Implementing e-learning across a faculty: Factors that encourage uptake

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The development of e-learning resources, the educational design and outcomes of their application dominate the e-learning literature. Less often considered, but equally significant, is the manner in which these resources are implemented and integrated into existing curricula and teaching contexts to promote sustainable use as well as high quality student learning experience. We describe our experience of the implementation of e-learning platforms utilising a centrally supported learner management system supplemented by Faculty developed innovative e-learning tools designed to stimulate learning through inquiry. The Faculty's implementation strategy focussed on incorporation of e-learning activity across the curriculum to enhance the existing on-campus experience. Shared leadership promoted innovation and encouraged staff to utilise e-learning approaches tailored for their teaching context that were authentic and constructively aligned to the graduate attributes, and to share their learning from these experiences. Significant aspects of the success of this strategy included the provision of high quality educational design, empowerment of staff to experiment, timely staff development, focus on the relationship of the specific learning outcomes to the graduate attributes, development of customised flexible and easy to use resource development platforms and a strong focus on student learning experience monitored by reflection and research.

Keywords: organisational change, infrastructure and management, ICT policies and strategies

Introduction

The use of e-learning activities or 'e-tivities' (Salmon, 2002) in higher education is now considered by students as a normal and essential part of their student learning experience. The manner and degree of success of e-learning incorporation into existing degree programs is variable within and between institutions as is the impact of e-learning on student learning experience. While students expect high quality online learning resources and activities and a greater flexibility in learning, there are also financial and resource constraints which impact on the uptake and integration of e-learning platforms. In contrast to the demand for greater flexibility, many student cohorts, such as those in the Faculty of Veterinary Science (FVS) at the University of Sydney (USyd), value the on-campus experience and the face-to-face interaction with academic staff and view substitution of these learning contexts with e-learning activity with suspicion, particularly fee paying students who may value interaction with academic staff more highly than other learning situations. As well as considering student perceptions of the quality of the learning experience, academic staff must balance the impact of e-learning activity development and its application with their workload and capability with educational technology. Consequently, some staff, particularly the "late adopters", need encouragement and targeted staff development to engage with the quality teaching opportunities that e-learning offers. A coherent faculty strategy for e-learning that provides the necessary resources can make a crucial difference by providing a context for e-learning that supports successful, sustained integration in the curriculum (Phillips, 2005).

The FVS embarked on a coordinated program of implementation of innovative blended delivery of e-learning resources in 2003, following three years of intensive curriculum innovation and cultural change. The FVS is a small professional faculty within a large research-intensive University and has achieved significant and sustained uptake of e-learning across the curriculum which students value highly as a contributor to their learning experience (discussed below). FVS encouraged innovation, and its 'post innovation' implementation strategy has seen the return of e-learning resource development back to academic staff, who require only a modest level of technological capability to develop their own resources. The Faculty has focussed on learning first, avoided a preoccupation with the technology, and empowered staff to pursue the full range of implementation possibilities, from supplementary to integral

use of e-learning, in their units of study. This approach supports our philosophy in which the pedagogy of the learning activity is paramount and the technology used to achieve these outcomes is incidental.

Background on level of e-learning uptake in the FVS prior to 2002

The FVS is a small faculty of approximately 80 academics on two sites with approximately 800 full time students enrolled in two undergraduate degrees (5 year BVSc and the new 4 year BAnVetSc) and a range of postgraduate course work and research degrees. Prior to 2000, computer assisted learning was used sporadically as a supplement for several units of study, primarily supplying content (on line notes), customised case studies on CD Rom, simulations, laboratory exercises (CD Rom) and formative self assessment (multiple choice questions). A small group of "early adopters" had invested substantial time in creating two important online learning resources: OLIVER (the Online Library of Veterinary Images for Education and Research), which is an indexed collection of veterinary images, and the library sponsored VEIN (Veterinary Education and Information Network), a portal for accessing a range of web and library based resources and readings for units of study.

