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Technology Enabled Knowledge Translation for eHealth

Principles and Practice

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Foreword

Health for all is explicitly declared by the World Health Organization to be a fundamental right, and in fact it has been a key operating goal of this organization and the basis of its primary health care strategy to promote health and human dignity for all. Of the many global and local challenges in achieving this, health knowledge dissemination, adoption, and optimal utilization is an important issue. For example, how is evidence-based knowledge best transmitted to health professionals, trainees, and community health workers? How are the best practices in care shared amongst communities and countries, and leveraged to influence policy establishment and adoption towards improving the health systems to serve the population? How are the latest research and findings applied in different community contexts towards effective knowledge adoption and translation? How can cost effectiveness help in making the best choice of management approaches and quality that would benefit the most individuals at the highest quality possible?

Modern information and communication technologies such as the Internet, mobile phones, and wireless networks have become indispensable to everyday living. In fact, the International Telecommunication Union, whose vision is "committed to connecting the world", declared at the September 2011 United Nations Millennium Development Goals meeting that high-speed broadband should be a basic human right. Simultaneously, digital devices are becoming much more ubiquitous and personal, such as smart mobile phones or digital tablets, which facilitate connectivity for individuals anytime, anywhere, in very personal ways.

This ground-breaking book marks the intersection between these important pursuits – the exploration of how modern information technologies can help achieve health for all. At the University of British Columbia, Faculty of Medicine, Dr. Ho and his colleagues first coined the term "Technology Enabled Knowledge Translation" (TEKT) in the literature back in 2003, a term that captures the vision of rapidly and seamlessly applying evidence-based health knowledge into routine health practices and education through the use of digital technologies. This democratization and mobilization of knowledge in turn leads to innovations of medical teaching in health education, facilitation of health professional and health system

decision support, improvement in interprofessional communication, and empowerment of the general public in optimal self-management and wellness attainment.

At the University of British Columbia Faculty of Medicine, the Technology Enabled Knowledge Translation Investigative Centre (TEKTIC) team of interdisciplinary investigators, led by Dr. Ho as the Executive Director, carried out extensive literature reviews, innovative experimentation, and reflective synthesis of strategies and tactics in using modern information and communication technologies in health professional education, health practice improvement, acceleration of health research, and exploration of principles and philosophies that underpin these TEKT pursuits. Their exploratory journey and the resultant findings, supported by winning the competitive team grant funding from the Michael Smith Foundation for Health Research in the Province of British Columbia, Canada, are vividly captured in this book. In addition, international collaborators also contributed their case studies that enrich the kaleidoscopic narrative of this research discipline.

The chapters articulate a case mix of innovative research projects that show actual evidence of TEKT in action, and also discussion and literature reviews on topics in this domain that would stimulate important academic dialogue and formulation of new ideas to move this young but promising field forward. This book synthesizes the concepts and ideas into a cohesive road map, pointing at exciting directions of development towards the intriguing and ever-changing odyssey in eHealth – the use of information and communication technologies in health.

The book chronicles the signposts that TEKTIC and its researchers have arrived through their work over the past 5 years. It also lays down a yardstick upon which the future of TEKT can be measured in terms of progress and influence in important health outcomes: access, quality, cost effectiveness, and knowledge dissemination and exchange. This work will not only stimulate the readers to continue their imagination, but also hopefully increase dialogue and knowledge sharing in this important area to lead to scaling up and implementation of these and other ideas of eHealth into our systems to lead to excellence in health. I recommend this very thought-provoking and action-generating book that will interest all those who aim at keeping the health profession at the forefront of progress and provide an ever-efficient policy of Health-for-All in all parts of the world.

S. William A. Gunn
President, Medical Society of the World Health Organization

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Preface

Technology Enabled Knowledge Translation

Technological progress leads to new and innovative information and communication technologies (ICTs) that facilitate communication, data storage and analysis, information visualization, and knowledge dissemination and sharing. How can these different types of ICTs be exploited to take advantage of their power, ubiquity, and connectivity, toward improving health service delivery, education, and research? This is the central thesis of "*technology enabled knowledge translation*" – to explore the use of modern ICTs that enable and support the animation of evidence-based health knowledge into routine health practices and engage key stakeholders including health professionals, community members, patients, health policy makers, health administrators, and researchers to work together towards this goal.

