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WikiVet: building a community of practice to support a self-sustaining wiki for veterinary education

Abstract: A collaborative 'community of practice' has been established between all seven UK veterinary schools to establish 'WikiVet' (http://www.wikivet.net/), an online, content-and activity-rich wiki to support veterinary education (facilitated by the Higher Education Academy Subject Centre for Medicine, Dentistry and Veterinary Medicine and funded by the Joint Information Systems Committee). There were strong pedagogic and financial reasons to develop a self-sustaining, shared wiki for supporting undergraduate and post-registration veterinary education in the UK. Students have developed and maintained the wiki with the support of subject specialists who reviewed the accuracy and quality of the materials. The community of practice relied on communication through face-to-face meetings, Web 2.0 tools and online chat to decide how and when to update the content. The initial focus on establishing educational content in pathology has now been extended to most areas of the veterinary curriculum.

There has been significant interest across the international veterinary community as the wiki has the potential to engender international participation which could substantially increase the user base, breadth and depth of content. Dissemination will continue to raise awareness and uptake of the wiki.

Keywords: wiki; veterinary; curriculum development; self-sustaining; student authorship; pathology; technology; Web 2.0; student-led; WikiVet; community of practice; CoP; collaboration.

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1. Introduction

The UK veterinary schools (representing approximately 1,000 staff and 4,000 students) have collaborated via a community of practice (CoP) (Wenger, 2000) to develop a wiki (CoP) to support undergraduate veterinary education which is:

• comprehensive, activity-rich and quality assured

• easy to edit/repurpose and expandable

• student-led, pedagogically sound and self-sustaining

• has potential for international participation.

The 'learning community' CoP built on relationships and goodwill established in previous projects, and the collaborators already had some experience of Web 2.0 tools in use within their institutions (Staley, 2009). Other technologies were relatively expensive, and while international sales of educational software brought in some resource, development was not self-sustaining (Chen, 2006), nor was it consistent with a moral purpose of promoting 'global animal health' (European Commission, 2007). The collaborators wanted to investigate new, cheaper ways of sharing resources that would enable them to maximise expertise, benefit the entire UK undergraduate veterinary student body, and (most importantly) improve the pedagogy and flexibility of their educational programmes (Clark and Estes, 1999).

The seven UK veterinary schools are relatively small, and curricula are under constant pressure to incorporate ever-increasing content as knowledge in existing topics deepens, and new topics (such as public health and communication skills) are identified for inclusion by the Royal College of Veterinary Surgeons (RCVS). Schools can set their own curricula, but students must meet the necessary 'day one competences' (outcomes) in order to graduate as a veterinary surgeon (RCVS, 2001), "the veterinary degree should continue to provide a broad, vocationally directed, science-based education sufficient to prepare graduates for life-long development within diverse veterinary careers…" [RCVS Council, (2002), p. 4].

Outcome-based education also encourages teachers and students to share responsibility for learning (Harden et al., 1999). An ability to undertake independent learning (Prensky, 2008) is an essential skill in graduates (Cheetham and Chivers, 2001) and the potential of distance learning to promote independent learning has been explored (Harden, 2005). Both students and staff use and contribute the content of the wiki, promoting a constructivist 'see one, do one, teach one' learning approach (Laurillard, 2008) highlighted in medical education studies where students are required to demonstrate teaching skills as part of their professional development (Swanwick, 2008).

Social networking, embedded in the wiki, enables all students to participate in the community and to explore different roles (Stevenson, 2008). The role of educational technology in facilitating the 'practitioner as teacher' is well documented (Vozenilek et al., 2004; Ferrell et al., 2008), and simulation enables students to practise in safe surroundings, better preparing them for clinical encounters (Scalese et al., 2007).

Veterinary students work hard to cover extensive undergraduate curricula, and often complete their clinical extra mural studies (EMS) placements during

holidays. There is so much information available on the internet (such as that signposted by the Veterinary Information Network and International Veterinary Information Services) that even 'Google Generation' (O'Brien, 2008) students lack the time, while they are still developing their critical appraisal skills, to distinguish potential sources of validated information at the right level for their studies (Pothen, 2008). They need educational content, found in repositories (such as Jorum and MyIntute) and elsewhere on the internet, to be signposted in the context of meeting their learning outcomes (Kirschner et al., 2006).

WikiVet contains many curriculum topics: pathology, anatomy and physiology, blood and immunology, bacteriology, virology and parasitology, veterinary public health, normal haematology, biochemistry and physiological parameters, pharmacology and therapeutics and clinical information. Supporting resources range from computer-assisted learning (CAL) packages, PowerPoint files, videos, links to external resources such as podcasts, activities and workshop content. The homepage also hosts news items and an 'article of the week'.