While students were enthusiastic in their utilisation of the educational technology, few staff used e-resources or e-activities in a systematic way to support the core face-to-face teaching in lectures and practical classes. E-learning was considered to be an optional 'add on': it was at the discretion of staff to use if they wished but was not governed by a strategic plan for its utilisation or support. Between 2000 and 2002 the FVS introduced a new curriculum for the BVSc degree which was designed to develop graduate attributes (including those in information literacy) (Collins & Taylor, 2002). It incorporated a lecture-free final year of clinical practice; much conducted off campus, and was combined with a rapid doubling of student numbers (increase in fee paying students). At the same time the Faculty was led through substantial structural and cultural change by a new Dean (Canfield & Taylor, 2005). Faculty leaders developed a FVS vision of shared leadership to achieve excellence in student centred learning and innovation. An aligned teaching and learning plan was developed to achieve this vision and Faculty commenced intensive staff development in shared leadership and student centred teaching and learning, which helped to create a climate that made change possible. These developments were set within a changing university context that saw implementation of evaluation and quality assurance of teaching and learning, coupled with rewards for excellence, innovation and scholarship in teaching and learning (Barrie et al., 2005).

Strategies, policies and initiatives that changed staff participation and uptake of e-learning and its use across the curriculum

A change in the context for teaching and learning has been a major factor driving increasing e-learning uptake in the FVS. While e-learning platforms and support were available prior to 2003, their uptake was fragmented. A shift in attitude occurred in the FVS from the view that e-learning was a desirable, but not essential addition to classroom teaching, to the current situation where blended and fully flexible learning are major aspects of the curriculum and involve most teaching staff. The FVS policies designed to support quality and innovation in teaching were a critical factor influencing staff responses to the possibilities that e-learning offered. The Faculty developed a coherent and harmonised strategy to encourage and support faculty-wide uptake of e-learning, following Ramsden's recommendations for improving the context for quality teaching (Ramsden, 2003). The key aspects of this change were: articulation of a vision of the FVS as a leading innovator in veterinary education; development and implementation of the FVS teaching and learning plans and key indicators for e-learning; appointment of staff to lead and support e-learning implementation; allocation of resources to upgrade e-learning classrooms; recruitment influenced by e-teaching potential; provision of competitive funds to support teaching innovation projects; training and development of staff in groups and individual coaching; establishment of an e-learning development and research group; and recognition of e-learning workload and achievements.

Since 2005 FVS initiatives have been complemented by USyd strategies which provide e-learning support through the Flexible Online Learning Team (FOLT, described in Wozniak et al., 2005). This support is directed at management of the WebCT learner management system and at strategic development. The FVS has also built e-learning resources and platforms to augment the WebCT LMS tools, including an image repository (OLIVER) and information gateway and learning object repository

(VEIN) and tools for the development of case-based e-learning activities (CaseBuilder) (described in detail in Canfield & Taylor, 2005 and Sheehy et al., 2006). The implementation of e-learning platforms across the Faculty was conducted in a strategic manner, with acknowledgment of the impact on academic workload and emphasis on sustainability of application and innovation. Staff and student perceptions of the value of e-learning were addressed through reflection and research to promote uptake and an enhanced learning experience. A central issue for the Faculty, when planning a substantial and widespread increase in e-learning, was to identify where and how online resources or activities might best enhance existing student learning tasks. A teaching innovations project team was established and operated, based on the principles of shared leadership developed through the Faculty staff development program. The project received support from the FVS, physical space and external funding; their first task was to identify goals for improving learning across the curriculum. The team developed an embracing theme for the teaching innovation project: "Learning through Inquiry". This incorporated existing teaching innovations (e.g. adaptation of face-to-face activities as described by Krockenberger and Canfield, 2002) and sought to develop software systems to make it easy for staff to adopt these models for online learning. An early decision was taken to use the funds to recruit expertise in e-learning design, to purchase equipment to enable all students to have access to the online resources, and to expand the existing OLIVER and VEIN resources (Canfield & Taylor, 2005). Faculty-wide debate ensued, followed by a process of project submissions, peer review and selection. Academic time and general staff support for development of e-activities and resources was obtained from FVS executive, through inclusion of a time allocation in the academic workload model that the Faculty developed. Staff with supported projects were accountable for researching, reporting and disseminating the outcomes of their innovations, and assisting their peers to adopt well-tested models of good practice.

