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Designing for successful diffusion: A faculty-based approach to enhancing staff use of technologies for effective teaching and learning

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The use of learning management systems and other technologies to support teaching and learning in higher education contexts is becoming ever more important, especially as universities move towards increasing offerings to students over the internet. However, as many researchers have found, academic staff engagement with educational technologies has been relatively marginal, with innovations not always diffusing to the majority. In any faculty, staff are likely to have a varying range of technological and techno-pedagogical competencies and differing motivations for using educational technologies and e-learning principles. This paper reviews contemporary research on technology adoption in higher education contexts which has informed the design of a current faculty-based project to address the emerging demands of the twenty-first century higher education landscape by enhancing staff use of technologies for effective teaching and learning.

Keywords: innovation, professional development, adoption, flexible learning, blended learning.

What does the research tell us?

E-learning, blended learning, flexible learning and other kinds of technology-supported learning are important yet contentious features of contemporary higher education. Technology has become an inextricable part of education at universities, but the ways in which academic staff use these technologies vary widely, both in the extent of technology use and the efficacy of this use (Zemsky & Massy 2004; Zellweger Moser 2007; Rosenberg 2007). E-learning in this context may include – but is not limited to – the use of learning management systems to publish course content or create online learning experiences, tools for communication and collaboration such as wikis, blogs and discussion boards, virtual classroom tools, media streaming, the creation of virtual environments for learning, and the use of other emerging technologies such as animation tools, social networking applications and tools for mobile learning.

Much of the current research in this field draws on Rogers' (2003) theories of innovation and diffusion (see for example, Zemsky & Massy 2004; Wilson 2007; Birch & Sankey 2008). According to Rogers, diffusion "is the process by which an innovation is communicated through certain channels over time among the members of a social system" and it is a "social change" either planned or unplanned (2003, pp. 5-6). According to this theory, an innovation is "an idea, practice or object that is perceived as new" as defined according to the individual rather than the date of discovery (2003, p. 12), and Rogers categorises individuals according to the rapidity of diffusion, from innovators and early adopters to early majority, late majority and, finally, laggards.

The use of educational technologies for higher education has a number of potential benefits, from increasing access to education and flexibility of teaching, to enhancing communication and providing more opportunities for student collaboration, and creating rich learning environments (Miller, Martineau & Clark 2000; Birch & Sankey 2008; Lonn & Teasley 2009); however, issues surrounding the diffusion of e-learning are complex and multifaceted. Some of these issues are fundamental to the invention of e-learning and its implementation at many educational institutions. Zemsky and Massy note that e-learning initiatives have been prone to "troubling assumptions" not supported by the evidence, which negatively impact on their success (2004, p. iii): that the creation of the technology will automatically inspire adoption, that young users in particular will naturally prefer e-learning, and that the use of the technologies will inevitably translate to changes in pedagogies. These assumptions must be addressed and dismantled if the implementation of e-learning is to be successful.

Current research suggests there are a range of critical success factors which need to be met in order to achieve success in the diffusion of educational technologies and e-learning practices in higher education contexts. Many of these factors relate to Rogers' (2003) perceived attributes of innovations: relative advantage, compatibility, complexity, trialability and observability. The research strongly suggests that effective diffusion of innovation in the field of e-learning requires a synchronised fostering of innovation from a top-down policy and leadership perspective together with bottom-up innovation and change (Wilson 2007; Davis & Eales 2007; Cook, Holley & Andrew 2007; Stein, Shephard & Harris 2009). Researchers concur that good communication strategies for awareness-raising and dissemination are vital to the diffusion process (Rogers 2003; Davis & Eales 2007, Zellweger Moser 2007). Arguably, however, this communication should be discursive in form, rather than didactic, and should encourage input by stakeholders at every level and in every part of the process (Davis & Eales 2007; Stein et al. 2009).

An individual's motivation to change is implied in Rogers' innovation attributes, and has also been recognised as a critical success factor by other researchers (Miller et al. 2000; Zemsky & Massy 2004; Davis & Eales 2007; Zellweger Moser 2007; Birch & Burnett 2009). Innovators may have an intrinsic motivation to adopt new technologies and educational practices (Birch & Sankey 2008), but early adopters and the early to late majority may be prompted to invest in the innovation out of perceived advantages such as workload efficiencies, increased student outcomes, more positive student feedback, and the opportunity to attract more enrolments by reaching a wider audience (Lonn & Teasley 2009). Yet motivation may also be negatively influenced, especially by factors such as complacency, a fear of change, a perception of increased workload (Zellweger Moser 2007; Miller et al. 2000), or other factors relating to the opportunity cost of investment (Rosenberg 2007; Birch & Sankey 2008; Birch & Burnett 2009).

