki, without additional work. However some students were unable to do this:

> *"…it is also time consuming putting info in there as you can't cut & paste"*

A number of students felt they did not have the IT skills or facilities at home to fully engage with the wiki

> *"It is ok to do if you are good with the computer and have a reliable internet service. As I don't this task was very difficult"*

As the activity covered only a short element of the programme, we could not justify the time it would have taken to train all students in the use of wikis. We therefore elected to use the model of cascade training

where one or two students from each group were 'wiki champions'. These champions received a short half-hour training session and were asked either to cascade their training to other students or to take on the role of editor of the wiki whereby they would upload material sent to them by other students. This model worked well in some groups and less so in others,

> *"I feel it would have been more beneficial if the training had been given to everyone"*
>
> *"I wasn't the one chosen to attend the training session, two members of our group took it upon themselves to attend and then not share the info or put all our info in the wiki so I didn't have a clue what to do"*

Flexibility

One of the many heralded benefits of on-line teaching and learning approaches is the flexibility of access. However only one of our students referred to this,

> *"It was great to participate from home…"*

Outcome and Application to other Areas

Wiki learning spaces are unique in their culmination of a single resource document. A number of students identified this benefit,

> *"…the outcome of the wiki was great I can see how many will benefit from this"*
>
> *"…having all the information about one subject area together will be good for revising.."*

A number of students could see how this benefit could be used to support the whole of their PBL course,

> *"I think it would be good for triggers within base group"*
>
> *"I think more use of the wiki style for triggers would be brilliant."*

Quantitative Analysis of student Engagement

Students tended to use the wiki during the day time with peak access at 10am, however it was accessed up to 8pm and there were also a number of hits in the early hours of the morning. See table 1. The most popular day for using the wiki was Tuesday. Surprisingly it was used infrequently at the weekend and never on a Saturday (see table 2).

Hour of day	% access
0	0%
1	4.27%
2	0%
3	0%
4	0%
5	0%
6	0%
7	0%
8	0%
9	12.82%
10	31.62%
11	11.97%
12	2.56%
13	0%
14	8.55%
15	1.71%
16	0%
17	1.71%
18	6.84%
19	4.27%
20	13.68%
21	0%
22	0%
23	0%
Total	100%

Table 1 hours of access

Day of Week	Percent
SUN	2.56%
MON	29.06%
TUE	47.01%
WED	5.13%
THU	14.53%
FRI	1.71%
SAT	0%
Total	100%

Table 2 days of access

Features of the Winning Wiki

The winning wiki (see figure 2) was chosen for its comprehensive content which was well-illustrated and presented in a consistent format (i.e. font, headings etc were consistent). The work was also referenced. Although the students cited 'evidence of team work' as the strength of the wiki, this could only be implied from the finished product since the students did not have access to the editing history. However, as tutors we were able to interrogate these statistics and found that there were indeed more views or visits to the site (445) and more edits (78) than any of the other wikis. There were, though, fewer contributors (4 radiographers and 11 nurses) which suggested fewer students did more of the work (see figure 1).

Analysing each individual version of the 78 versions for this wiki we found that the majority of edits were for the purpose of depositing material. On occasion, students added references to other students' work, thus improving the content quality (see figure 3), whilst other edits were made to improve layout (figures 4 & 5). There was very little changing of one another's work the exception to this was the removal of a CT scan of the head by one of the nurses which was replaced with a photograph of a piece of x-ray equipment. She said in the comments section (area for the group to discuss the wiki with one another) that she felt it was more pleasing to the eye. The radiographers felt a little aggrieved by this as the scan had demonstrated the relevant pathology and they made a comment to this effect. However it was four weeks before they had the courage to replace the image. There may therefore

be a need to educate the students regarding the etiquette of wiki editing and the necessity to be critical of one another's work, in order for the final product to be effective. Linking the wiki to summative assessment might drive motivation in this regard.

Another potential problem with using wikis is one of plagiarism. As an on-line piece of work, it is easy to copy web-based material directly into the wiki and as this is not an assessed piece of work students do not readily see the relevance of copyright and referencing regulations.
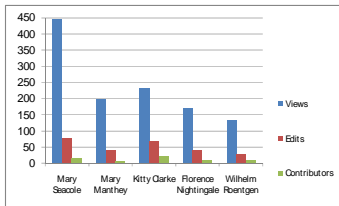

Figure 1. Views, edits and contributions per wiki

Discussion
Limitations of Study
Of 150 students only 41 (27.3%) returned their on-line questionnaire. Furthermore, the spread of returns across the groups was inconsistent with 14, 9, 7, 4, and 7 responses from the five groups and the group with the most responses was also the group which was voted the best by the students. It is not clear whether students therefore voted for their own wiki, however, the fact that the students' preferred wiki coincided with that of the lecturers, and that students provided critical reasons when making their preference provides an element of validity.
Reasons for low return rate of questionnaires are well-articulated in the research literature (McColl et al 2001), but the limitations of evaluating the experience and participation in an on-line activity through on-line methods are obvious. Students who did not engage with the activity due to lack of confidence, competence or interest may similarly have

avoided the on-line evaluation questionnaire. Indeed none of our respondents identified IT as a problem for them suggesting our sample was biased in favour of IT-competent students and against those for whom lack of IT skills left them disengaged from the whole process. However, students who did respond were able to provide useful qualitative comments, both positive and negative that will be discussed.

Group Balance and Size

As stated by Gill and Ling (1995), for IPE to be truly interactive there needs to be an equal balance in the number of students from each profession. It is suggested that skewing of one profession hampers interaction, as the larger group dominates. This poses a problem for our groups as there will always be more nursing than radiography students. Furthermore, student numbers in each group were large which according to Reeves (2000), who recommends an optimal number of 8-10 students per group, might result in poor interaction. However financial constraints limit staff resource, identified as one of the difficulties in planning IPE activity (Barr, 1994).