High quality educational design to support implementation of e-learning

Student perceptions of their learning experience were a central consideration in planning the implementation of e-learning. FVS sought to use e-learning activities and e-resources in a strategic way to improve student on campus learning experience. Student perceptions of the benefits of e-learning activity are related to their perceptions of relevance and alignment to the learning outcomes that will be summatively assessed in the unit of study (Marcus et al, 2004). In planning the educational design, focus should be on the appropriateness of the learning activity, its relationship to assessment, and how the online activity supports student achievement, therefore applying the principles of constructive alignment (Biggs, 2003). To guide and ensure effective design, and avoid the risk of becoming distracted by the technology itself, the Faculty employed an educational designer in 2003. The availability of this expertise, embedded in the Faculty, was a turning point in reaching and engaging the middle and late adopters to experiment in using e-learning. At this time a series of FVS workshops was provided to generate discussion about different ways to offer e-activities, many staff attended USyd-offered WebCT workshops to develop skills, the Library personnel trained staff in OLIVER and VEIN use and key staff were funded to attend formal training in e-learning design. The in-house assistance of an e-learning designer, along with project supervision by the Faculty's teaching innovation team, helped ensure new e-learning activities were directly linked to learning outcomes of units and, in many instances, incorporated as a component of assessment. Table 1 highlights the percentage of units of study which develop graduate attributes in information literacy through e-learning (Faculty of Veterinary Science, 2006a) and the number of units of study that incorporate some e-learning activity as a component of assessment (summative or formative).

Table 1: Percentage of units of study that develop information literacy attributes and utilise e-assessment

Year of BVSc curriculum	Percentage of units that utilise e-assessment	Units that don't focus on developing information literacy skills*	Units with minor focus on information literacy attributes*	Units with major focus on information literacy attributes*
1	87%	0%	14%	86%
2	62%	14%	43%	43%
3	78%	0%	20%	80%
4	67%	11%	44%	44%

Note. * Source of data: Faculty of Veterinary Science (2006b)

The integration of e-learning activity into a predominantly face-to-face learning context, described as a 'blended delivery' approach, has also been an important driver in student acceptance and at no stage has e-learning been substituted to save on teaching costs. Student acceptance of this approach has been high: 'The mixture of lectures as well as small group tutorials and practical classes as well as online learning ensured that students were learning the same topic from a different angle', 'I think that it is good that they are doing lots of online cases and other online components to complement learning'. The maintenance of staff contact and on-campus timetabled e-learning activity has allowed for an easy transition to an online supported curriculum. Importantly, the Faculty spends very little time training students in use of the LMS or other e-learning platforms as students now display a high level of technical literacy and most platforms (particularly the Faculty designed interfaces) are intuitive. A general introduction into the use of WebCT is provided in Year 1 and various units of study introduce other software interfaces as they are encountered in the curriculum; online or telephone help is available.

Influencing and empowering staff to adopt e-learning

The FVS has maintained a clear focus on the question, "Why use e-learning?" to ensure it is appropriate and effective for our curriculum. Teaching staff understand that the relevance of learning outcomes and alignment with assessment are key factors for student engagement online as well as in traditional classes; so careful, strategic selection and use of e-learning activities is essential. Of course producing and maintaining more sophisticated online materials and activities, carefully tailored to meet student learning needs, has great potential to increase the academic workload, particularly as they become widely used (Table 2). The Faculty have undertaken to limit the impact on workload by acknowledging the way in which academic staff develop resources and by providing tools to enable staff to adapt content to an online format while requiring only a low level of technical competence. These initiatives have included providing educational design and administrative support for e-learning innovation and LMS site maintenance, promoting University administered e-learning training opportunities and developing e-learning resource development platforms that are easy to use and well supported. Another approach to promoting sustainable e-learning use and innovation by academic staff has relied on modifying staff perceptions of the benefit of e-learning to the learning experience. The incorporation of an e-learning question to the Unit of Study Evaluation process in 2004 personalised the accountability for e-learning to unit of study coordinators and provided student feedback on e-learning in each unit of study, which is openly available in FVS (Table 3). The profile and significance of e-learning to the academic workload is highlighted by its inclusion in new staff contracts of employment, signalling that e-learning activity is an expectation of an academic position along with traditional teaching and research activity.