Beyond the motivations of an individual to change, motivation can also be influenced by a range of organisational factors. These organisational factors have an impact on the overall success of educational technology adoption and include having strong leadership over the change process and an institutional culture which supports and fosters change (Miller, Martineau & Clark 2000; Davis & Eales 2007; Bates, Manuel & Oppenheim 2007; Naveh, Tubin & Pliskin 2010). This includes the formalisation of incentives and expectations, the development of infrastructure and the implementation of support frameworks (Zellweger Moser 2007; Birch & Sankey 2008). Identification of the current baseline use of technology by capturing current practice must be a starting point for any policy for e-learning enhancement, from which diffusion strategies can ensue (McGee & Diaz 2007). Rewards and recognition strategies are an important part of establishing a supportive institutional culture, and can be effectively implemented to support innovation development and widespread diffusion within the institution (Miller et al. 2000; Stein et al. 2009; Wilson 2007; Davis & Eales 2007; Birch & Burnett 2009). It is essential for the organisation to acknowledge – and where possible, alleviate – the opportunity costs involved in e-learning adoption, such as amount of time academic staff need to commit in order to change curriculum and pedagogy to include educational technologies and e-learning principles, as well as the time required for professional development activities (Zellweger Moser 2007; Birch & Burnett 2009).

Organisational support must extend to the provision of adequate professional support, including technological, audio-visual, pedagogical, learning design and library support (DeLone & McLean 2003; Zellweger Moser 2007). Learning designers or learning technologists are an "extremely valuable" part of the process for e-learning diffusion according to Davis and Eales (2007, p. 771), because they provide an interpretive link between academic staff and technology specialists, although

their mediative role between achieving project goals and supporting academic staff can be a site of tension (Hannon 2008). Academic staff need clear knowledge of what professional support staff can assist with, as well as ready access to these professional support structures at all stages of the adoption process (Zellweger Moser 2007). Furthermore, as different adopter groups may have differing support requirements, institutions should tailor support structures and offerings appropriately (Birch & Burnett 2009).

Academic staff require skills and confidence with the technological tools at their disposal, as well as the knowledge of how to use these tools most effectively in their teaching. This assertion is supported by Selim's (2007) research into critical success factors for students in e-learning, where the prime success factor is the instructor's attitude towards and control of e-learning technologies, together with his or her teaching style. This suggests that staff development activities must include training to develop technology competencies as well as exposure to the ways the technologies can be used (Birch & Burnett 2009), which in Rogers' (2003) terms correspond to observability and trialability.

Professional development should be scalable and customisable (Zellweger Moser 2007), recognisant of the differing needs of adopter groups (Birch & Burnett 2009), occur in stages and in manageable forms (Stein et al. 2009), and be situated in authentic contexts where the innovation can be modelled as part of the development activity (Wilson 2007). Particularly when it comes to the use of learning management systems, training in the technical aspects of system use as well as training in site organisation can have a strong positive impact on student satisfaction (Naveh et al. 2010).

One way of supporting staff and providing observable examples of adoption at the same time is via peer sharing and collaboration, as "much valuable professional development is embedded in everyday life" (Stein et al. 2009, p. 16). Peer support can have a large impact on the successful diffusion of e-learning technologies and pedagogies (Birch & Sankey 2008), not least because such support encourages the development of communities of practice around e-learning, which are vital to enduring successful diffusion (Davis & Eales 2007).

Some researchers suggest that identifying and targeting early adopters at an early stage is an effective approach to innovation diffusion (Bates et al. 2007; Birch & Burnett 2009), not least because potential adopters are most likely to be persuaded by earlier-adopting peers (Rogers 2003; Birch & Sankey 2008). Yet other researchers have questioned whether fostering innovators and early adopters is a successful strategy for wider diffusion (Taylor 1998; Wilson 2007). Wilson advocates that faculty development activities should "build on the work of [innovators and] early adopters, but focus most on the mainstream majority" to achieve an embedded innovation, where "a critical mass of staff ... are competent working in the e-learning environment" (2007, p. 33).