An investment of £23K (plus in-kind contributions from collaborators) for 2000 interactive pages supporting the undergraduate veterinary curriculum represents excellent value for money when compared with other learning development projects in the UK (e.g., the Technology in Learning and Teaching Programme). Staff and students participate in development of the wiki, and recent graduates in veterinary practice have contributed clinical exemplars to enrich the knowledge-base. WikiVet has over 2,600 registered users and 40 contributors worldwide at the time of writing, with approximately 50 new registrations per week. WikiVet is a work-in-progress and is in the process of being evaluated. Early results are promising "…having just graduated I wish I'd had access to [WikiVet] all the way through vet school. It is a great resource and so easy to use and I think the best thing about it is that you can trust the information on it. I love how you can use it for quick reference or for in-depth discussion. I have since used WikiVet in practice and shown it to members of the profession to try and spread the word!" (Tulloch, 2008).

Establishing the CoP was an essential stage in developing the wiki and 'being part of a friendly group of people all contributing to a common goal that has produced something tangible and easily understandable' (WikiVet CoP Participant, 2008) is highly valued.

This paper provides more detail of the background, role of students and staff in developing content, and issues arising from the development of this CoP and WikiVet.

2. Background

2.1 Existing learning community and collaboration

A CoP is a group of people with a common vision interacting as they move towards a shared goal, while improving their performance. 'Since the beginning of history, human beings have formed communities that share cultural practices reflecting their collective learning' [Wenger, (2000), p.228]. The WikiVet CoP built on the goodwill, expertise and people-networks of the Computer-aided Learning In Veterinary Education (CLIVE) consortium and VetSchools involving the UK veterinary schools. CLIVE successfully developed interactive CAL materials to support veterinary undergraduate education in all topics and stages of the veterinary curriculum which were shared within the UK and sold abroad, however materials and resources were locked into formats from which it was difficult and expensive to repurpose them (e.g., AuthorWare). VetSchools was aimed at students and graduates of all the UK veterinary schools, and featured discussion forums, online continuing professional development (CPD), a multiple choice question (MCQ) database of assessment items, a database of veterinary practices willing to take students on EMS placement, some Web 2.0 technologies, and other facilities of interest to UK vets.

Members of the CoP meet face-to-face wherever possible and between meetings communicate via email, voice over IP (Skype) and telephone calls. Regular communication means the collaborators know what others are working on, and are therefore not duplicating effort.

2.2 International context

Online learning resources have the potential to support raising the basic standard of veterinary education, in western and developing countries by providing an invaluable mutual information exchange, and be enhanced by international contributions and casebased discussion. Western students benefit from readily available English language veterinary texts and journals both in print and online, making relevant and accurate information readily accessible to both students and practitioners. There generally exists a high cultural awareness of animal welfare, and veterinary faculties are centres of excellence in both animal and comparative research, attracting a high level of financial and intellectual investment in developing the profession.

The standard of veterinary education available in the 450 veterinary colleges of the world in 109 countries recognised by the American Veterinary Medical Association Commission (AVMA, 2008) is variable, especially in developing countries where paraprofessionals work alongside qualified vets. Veterinary faculties attract minimal if any governmental funding and lack adequate facilities, especially up to date written material from which students and lecturers can supplement their education. In the past, the flow of information has generally been one-way and inefficient, such as western countries donating veterinary texts to developing countries, which may not be well suited to the specific epidemiology or language needs of that area, and do not allow any facility for case discussion.

WikiVet was presented to the International Veterinary Students Association Conference (IVSA, 2009) with a view to attracting more international student support.

Interest was shown in translating WikiVet into other languages and, by adding more content, widen the relevance beyond the UK. 'There was a huge interest in the wiki and broadening the content so as to make the wiki a universal application' (Brown, 2008).

3. Method

3.1 The project

The Higher Education Academy Subject Centre for Medicine, Dentistry and Veterinary Medicine (MEDEV) and the Joint Information Systems Committee (JISC) 'Distributed eLearning Programme' awarded the CoP £23K to fund firstly a pilot with three schools to develop a wiki in pathology ('VikiWiki'), and secondly an expanded 'WikiVet' to cover all aspects of the undergraduate veterinary curriculum. The schools provided further 'in-kind' contributions, and MEDEV also provided some administrative support.