The change in e-learning culture has been supported by acknowledging and rebutting common negative views, including the long held misconception that e-learning will decrease academic workload or render staff redundant. This has not been in evidence in FVS, but the equally erroneous conclusion that it will result in additional workload (beyond the development phase) has also not been confirmed by experience. Consistent with Applebee et al. (2005) FVS staff identify significant pressures and limited time to devote to developing their capabilities for e-learning. While initial development may be time consuming, the application of those resources in a blended delivery model has mostly resulted in substitution of work from traditional activity (e.g. lecture, tutorial and practical classes) to online learner management (e.g. online discussion moderation or generation of formative feedback). The blended delivery model has enabled staff to engage with e-learning in a way that is comfortable without encountering the significant challenge of running a wholly online unit (Armatas et al, 2004). Additionally, staff can make small, manageable changes that create significant impacts on the student learning experience and then, through cycles of reflection and experimentation, engage more fully as their confidence and success grows. The strategies taken to broaden staff perspectives have included development of a team of staff with significant experience and a track record in innovation who provide peer support for others, the communication of the experiences of colleagues (e-learning champions) at Faculty Teaching and Learning forums and targeting individual academics for additional coaching support when undertaking new e-learning projects. While development of e-teaching skills is encouraged through University supported workshops and formal training (with high rates of FVS staff attendance) the level of technical competence has not been a significant impediment to the implementation of e-learning in the curriculum.

Staff development, funding support and new staffing supporting change

The pattern of e-learning use in the FVS has undergone further change in the past two years, from team projects to mainstream adoption. This substantial shift has occurred because the outcomes of several discrete projects that were undertaken by a core group of 8–10 participants in the teaching innovation team have now been widely disseminated and adopted in a variety of ways across the Faculty. At the same time, the core project team has continued to innovate in the pedagogy and design of the online learning activities. The e-activities have shifted in nature from short discrete case studies, designed to be undertaken independently and discussed with a group, to more complex models that stimulate student-driven choices in the learning path that is taken. These models commenced as a way to present authentic, real-world information that enabled students to engage with veterinary cases that were typical of professional practice.

The Faculty has provided continuing support for the core online education design activities; however, considerable funds have been generated to support external development and collaborative projects, as the expertise developed has been sought after by other Faculties. It has also recognised that effective, cross faculty utilisation of e-learning requires general staff support for e-learning administration and staff assistance. This acknowledges the key role of staff in implementing and sustaining e-learning in ways that are meaningful for students in their discipline, and aims to maintain that focus on teaching practice and research. Effective staff support provides a means to present mature, tested solutions with manageable risk to novice teachers so they can trust these activities in the classroom and teach with confidence rather than fear of the technology failure impairing learning. Much of the staff development is now occurring by informal, task-directed coaching, which has proved an effective approach for encouraging staff to experiment and then sustain their role as resource developers. A further incentive has been the use of University teaching innovation funds and Faculty teaching performance income for funding small teaching development projects, paying for specialist expertise in content and in design.