In 2006, an interdisciplinary group of researchers from medicine, global health, computer science, social sciences, educational psychology, health policy, health informatics, and health management, representing institutions that included the University of British Columbia, University of Victoria, Simon Fraser University, and the University of Calgary, successfully applied to the Michael Smith Foundation of Health Research for a multi-year research team grant to explore technology enabled knowledge translation. The University of British Columbia endorsed the formation of this team under its Faculty of Medicine as the "Technology Enabled Knowledge Translation Investigative Centre" (TEKTIC).

Since its inception, TEKTIC has supported the initiation, growth, and expansion of 31 research projects during its team grant period. This Centre also helped form and nurture a growing community of researchers and stakeholders who expanded this continuing and exploratory journey beyond the team grant funding period.

This book represents a synthesis of the various projects and the investigation of different theories and hypotheses that occurred under TEKTIC. Over time, we found

support to validate many of the ideas that our group formulated in its original vision and generated excitement in the discovery of new possibilities and directions that emerged through our collaborative empirical efforts. We have met new researchers and collaborators along our way, with several contributing to this work to further bring clarity and inquiries into this exciting area of research. We hope that this book, divided into six sections, will give readers not only a window into the research endeavors attempted in TEKTIC, but also serve as an invitation for readers to consider joining us as our continuing voyage forward unfolds. Welcome!

BC, Canada   Kendall Ho

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Part I
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Chapter 1
The Case for an Innovations Framework for Technology-Enabled Learning Environments and Knowledge Translation

Elizabeth Heathcote and Shane Dawson

Abstract In order for innovations to fulfill their potential and deliver maximum value for education and health services, they need to be distributed and adopted as widely as possible. Like many large educational and health service organizations, a large urban Australian university was faced with the challenge of managing existing educational technologies while identifying, nurturing, and scaling up innovations to benefit the organization. Representatives from various faculties and support units participated in a working party (the *Innovations Framework Working Party*), to align resources to best leverage the value of technological innovations in learning and teaching. The Working Party developed an *Innovations Framework* to address the strategic imperatives as well as individual motivations which involved setting goals for innovations followed by nurturing, developing, disseminating, and mainstreaming innovations within the institution. This served as the conceptual and practical basis for planning resource allocation, including internal university learning and teaching grants, and for managing an increasingly diverse and expanding suite of educational technology innovations. This chapter argues that an Innovations Framework, often used in business research and development, could also be used as a tool to facilitate knowledge translation activities in health-care contexts.

1.1 Introduction

The various educational and health service innovations described in this book were in part supported by funding designed to encourage innovations, and each has delivered educational, economic, and/or social value that is potentially available for their

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respective organizations. The challenge with any innovation relates to the transition from innovation to mainstream adoption in order to ensure that any resulting value-added outcomes become standard practice. Thus, in this chapter, it is argued that beyond seeding innovations, organizations must ensure that any work and lessons learned from innovations have full and timely opportunities to translate into mainstream practice across the organizations. This transition from innovation genesis to mainstream adoption is a complex process and one that is generally poorly understood and resourced (Bates 2000).

For embedding and mainstreaming to occur, innovations should be considered within the broader organizational strategy; organizations need to take control of the innovation cycle to leverage the adoption of innovations from genesis to mainstream. Drawing on a specific case study at a large Australian university, an Innovations Framework for Technology-Enhanced Learning Environments is examined in the context of guiding strategic resource allocation and the nurturing of innovations in learning technologies. This serves as an example of an organization better articulating its innovations strategy. Key lessons from the project suggest further potential practical directions for managing innovations in this world of constant technological change and call organizations to action in proactively and strategically ensuring they leverage maximum value from innovations.

To address this challenge, an Innovations Framework is proposed as a tool to better inform and guide higher education and health-care organizations in strategically managing the innovation cycle and, in particular, ensuring innovations translate into mainstream best practice within the organization. To begin, an overview of the role of innovation in organizations and existing theories of innovation diffusion is presented, with particular reference to the context of higher education. Next, a specific case study illustrating the development of an "Innovations Framework" for Technology-Enhanced Learning Environments is offered. The Innovations Framework was designed to inform the university's strategic resource allocation and articulate a clear process for planning, managing, disseminating, and embedding educational technology innovations. To conclude, key findings from the project are summarized, and recommendations for proactively and strategically leveraging maximum value from technology-enhanced innovations in these higher education and health-care contexts are offered.