The Flexible Learning Initiatives Project: designing for success

The Flexible Learning Initatives Project (FLIP) is a current faculty-based initiative within the Faculty of Law at QUT (hereafter referred to as "the University"). The primary objective of the project is to enhance faculty staff use of the University's learning management system (LMS) – QUT Blackboard – and other technologies to support flexible and blended learning. The project emerged from a leadership directive to find ways to maximise student satisfaction, engagement and learning outcomes particularly within the wider context of an institutionally-mandated use of the LMS as well as a faculty and institutional shift to increasing external offerings and flexible components to units and courses. The project design is informed by the critical success factors identified in the research above. The key challenges to be addressed in the project are, firstly, how to encourage widespread engagement in the project by academic staff in the faculty, and secondly, how to enhance the use of the LMS and other educational technologies in the faculty given the differing techno-pedagogical competencies and adopter groups of staff. The project is twelve months in length and it funds 80% of a learning designer position, as well as limited multimedia support and graphic design. The organisational leadership and management aspect of the project includes the Law Faculty's Assistant Dean of Teaching and Learning (project sponsor), the Faculty Senior Management Group (steering committee) and the learning designer (project manager).

Data from the project will be collated from a range of sources (specified below), and analysed using thematic coding and triangulation of data across sources. This methodology as set out in the project proposal has met Faculty standards for its primary purpose: to establish the extent to which the project

has influenced the use of technologies for learning and teaching within the Faculty as measured on qualitative and quantitative axes and to inform recommendations for ongoing and future development activities within the faculty. Where data is to be additionally collected for qualitative research purposes, further ethical clearance procedures will be implemented as required.

The project has four distinct phases: project planning, identification of project priorities, development, and a final phase of project evaluation. In the first phase, the parameters of the project are planned and scoped through negotiation between the project manager, sponsor and steering committee. For example, rewards and recognition strategies are agreed upon and initial activities to identify project priorities are developed. Communication and dissemination strategies are implemented from the beginning of the project; the first communications to staff (via the project sponsor) aim to foster awareness-raising of the initiative and invite staff to participate, and ongoing mass communications maintain awareness and inform staff of project activities as they occur. Organisational (Faculty) support structures are developed and communicated in this phase, and ongoing active leadership throughout the project aims to foster a supportive organisational culture within the Faculty. Data on this phase of the project is collated from project documentation as well as communications records and field observations. Project documentation is analysed to ascertain how the planning and design of the project is influenced by the needs of the stakeholders and the extent to which the project planning (over time) continues to reflect the theories of innovation and adoption informing the initial design. Additional data are harvested from communication records and field observations to determine staff perceptions of and attitudes to the project, rates of volunteerism and incidences of resistance, and these records are cross-referenced against project planning milestones to analyse the impact of this phase of the project.

The second phase of the project aims to identify development priorities in a multi-pronged approach. Firstly, a student review of QUT Blackboard sites contributes to a current snapshot of LMS use: a group of volunteer student reviewers give anonymous feedback via a semi-structured questionnaire on the site organisation, functionality and user-friendliness of undergraduate unit sites in the faculty, as well as some other targeted areas. The data are coded and analysed thematically within schools and across the faculty to illustrate the student experience of Faculty sites, clarify student priorities and preferences in site structure, identify potential areas of need which can inform development priorities in the project, and highlight examples of good practice LMS usage. The findings, conclusions and recommendations of the student review are presented to the steering committee, together with proposed development priorities identified by the Heads of Schools and invited development proposals from individual staff members, and the committee subsequently decides on development priorities for the duration of the project. The staff responsible for the good practice exemplars may then be recognised as part of rewards and recognition activities, and approached to participate in peer sharing and showcasing activities. Again, project documentation, communication records and field observations contribute data towards an overall understanding of the evolving development priorities within the faculty.

The third phase of the project encompasses a wide range of development activities aimed at reaching and engaging with a critical mass of staff in order to support embedding. As per the research discussed here, developing staff technical and techno-pedagogical skills is an important priority of the project, especially as the University mandates the use of the LMS for all units. Activities may include targeted one-on-one training, group workshops, and reusable training resources on a range of topics, from LMS technical skills to effective online discussion moderation, vodcast production, designing online scenario-based learning, and use of virtual classroom tools for synchronous online learning activities. These activities are developed in response to identified areas of need and staff requests. Review findings and site design guidelines emerging from the student review of sites are disseminated to staff to foster a faculty-wide motivation to improve practice, and workshops on site design and organisation aimed at whole teaching teams bring full-time and sessional staff together to collaborate on effective design solutions for their respective courses.