Creating an environment of support for leadership and change in e-learning

In order to produce successful uptake of e-learning, FVS recognised the need for effective human and technical resources to underpin our strategies for moving staff from a position of little knowledge to one of capability, confidence and leadership as e-teachers. Staff considering e-learning needed to be convinced that they wanted to use it before committing the time and effort required to make it a success. Providing just-in-time support through in-house coaching was effective, as it delivered a high level of support but enabled academic staff to gradually assume the role of e-learning developers. The leverage, where possible, of centrally provided platforms and resources was a significant strategy to ensure that Faculty resources could be directed to projects geared to meet the needs of staff. Essentially, the central services provide more generic support through a basic LMS which staff new to e-learning find cumbersome and difficult to integrate into their teaching methods for large classes. Many staff find it difficult to determine how they could best apply e-learning to their teaching context with this platform and the limited support provided. The FVS e-learning implementation strategy is specifically tailored to meet the learning, administrative and technical needs of staff to maintain a cohesive "whole of curriculum" perspective of Faculty elearning.

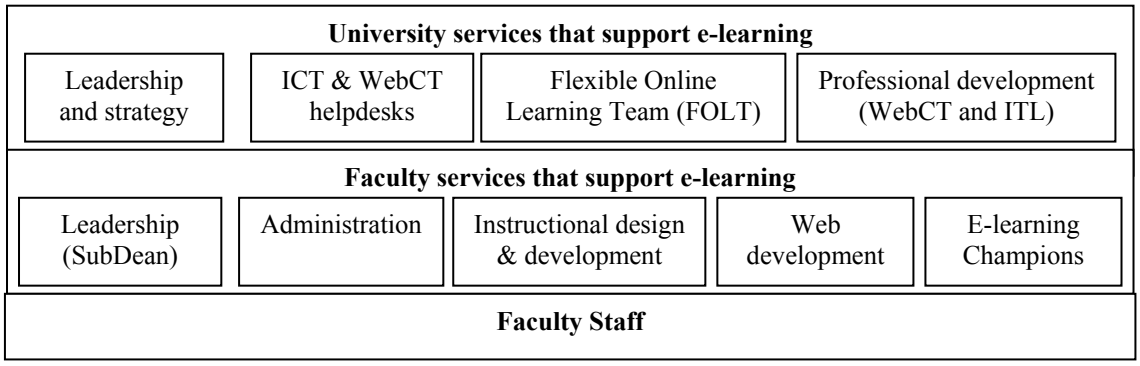

Figure 1: University and Faculty services that support e-learning

The aim of FVS support is to generate confidence in the application of e-learning to the teaching and learning process and to provide the tools to enable staff to easily create and maintain online learning resources without the need for web development skills. It was recognised that staff have priorities and expertise in their own discipline and usually are not interested in becoming experts in web development and applications. Therefore it was critical to develop ways in which tools could be provided that better align with the needs of staff and enable them to create high quality online and blended learning experiences for their learners. The tools required differed depending on the level of capability of staff and their understanding of e-learning, so it was necessary to provide tools that require a level of capability consistent with word processing applications. With a wide degree of expert and peer support within the Faculty, it was possible to support staff at whatever level of e-learning they wished to engage with. This included blended learning support, teaching and learning strategies and e-learning resource design and development. In the course of the implementation of e-learning over the past 3 years it was observed that academic staff follow a sequence of e-learning skill development and engagement as seen in Figure 2.