1.2   Why Value Innovation?

Commercial enterprises have, for a considerable time, recognized the importance of innovation in order to establish new products and services or improve the efficiency and effectiveness of their existing offerings in an effort to maintain a competitive advantage in the marketplace (Betz 2003; Porter 1998). Although related, *innovation* differs from notions of *invention*, the latter implying the creation of a new device or process (Gurel 2007). The interest in the concept of innovation within organizations largely lies in an innovation's perceived capacity to build economic value. The term *innovation* is broadly defined as the practical application of ideas

with some expectation of value enhancement (Schumpeter 1934; Rogers 1962). The full value of any innovation for an organization is only realized through its adoption within the organization's systems and workflows. As Chigona and Licker (2008) note, "…one of the important duties of those responsible for an innovation is to maximize its adoption rate" (p. 57). As such, the term *innovation* could be considered to include not only the conception of an idea but the process for adoption (Cutler and Dodgson 2006).

For the purposes of the Innovations Framework project outlined in this chapter, the Amabile et al. (1996, p. 1155) definition of *innovation* as "the successful implementation of creative ideas within an organization" is used, as it both acknowledges the practical, value-enhancing potential of the innovation and recognizes the processes required to support its dissemination within an organization. An important element also implicit in Amabile et al.'s definition relates to the inclusion of the various steps and practicalities that are necessary for moving creative ideas from their genesis to their eventual mainstream adoption.

1.3 Innovation Diffusion

As the value of an innovation lies in its ability to be widely adopted within an organization, it is important to understand the factors influencing both its dissemination and adoption. This is especially true when organizations are striving to systematically and strategically manage innovations involving technology. In 1962, Everett Rogers (as cited in Rogers 2003) published *Diffusion of Innovation*, a synthesis of over 500 innovation studies in which he examined an individual's process for adopting products or services, noting wide variations in the uptake of innovations. Rogers' theory for the diffusion of innovations contained a model for classifying an individual's preparedness and motivations influencing his/her adoption of innovations and therefore the time to achieve significant market penetration. This "innovation adopter curve" detailed five categories relating to individual adoption profiles. The established categories ranged from *innovators*, to *early adopters*, to *early* and *late majority,* and finally to *laggards.*

Rogers' (as cited in Rogers 2003) now seminal framework is widely relied upon when planning how best to address the motivations of individuals in each of these categories to facilitate their uptake of an innovation. Although Rogers' work is more commonly associated with business, the model has also had significant impact within education for identifying the state of the adoption process within an organization (Robinson 2001; Smothers et al. 2008). While Rogers' model originally applied to measures of market share, the concept of innovation penetration can also be applied to education and health contexts. For example, White (2007) used a modified version of Rogers' adoption classifications to illustrate the issues and constraints related to educational technology adoption in the UK higher education sector.

Rogers' Innovation Adopter Curve serves as a strong conceptual basis for establishing an organizational framework for innovations in technology-enabled learning environments (see Fig. 1.1).
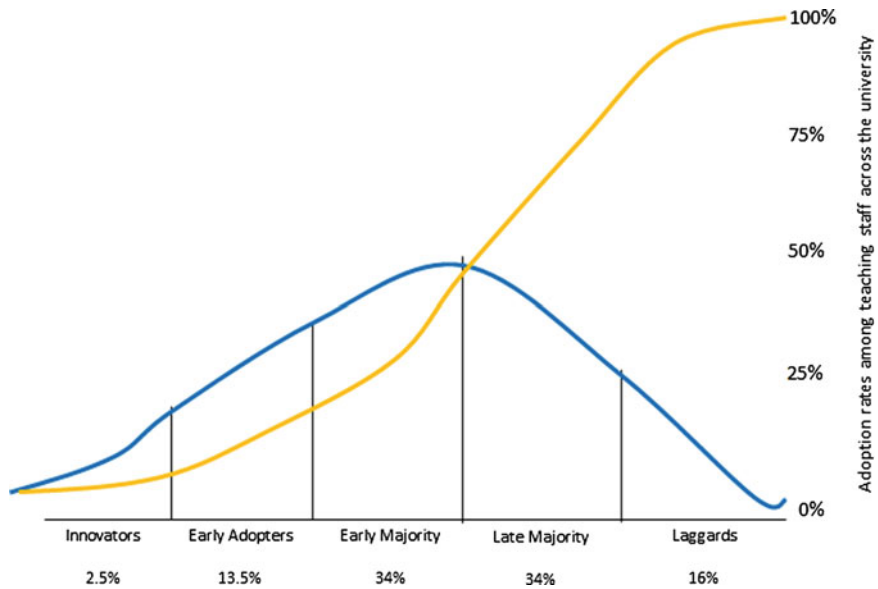
Fig. 1.1 Rogers' innovation adoption *curve* adapted to organizational mainstreaming of teaching and learning innovations (Adapted from Rogers 1962, p. 150)