Consultation, design and development work on priority units and degree-courses (as determined by the project sponsor and steering committee) is another aspect of this development phase, and brings together academic staff members with the learning designer, graphic designer and multimedia support staff. This work aims to support and inspire Faculty innovators, foster early adopters and support and outreach to the majority, working on a case-by-case basis to support staff members' pedagogical designs and maximise student learning outcomes. The learning designer also fulfils an on-call assistive function, and is available for consultation and assistance for Faculty staff in need.

Innovations, good practice exemplars and staff reflections on the process, successes and challenges of adoption are drawn together in peer sharing, collaboration and showcasing activities throughout the length of the project. Some of these sharing activities occur within the faculty or individual schools, while other activities aim to showcase Faculty work across the institution. Communities of practice and other formal and informal supportive peer networks are established, with the learning designer serving as an agent for networking and collaboration. Additionally, an online project site aims to create a dynamic but enduring record of staff achievements and reflections, as well as professional development resources, in order to support embedding beyond the life of the project. These sharing activities may highlight the work of innovators and early adopters, but also strongly encourage less innovative staff members to share their challenges and successes, thereby demonstrating the achievability and benefits of e-learning enhancement to the majority.

Although some professional support for development activities is funded by the project (learning design, technical support and graphic design), the project also leverages a range of existing institutional support structures. These include library support provided by University law library liaison staff and reusable online study guides which the library produces, first- and second-tier technical support structures such as the IT Helpdesk, QUT Blackboard Support and Audio-Visual Services, and other kinds of centralised support provided by the University's Division of Technology, Information and Learning Services. One special kind of centralised support is offered by the centrally-located learning design team: although only one learning designer works specifically on the FLIP project, Faculty staff are encouraged to make use of the reusable resources and training activities developed by the centralised team, and examples of good practice in other faculties are disseminated to Law Faculty staff. This process goes both ways: the innovations and good practice exemplars developed under the ambit of the project are subsequently disseminated to other faculties via this centralised team.

Data in the project's third phase is collated from quantitative sources (such as number of sites developed, number of learning design consultations, attendance records at showcasing and training events) and qualitative sources (such as field observations and communication records) in order to establish the extent of outreach this phase of the project is achieving.

The final phase of the project draws on data collected throughout the project to evaluate the project activities, challenges and achievements; also in this phase, staff are invited to contribute reflective input on their participation in the project. This data is analysed by coding and triangulation across sources to formulate the key conclusions of the project as well as recommendations for future development strategies within the Faculty. In addition, the contributions of project participants will be formally acknowledged and the impact of their contributions will be disseminated back to them. The project's evaluative process recognises that many of the achievements of the project will only emerge after the project completion date, and may be both qualitative (the development of an innovative Faculty culture, enduring peer support networks and communities of practice) and quantitative (improvements to site design and organisation, increasing use of educational technologies and improved student learning outcomes).

Conclusion

By creating a project design informed by current research into innovation, adoption and staff engagement, the FLIP project aims to enhance academic staff use of educational technologies. Data collection and evaluation throughout the project will identify the extent to which this objective was successful and suggest directions for further development. This project evaluation may also be able to shed more light on some of the key issues raised in the literature with which the project must grapple. These include determining which strategies work effectively to prompt late majority and resisting staff to engage with the initiative, and understanding how formal and informal professional development activities – so essential for successful diffusion – can be successfully prioritised within the "many competing organisational and educational tensions" academic staff must navigate (Stein et al. 2009, p. 16). Other long-term issues may be more challenging to address, given the time and resourcing constraints on the evaluation framework. For example, although the project aims to give staff techno-pedagogical skills for emerging and future educational contexts by fostering embedding and ongoing innovation beyond the life of the project, the overall success of this enterprise may be affected by future contextual, organisational and individual factors. The effect of these factors may only appear

long after the project itself is complete, and this suggests the benefit of implementing longitudinal evaluation frameworks which are situated outside the project.

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