Benefits of Wikis for Teaching and Learning

Barr (2005) suggests that IPE is portrayed by the capacity to cultivate collaboration with both theoretical and clinical learning between different groups of health and social care professionals. In this regard, the benefits of the wiki far outweigh the limitations because wikis encourage peer review and collaboration. This was certainly the most commonly cited benefit in our study and reflects the work of others (Levy 2001 and Long 2006 for example) thus satisfying the interprofessional education agenda when two or more professional disciplines are involved in this collaboration. Wikis therefore have the potential to address the key themes for successful collaboration: knowledge of each other's roles, communication skills development, willingness to work together, trust and mutual respect for each other's capabilities (D'Amour et al, 2004).

In addition to addressing the IPE needs of our students, the wiki appeared to have other pedagogical benefits: wikis

• Are available anytime and anywhere, as long as students have access to a PC and the Internet they can access a wiki. In our study students did access the wikis outside traditional classroom hours and occasionally at the week end. 'Out of hours' access was not as extensive as we had imagined however, this might be due to the structure of the

PBL curriculum timetable which provides students with non-contact, self-directed study time during weekdays.

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• Can accommodate learning styles (e.g.Honey and Mumford, 1982) of each student and thus supports the lecturer managing diverse groups (Snelgrove, 2004). However in our evaluation, at least one student felt unable to participate preferring the verbal approach associated with class-based Problem Based Learning. For some learning styles, on-line methods may therefore need closer facilitation but this would need further investigation in the future.

• Develop students' IT skills beyond those required to engage with the current VLE provision. Online learning is motivating in itself as it can be carried out during 'freetime', and by inputting their own work, the student develops confidence in IT (Wallace, 1996). It is difficult to concur with Wallace from the findings in our study as it was not a theme identified by our students and indeed, a number of students suggested that insufficient 'up-front' training has the opposite effect, discouraging them from taking part. We found development of IT skills did not happen as a matter of course and time does need to be invested in preparing students.

• Develop problem solving skills. Gick and Holyoak (1983) suggest that by using the wiki and viewing others working out problems, learners see peers using prompts and suggestions to solve the analogy and therefore the problem thus developing problem-solving skills. This skill was not identified as a theme by our participants however as both cohorts of students were studying on Problem Based Learning programmes the concept of problem-solving may no longer be novel to them and thus worthy of comment.

• Can build on self confidence of students who are quiet in class but have a voice in the wiki (Farrell, 2005, Pick, 2005, Ganley, 2004), with social status and motivation of these students increasing. This benefit was identified by one of the participants in our study.

• Are enjoyable learning methods. According to our evaluation students actually enjoy using wikis to supplement face-to-face sessions. Farrell (2005) suggests that e-learning programmes rid students of personal obstacles that are considered challenging in face-to-face situations.

- Provides quality resource material and has been highlighted in the student evaluations for problem based learning as a continuous way to maintain and engage in the topics learnt and with each other, which according to Van Winkelen (2003) can assist in the broadening of the knowledge and practice base of students.

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- In addition, wikis may provide more effective use of lecturer's time. Where traditionally, feedback may involve another day of sessions in a fixed time frame and setting, wikis provide a more convenient input from anywhere at anytime, conducive to the lecturer's workload. For this small pilot project staff time was not the focus of the evaluation and it is highly unlikely that such benefits would be realised until beyond the labour-intensive period of initial development.

Limitations of Wikis
Engaging non-participants

In face-to-face contact it is easier to engage non-participants through verbal and non-verbal communication, this is more difficult in e-learning. Emails were sent to encourage involvement but with limited effect and only increased activity from those already engaged. Farrell (2005) suggests that early on, IT training should be provided and students should be actively encouraged to get involved with additional support provided when needed. Our model of wiki champions was developed to provide peer training and support within a limited time frame however it appears this approach was not successful with all groups.

Integration with Summative Assessments

Many of the respondents to the questionnaire felt the wiki was another added pressure. If the wiki had been incorporated into the assessment process then engagement would be compulsory and therefore encourage regular use. This is supported by Parsell and Bligh (1998) who advocate that students react positively to IPE if they see an obvious relevance between their educational experience and future practices. To make IPE part of mandatory assessment sends out a clear message that IPE is important (Reeves, 2000).

Changing the Culture

At least one student admitted to being reluctant to join in for fear of being 'incorrect', yet the philosophy under-pinning group editing software is the evolution of the resource, so-called Darwikinism,

whereby students must feel comfortable to critically evaluate and develop one another's work in order to produce an end product that has been refined and perfected by all (wikipaedia 2007). Interestingly, even those student who were comfortable with loading information onto the wiki made very few changes and improvements to the work of others. This is in spite of them having two-three years experience of problem-based learning. It is possible that the skills of debate and discussion in the classroom are not easily transferable to written forms of communication and this would make an interesting area for further research.

Conclusion

We have developed an on-line learning tool to provide students from two different disciplines with the facility to extend their collaboration, in a flexible manner, beyond the limited time normally available for this activity. Despite a number of limitations in the method, evaluation has shown this approach to be successful in providing an enjoyable experience that satisfied the requirements for collaboration within the interprofessional education agenda. Further developments would include additional training and support for students less comfortable with IT and further facilitation to foster a critical approach to peer support and learning, possibly linked to summative assessment. Interesting areas for further study might be a comparison of face-to-face and on-line tutor facilitation and an investigation into the transferability of PBL skills from the classroom to the virtual environment.

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