1.4   Innovation in Higher Education

The pace and sustained nature of technological change both challenge and provide opportunities for current higher education teaching and learning practices. Rapid changes in the personalization and miniaturization of communications technologies have already occurred, including synchronization across devices and the growth of high-speed bandwidth options through Wi-Fi and Bluetooth. These technological innovations are challenging both higher education and health care in terms of strategy, organizational governance, support and technical infrastructure, as well as appropriate integration into learning and teaching practice (Damiano 2011; Green et al. 1996). Systemic adoption of innovation within large educational organizations is a challenge that requires a strategic approach to effectively promote and manage the innovation from its conception to a large-scale adoption (Bates and Sangrà 2011).

From an organizational strategy perspective, it is important to identify the types of innovations likely to have strategic value (i.e., *setting goals* for innovations) and then nurture these developments by encouraging experimentation and supporting development. This, in turn, forms the basis for a broad-scale adoption of the innovation so that its outcomes are shared and the innovation itself is mainstreamed and embedded into workflow and general operations. The organizational framework for an innovation could be described as depicted in Fig. 1.2.

Figure 1.3 illustrates a common scenario found in higher education and illustrates possible challenges routinely faced in the allocation of resources. Broadly speaking,
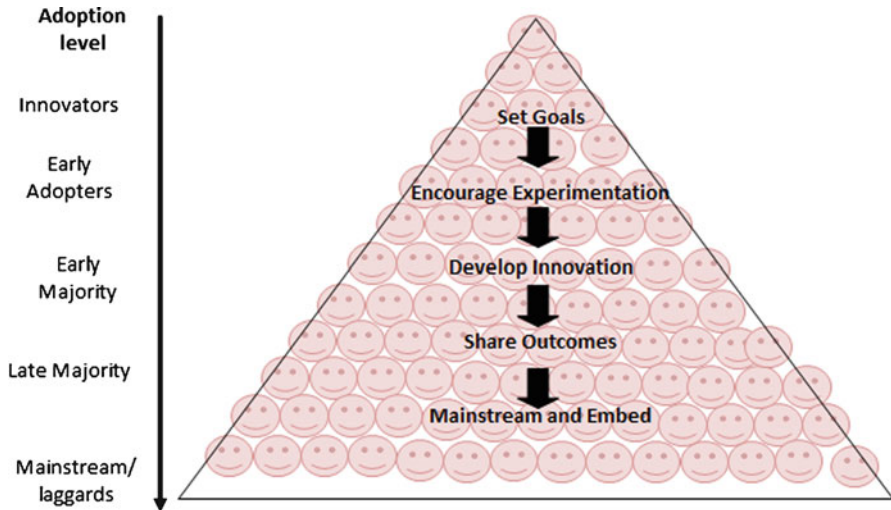
Fig. 1.2 Innovation adoption process pyramid processes to reach target audience
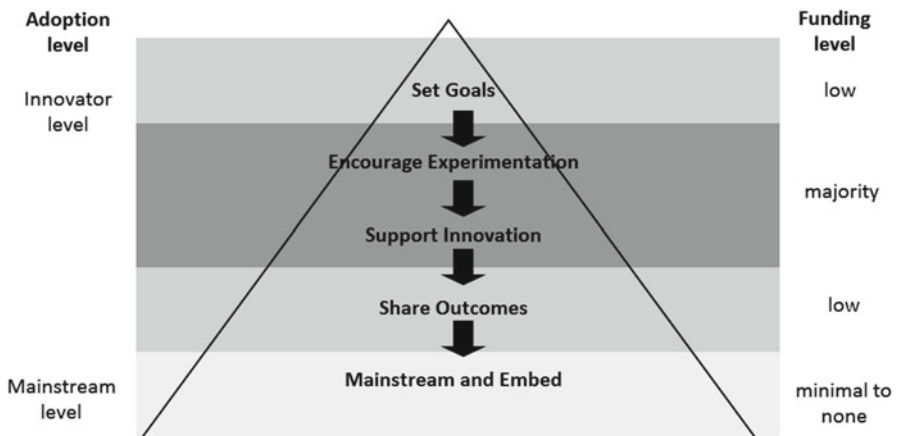
Fig. 1.3 Innovation adoption process pyramid and typical university teaching innovation funding allocation