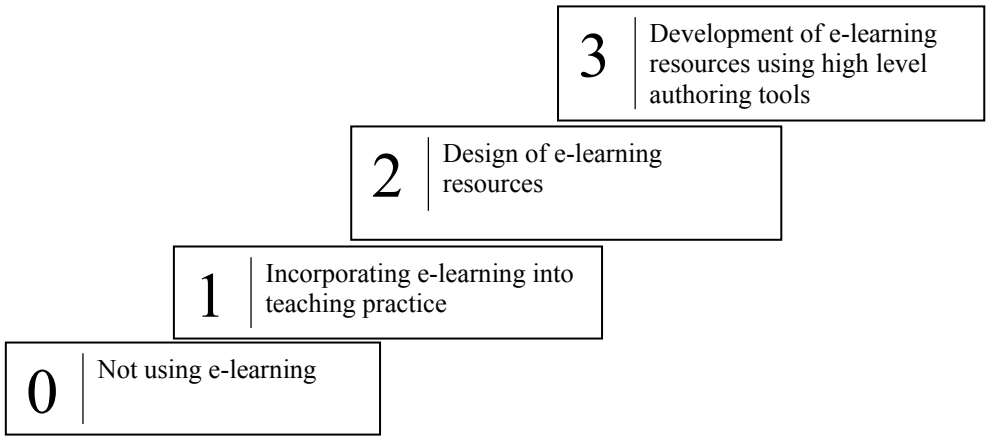

Figure 2: E-learning skill development and engagement of academic staff

At each of these steps, opportunities for research into teaching practice and support to develop capability are available. However, at levels 1, 2 and 3, there are additional opportunities for staff to make a contribution to the field teaching and learning.

Equipment to provide capability

Access to equipment that makes e-learning readily available is an obvious, but often overlooked, aspect of encouraging uptake. While acknowledging that maintaining and updating equipment in a campus with a large student body is a challenge, lack of suitable teaching facilities may be a significant disincentive to the widespread adoption of e-learning. Given the resourcing constraints as well as variations in staff capability, it is important to have access to up to date, suitable equipment that can reliably support staff in their endeavour to provide resources in an online friendly format. The Faculty invested in both equipment and staff to provide better support for teachers planning small group e-learning activities (e.g. digital projectors, computer laboratories and computer-equipped group rooms) and to support the conversion of materials to a digital format. Initially, this equipment was provided for staff to use, however, existing non -academic Faculty staff now provide high quality conversion services, although academic staff still have access to the equipment should they choose to utilise it themselves. The service model reduces workload and complexity for staff as they don't need to learn how to use new equipment and software such as flatbed scanners and digital video editing applications. This approach has also substantially increased the rate of development and utilisation of online resources (Table 2).

Implementation and impact

E-learning uptake

The uptake of e-learning across the Faculty including the range, depth, diversity and number of e-learning resources now in use has been significant (see Table 2). The number of WebCT unit of study sites has

doubled since 2002, when a policy was introduced that all units of study in the Faculty should have a WebCT presence. A large increase to almost all units in the FVS was observed in 2003, which additional unit of study sites generated each year in response to curriculum changes and the addition of specialty sites (e.g. academic honesty, year and degree administrative sites etc.). Similarly, there has been a steady increase in the contributions to the OLIVER image repository as academic staff routinely use image resources in e-activities. Further, through staff engagement with the industry, a steady contribution is being made to OLIVER by members of the veterinary science profession. The number of more complex case-based e-learning activities developed by academic staff through the 'CaseBuilder' resource development platform has more than doubled since its introduction in 2004. The success of the CaseBuilder system (and the underlying educational approach) has resulted in this model being adopted by other Faculties internal and external to the University. VEIN learning object repository visits have steadily increased and include student and general public access, as this resource is available through a public interface.

Table 2: The measures of staff uptake and student usage of e-learning resources in the Faculty of Veterinary Science

Resource	2001	2002	2003	2004	2005	2006
Units of Study with a WebCT site	13	28	45	50	52	56
OLIVER Images*	2,171	5,848	7,331	9,431	9,956	11,221
CaseBuilder Cases*	N/A	N/A	N/A	81	173	219
VEIN hits/ year	126,189	250,549	513,515	643,892	537,421	331,852[‡]

Note. * cumulative total; [‡] hits to 30/6/06

E-learning impact on student learning experience

More important than the uptake of e-learning is its impact on student learning experience. Table 3 shows the percentage of students over a range of units of study that responded positively to a question asking if e-learning helped them to learn effectively in their unit of study. While significant variation exists between units of study, the mean percentage of students indicating e-learning benefit has also steadily increased.

Table 3: Student perceptions from Unit of Study Evaluations (USE)[†]

	2003	2004	2005	2006[#]
Student Response (% Agree or Strongly Agree)	36%	43%	46%	48%

Note. [†] Question 'The online component (e.g. WebCT, VEIN and OLIVER) of this Unit enabled me to learn effectively in this Unit'; [#] Six months to 30/6/2006.