Development involved:

• choosing a technology to support the vision of an online resource to support undergraduate veterinary education which was:

• flexible and able to be accessed from all participating schools (distributed)

• easy to use

• could hold or link to a wide variety of social networking software and media types such as text, images, application files (such as PowerPoint and Excel), video, podcasts, quizzes, interactive patient cases, flashcards, etc.

• had role-based workflow (author, user) and variable access (passwords)

• cheap

• expandable

• investigating the integration of Web 2.0, podcasting and folksonomy technologies in teaching and learning

• establishing demonstrator activity, utilising the input of an expert group of advisors, including 'help' pages to explain what was available

• training staff and students in developing content

• working with veterinary schools to raise awareness of the resource/s available (e.g., summer road shows at vet schools, planning meetings, assist with content population, feedback)

• evaluating the resource and document the wiki

• disseminating the outcomes at conferences and in newsletters, journals, etc.

3.2 Web 2.0 technologies

The CoP reviewed the literature to investigate the potential utility of Web 2.0 social networking software (Azoff et al., 2008):

• Subscription to really simple syndication (RSS) feeds (such as MyIntute), with notification of page changes.

• Podcasting to support student learning. The Royal Veterinary College, University of London (RVC) produce podcasts on topics ranging from bird flu and bluetongue disease to animal welfare and elephant locomotion, that are available as a free subscription via iTunes (e.g., Cleasby, 2009).

• Virtual pet games and farm webcams. At the University of Edinburgh (UoE) the 'virtual farm' gives veterinary students real-time visualisation (via webcams) of animals they have 'adopted'. They receive newsfeeds about cow's milk quality, lamb sales or any foot and mouth restrictions, etc. Data is automatically provided for teaching purposes.

• Web based blogs and wikis enable numerous distributed authors to work together to produce a document or structured knowledge base, with navigation to resources elsewhere on the web.

• Folksonomy (tagging) learning resources to link content and identify who has been accessing the material.

• Mashups which combine content from more than one source into an integrated experience for students.

• Content maps that can be used as navigational tools.

• Social networking websites such as MySpace, Facebook where users can interact with each other in real time or asynchronously.

• Media repositories such as YouTube and Flickr host videos and photographs that are shared online.

• Virtual patient cases. Developed in-house at UoE, 'Labyrinth' allows students to create and share clinical cases. Students enhance their decision-making skills by challenging their knowledge using 'game-informed learning' (Begg et al., 2005).

Mediawiki was chosen as many people are already familiar with the look and feel of Wikipedia (Hoare, 2008), and staff and students were trained in developing and quality-assuring (reviewing) content. A wiki could incorporate RSS feeds and other Web 2.0 tools.

3.3 Authorship

The CoP established a content-authoring process which minimised effort and maximised expertise across the UK schools. A small editorial board drawn from the CoP was established to regulate content on the wiki and resolve disputes about what was acceptable etc. Some veterinary students who wanted an opportunity to revise, to extend their IT/educational skills, or simply to have job for the summer were employed at each of the participating sites. Face to face authoring workshops where participants designed a generic framework for the structure of the wiki, created formatting templates (guidelines and styles), and authored content (see focus and content below) were held where attendees could test the process/procedures developed, and practice creating content within the wiki. Disputes (of which there were very few) were escalated to the editorial board.

The first face-to-face meeting allowed the students to get to know each other, which facilitated subsequent online collaboration and progress exchanges. Students appreciated that they were involved in developing a living site which was a learning resource and not a text book. A few students became 'WikiMasters' who were usually in contact with the other students on a daily basis (communicating via Skype, Google chat or email) to guide them when looking for information to populate the wiki. They found arranging 'who did what' within the wiki easier than anticipated. As topics were nearing completion the students held online meetings to collaboratively discuss which topics they needed to work on next. These could be divided up according to preference and interest areas or randomly allocated to student authors. Students used lecture notes, texts, and other sources of information to draft content for the wiki. These were mostly provided by the student's host institution (see limitations below) but could be supplemented by materials from elsewhere. They also created interactive activities to support student-learning and formative assessment e.g., case studies from general practice, flashcards, etc. Recently qualified residents contributed case studies and other learning content to enrich the wiki and make it more interactive.

Students initially peer-reviewed content authored by others (giving feedback on the basic presentation and granularity of each section), after which it was marked for the attention of staff specialists. All content 'under development' in the wiki remained visible to all, but its status (what stage of development, or signed off by an expert/the editorial board) was clearly identified at the top of each page.

Authorship is ongoing (the number of registered contributors has increased four-fold) since the funded period, with students and staff continuing to contribute to

the wiki using the processes outlined above. Student authors are recruited by job adverts, word of mouth and recommendation.