The data presented in Table 4 indicates that, prior to the implementation of strategies for the uptake and integration of e-learning, the FVS lagged behind other equivalent faculties in the Student Course Evaluation Questionnaire (SCEQ) student agreement that Information technology helped them learn. Following the incorporation of these approaches the mean student response was significantly altered and approximately 74% of students then agreed that "Information and Communication Technologies helped my learning". Interestingly, the mean of USE data for 2005 (Table 3) indicates that only 46% of students agreed or strongly agreed that e-learning enabled them to learn effectively compared to the 74% of respondents in the SCEQ data (Table 4) who felt that information technology helped them learn; this reflects the variation that persists in effective use of e-learning across units within the curriculum.

Table 5 shows the mean percentage of students that have responded positively to various e-learning questions in the 2005 SCEQ and includes comparable responses from the mean of all other Science faculties as well as all faculties at USyd. Each of the questions asked about a different aspect of e-learning (learning experience, resource quality, communication, integration and engagement) and for each of these aspects a greater percentage of FVS students responded favourably than those in the other Science faculties and the University mean response. Student comments include, 'Online learning experiences prompt individuals to study throughout the semester and highlight the important aspects of

the subject that should be focussed on' 'I also think that WebCT has benefited my learning as it allows access to subject matter prior to being taught this material'.

Table 4: Mean percentage of students that agree or strongly agree to the SCEQ e-learning questions prior to 2005

SCEQ Question 14*	Faculty of Veterinary Science	All Science Faculties	All Faculties at USyd
2001	64%	66%	61%
2003	57%	65%	62%
2005	74%	67%	64%

Note. Q14. Where it was used, information technology helped me learn; * other questions seen in Table 5 are not in SCEQ surveys prior to 2005.

Table 5: Mean percentage of students that agree or strongly agree to the SCEQ e-learning questions in 2005

SCEQ question	Faculty of Veterinary Science	All science faculties	All faculties at the University of Sydney
Q14	74%	67%	64%
Q38	87%	76%	73%
Q41	55%	45%	45%
Q43	61%	45%	45%
Q45	59%	49%	48%

Q14. Where it was used, information technology helped me learn.
Q38. Resources on University of Sydney websites (e.g. WebCT, Blackboard, degree course sites, faculty sites, etc.) supported my learning.
Q41. Communication online with students and staff helped my learning.
Q43. The online learning experiences of my degree course were well-integrated with my face-to-face learning.
Q45. My online experiences helped me engage actively in my learning.

We used SCEQ data to map the impact of e-learning across different years of the curriculum and to identify strengths and weaknesses of e-learning in the BVSc degree program (Table 6). Years 1 and 2 have a significant level of e-learning support to learning which tapers in later clinical years where the focus is on the development of clinical and practical skills that are more appropriately supported in a face-to-face context.

Table 6: Mean percentage of students that agree or strongly agree to the SCEQ (Student Course Evaluation Questionnaire) e-learning questions in the Faculty of Veterinary Science (BVSc) 2005

Question♦	Year 1	Year 2	Year 3	Year 4	Year 5
Q14	76%	79%	71%	73%	68%
Q38	90%	97%	89%	89%	57%
Q41	63%	48%	60%	50%	40%
Q43	62%	55%	74%	57%	50%
Q45	65%	52%	62%	63%	50%

Note. ♦ Questions as defined in Table 5.

These findings demonstrate that the strategy for uptake of e-learning in the Faculty of Veterinary Science has been effective and more importantly that the e-learning activity offered to students is supporting their learning and providing an enhanced learning experience. FVS is a small faculty with a strong commitment to excellence in research and teaching so our approaches to implementation have relied heavily on creating a culture of shared leadership for education change, providing high quality education design to staff as needed, use of evidence and reflection and the alignment of activities to support the graduate attributes. It is recognized that these strategies may be more challenging to implement in larger educational units, the need for clear, well supported strategic directions, high quality support for teachers using e-learning activities, adequately equipped teaching spaces, customised easy to use platforms for

developing tailored activities and a clear focus on reflection based on gathering and using feedback on the student learning experience are applicable to an enterprise wide approach to e-learning implementation.