3.4 Focus and content

Pathology was chosen for the VikiWiki pilot. A basic structure was designed and, once established, the content was developed. The look and feel of the wiki and the transition between resources was made consistent. As the wiki became populated, linkages or 'stubs' were created which led into associated disciplines (such as anatomy, physiology, clinical medicine, etc.), which provided an ever-expandable structure.

There are almost 2,000 completed pages in the wiki, organised into approximately eight major sections including pathology (WikiPath); anatomy and physiology (WikiAnt); blood and immunology (WikiBlood); bacteriology, virology and parasitology (WikiBugs); veterinary public health (WikiVPH); normal haematology, biochemistry and physiological parameters (WikiNormals); pharmacology and therapeutics (WikiDrugs) and clinical information (WikiClinical). The structure of articles varies depending on which section is accessed. Some are purely text, and others have text with additional materials such as images, interactivity or links to video clips/podcasts. 'WikiNormals' allows users to look at all the breeds of different species as well as cover the normal haematology, biochemistry and physiological parameters. Searching by species in the 'WikiClinical' section provides common signalment and history, clinical signs, useful diagnostic tools and the treatment and expected outcome of each case. 'WikiBugs' divides into sections of infectious agents (e.g., parasites, viruses and fungi) and 'WikiDrugs' is organised by vaccines, anaesthetics and alternative medicines.

Figure 1 Screenshot from WikiVet

Each section introduces the topic and splits into more sections (i.e., general pathology splits into alimentary system, cardio respiratory system etc.), and then divides into a content list for that section. Users can drill-down to more pages or 'articles'. Images in the articles are presented as thumbnails (small photographs) that can be enlarged when clicked. Each article has a table of contents that is anchored to the entries (and can be hidden) and each entry within the article can be individually edited if required. There are also hyperlinks to other cross-referenced articles and resources from within the wiki.

Figure 2 Evolution of the WikiVet CoP

The WikiVet e-learning resources section contains CLIVE materials that have been repurposed from ToolBook/AuthorWare, or links to other websites. PowerPoint presentations, text, images and CAL materials (ranging from veterinary dentistry to emergency case simulators) are easily accessible from the links provided. Flashcards (questions with covered answers) sit within the wiki

structure to support revision and feedback, as users can follow up on the 'more information' link. Virtual patient case simulations include 'patient' presentation (a list of symptoms and a little background information) from which students have to deduce which treatment or further tests are necessary in order to make a diagnosis. Videos of anatomy, pathology and surgery are streamed from within the wiki structure. Interactive content maps are available and, like Wikipedia, the navigation bar is permanently displayed. WikiVet links to an interactive map where users can add their own details, and see the physical location of other users.

Schools currently signpost content in the wiki from their curriculum documentation, enabling the wiki to be accessed by and relevant to all curricula. International contributions could extend the content into new areas, and it could be translated into other languages (it is already being translated into Spanish).

3.5 Limitations

Several students were less communicative which the others found frustrating as e-mails were unanswered and it wasn't clear if content was being developed. More students were recruited to the project during term-time in order to complete any outstanding sections.

Students sometimes found it difficult to combine information from various sources, especially when there were multiple interpretations, however this was considered to reinforce critical appraisal and research skills. Reviewers (including specialists in the field) found it challenging to find time to quality assure and sign-off content, despite incentives such as book tokens. They had some difficulty finding what content had been allocated to them for review. Members of the post-registration practitioner sector became involved on an individual basis, but it was not systematic. Some of the students were reluctant, at first, to accept reviewers' suggestions for changes, however, a wiki is designed to be updated and participants soon saw the value in 'shared authorship'.

Many of the interactive parts of the wiki were derived from CLIVE and other existing materials, it is possible that costs for developing added-value interactive materials will rise in future. Maintaining the content requires processes for review and signoff to be established and implemented. As the content is extended it is possible that the wiki will lose its focus and linkage with, for example, the RCVS day one competences, but it is considered that signposting from curricula documentation will continue to be necessary.

3.6 Ownership, access, intellectual property rights (IPR) and confidentiality

WikiVet editorial access is restricted to registered users from the veterinary community (at the time of writing), but it may be opened to animal science faculties in the future.

Access was initially open, but it was possible for users to accidentally damage the content created or for non-reviewed material to be marked as 'final'. To assure the quality of the education provided (e.g., Bergstein, 2007; Prosoco, 2007) it was considered essential that content in the wiki was from validated sources.