Facing the future

The immediate future of e-learning in the FVS is growth, with expansion of the e-learning resource development tools currently in use to enhance their flexibility further in educational design and activity format. The other approach that will be of significant benefit to both our staff and students will be the establishment of an e-learning collaboration of Australian and New Zealand Veterinary Science Schools and Faculties (AVSeC) for sharing of resources and potentially cross-institutional collaboration. We hope that the same philosophies of learner-centred and teacher friendly models of e-learning resource development and application will shape the nature of this collaborative initiative.

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Acknowledgements

The authors would like to acknowledge Sally Pope for her support of the WebCT Learner Management System, The University of Sydney Library for their continued support of VEIN, Paul McGreevy, Peter Windsor and Su Hanfling for their work in establishment of OLIVER, Mark Krockenberger and Jacqui Norris of the teaching innovations group and Irene van Ekris for the collection of USE data.

VEIN	Veterinary Information Education Network: A collaboration with the Usyd library, this resource aims to provide general information on a wide variety of veterinary topics as well as administrative information for learners studying at Usyd.
OLIVER	The Online Library of Images for Veterinary Education and Research is a repository of images and videos that provide staff, students and industry partners with a visual insight into veterinary science.
CaseBuilder	CaseBuilder uses a forms-based interface and requires basic computing skills to enable staff and students to easily create interactive online cases, which can contain images, videos, PDF documents and Word-based document templates.
Virtual Clinical Campus	The Virtual Clinical Campus provides online administration services to students in their lecture-free final year to enable them to easily choose placements submit assignments and receive feedback while they are off campus.
TILHAPS CAVMOLS, ICAPS	These learning resources are also designed around the same educational model which aims to engage students in authentic, real-world cases that require them to respond to tasks as required by a veterinary professional.
Anatomy online revision	This resource provides students with quizzes that help them revise their understanding of anatomy. Tags are located on high quality images and students have to identify structures, nerves and muscles that these tags are identifying.

Bionotes

Paul Sheehy is a Senior Lecturer in Cell Biology and Animal Nutrition in the Faculty of Veterinary Science since 2000. He also acts as the Sub Dean for e-learning within the Faculty and has coordinated the introduction of the WebCT Learner Management System into the FVS and championed the development of additional enabling e-learning technologies to support teaching and learning. He was awarded the Grace Mary Mitchell Award in 2005 for contribution to e-learning.

Gerard Marcus is the educational developer and instructional designer of the FVS. He has supported teaching staff with blended learning and has developed a number of successful online learning resources. Gerard has also co-authored 4 research papers on student approaches to learning, case-based learning and blended learning. He was part of a team that won the Pearson Education UniServe Science Teaching Award for 2006. He was also part of the team that won the Edith Cowan Authentic Learning award for a research paper presented at HERDSA 2005. He was one of the recipients of the Faculty's Grace Mary Mitchell Award in 2004 for providing outstanding support to education, innovation and staff support. In the same year, Gerard was also part of the team that was awarded the Vice-Chancellor's Award for Support of the Student Experience.

Federico Costa is the Web Services Coordinator for the Faculty. His role includes coordination, management of the Faculty's online portfolio and design and development of Faculty on learning systems. He was part of a team that won the Pearson Education UniServe Science Teaching Award for 2006 and the Vice-Chancellor's Award for Support of the Student Experience in 2004 and was also a recipient of the Grace Mary Mitchell Award in 2005 for outstanding contribution to Faculty online services.

Rosanne Taylor is an Associate Professor and teaches in neuroscience, physiology, cell biology, animal biotechnology and animal science. Rosanne is an advocate for professionalism and evidence-based teaching practice and completed a Graduate Certificate in Higher Education, 2001. She received the Faculty's Pfizer Teaching Award and Grace Mary Mitchell Award in 2001, the Vice Chancellors Award for Outstanding Teaching, 2002, and was a national finalist in the Australian University Teaching Awards in 2002 and as a team entry in 2003.

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