Copyright and IPR issues could have been problematic, however the CoP had existing agreements for collaboration and exploitation, and MEDEV assisted with the resolution of IPR issues. Materials (including student-authored content) are owned by the contributing institution, and licenced under a Creative Commons license for use and reuse in WikiVet. Client consent (Ellaway et al, 2006) is an essential consideration in human and animal health. Clients might give permission for recordings (such as images or video) of their injured or ill animals to be used in teaching and education, but may be less amenable if recordings were accessible by the general public. The CoP adopted the principle of removing any recordings such as image or other resources where there was any doubt at all under IPR or consent whether permission existed from authors/owners that these could be re-used online.

3.7 Evaluation and dissemination

The collaborators are currently evaluating the uptake and impact of WikiVet on teaching and learning (on those who developed content and those that used it), and the nature of the collaboration within the CoP. Early results indicate that the students enjoyed being part of a community and the process of developing the wiki, "I feel proud I was there at the beginning and helped create something that should be very helpful to veterinary students worldwide in the future" (Stanikova, 2008). It was exciting to watch the project quickly grow and receive great feedback. The other students reported how useful they found it to be involved in a collaborative effort with other vet schools. In addition, it was a good learning experience to be active in creating something new and to see how the process of undertaking something like WikiVet works and can be developed. They particularly valued the face to face meetings with students and staff from other veterinary schools, "I feel that I have helped build and develop part of a project that not only helps fellow veterinary students in the UK but hopefully also future generations around the world" (Tulloch, 2008).

WikiVet was formally launched in October 2008 with a web streamed 'virtual classroom' for those who could not attend in person. Presenters outlined the background and context, and students demonstrated the content that they had created. The launch was extremely successful and the technology proved invaluable when answering questions from both attendees and those attending virtually. CoP staff and students took a highly successful 'road show' to schools in the UK and Ireland to promote WikiVet, and encourage staff and students to register and review the site, contribute content, and provide feedback.

WikiVet has been presented at various conferences such as the national meeting of the British Society of Veterinary Pathology (an opportunity to gain informal

feedback pathologists on how the wiki was proceeding), the Association of Veterinary Teaching and Research Work Conference (AVTRW) (an opportunity to gain feedback from a range of specialities), and the International Association of Medical Educators Conference (AMEE), where it was very well received. "What was exciting was not only the commitment of some of the other veterinary schools in Europe but also the interest from several of the principal US schools…" and "…the site has the potential to grow into the principal online educational resource for all vet students" (Short, 2008).

4 Discussion and conclusions

The achievement of developing an editable and expandable comprehensive wiki can be attributed to the strong underlying CoP which has developed expertise in "learning about community formation and how to sustain it…" (WikiVet Participant, 2008). It involves all UK schools, and undergraduate students working closely with academics. The commitment and diligence of the students was essential "…it will be fun as a student to go back and review some of what I wrote with a preclinical understanding and see whether that shifts at all [ ] …a site like this is sorely needed across the veterinary world, both to encourage our education as well as our curiosity" (Pocock, 2008).

WikiVet has potential for further expansion and development and demonstrates the opportunities afforded by Web 2.0 technologies:

• the CoP has enabled academics and technical experts to work together to develop and share innovative e-learning resources across the UK veterinary schools through a 'learning community'

• involvement of veterinary students has been central to authoring content in the wiki and developing processes towards self-sustainability

• clear signposting of quality assured (reviewed) material promotes confidence in the validity of the content of the wiki.

The WikiVet CoP is hoping to widen the community using various modes of dissemination and in evaluation of student use, and will continue to use the editorial board for moderation of content. WikiVet will be used as a learning tool and forum for the day one competences to help students learn about the levels of competency required of a new veterinary practitioner. A comprehensive map can provide a contextual guide to existing educational resources of relevance to specific competences.

A CoP functions at its best when educators and users engage one another about issues and challenges and by sharing resources (Stevenson, 2008). The WikiVet CoP is testimony to the growing recognition of the value, the necessity even, of collaboration among the UK veterinary schools. It proves that schools have a mutual self-interest in helping to build systems and processes for the delivery of best practice in veterinary education. The WikiVet CoP has engendered some aspects of a self-sustaining model for continuation and development of the wiki,

but needs to work on maintenance. It has the potential to be used and updated with multiple language versions by an international constituency. The wiki could become a central part of the curriculum used by veterinary students worldwide, "the fact that the participants are motivated to complete something the UK veterinary education community has never seen before, drives us to keep coming up with ideas that will improve the student experience" (WikiVet Participant, 2008).

Acknowledgements

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