in the teaching and learning domain, the promotion of innovations is via two separate but interrelated processes. The first comprises seed funding to spark educational and/ or educational technology innovation development. The second relates to the establishment of reward and recognition systems for promoting the development of "innovative" teaching practices. Central to these models is the notion that any promotion of innovation at the grassroots level will spark future adoption within the broader social system. Hence, the concentration of resourcing to date is commonly applied to the front end of the innovation cycle, leaving the dissemination and embedding phases of innovation traditionally underresourced (see Fig. 1.3).

To best support the outcomes and full potential value of seeded innovations, a realignment of the resource pyramid is proposed. Although front loading the initial phase of the innovation process (i.e., conception and development) allows for an influx of creative ideas and processes, this leaves minimal resources to support the sharing of outcomes, mainstreaming, and embedding of innovations into practice. Allocating the majority of an organization's often scarce resources for pilot developments leaves little resources left to extend innovations, resulting in missed opportunities (e.g., leveraging any integrated development and through mainstream adoption). In order to maximize the potential from any given initial innovation, resources need to be focused beyond seed funding a core set of early adopters. To this end, three strategic requirements for an Innovations Framework should include:

- An evaluation framework to assess the innovation potential for impact in alignment with the institution's strategic goals and key performance indicators.
- A common project management framework for documenting innovation development and progress. This framework serves as a medium for communicating current and past innovations for future "innovators" to extend or modify.
- Dedicated resourcing for mainstreaming key innovations. Effectively, this will turn the innovation pyramid into a trapezoid, to spend less on pilot innovation development and more on rolling out innovations that have strategic applicability across the organization.

1.5 Project Description: An Innovations Framework for Technology-Enhanced Learning Environments

This next section details a specific case study showcasing the development and application of an institutional-wide Innovations Framework. The concept of an Innovations Framework was applied at a large Australian metropolitan university (enrolling approximately 40,000 students) to better address the challenges associated with the development, selection, and adoption of technology-enabled learning innovations to assist the institution's teaching and learning practices. Based on that experience, this chapter examines how the process of creating an Innovations Framework could assist innovation dissemination activities for the types of educational and health service innovations outlined in this book. This is achieved through a considered and resourced method of identifying, supporting, and mainstreaming new knowledge.

The work that led to the *Innovations Framework for Technology-Enabled Learning Environments* was undertaken by the lead author and a diverse working group of representatives from the faculties and units across the university (referred to hereafter as the *Innovations Framework Working Party*). Although an overarching goal of the Innovations Framework was to further promote innovation and experimentation among faculty, this was balanced with the need to further cultivate innovations beyond an initial pilot phase into more mainstream adoption.

The institution recognized that while there was a well-supported culture for innovations, there remained limited exemplars that demonstrated impact extending beyond the initial development of team and key stakeholders. In essence, to use Working Group member Professor Peter Taylor's terminology (Taylor and Grace (2006)), the institution had seeded innovation to the point of a "thousand flowers blooming" (p. 370). Thus, the Innovations Framework aimed to establish a clear process for identifying the types of innovations that would address the institution's strategic priorities and could be considered excellent candidates for further resourcing to enable mainstream adoption.

1.6 Conceptual Basis for the Framework

The Innovations Framework developed here arose from the concept and assumption that managing technology-supported learning environment innovations at the university level required a methodology that maximized the value of the innovation in the achievement of excellence and supported the goal of creating optimal learning environments and experiences for students. The first key issue required balancing institutional priorities (i.e., control over and investment in selected areas of innovation identified as priorities) with the individual innovator's priorities (i.e., allowing and encouraging innovation to evolve more naturally as per individual interest/need). As a result, the Working Group decided that the framework's focus should be on the strategic priorities of the institution and that innovations demonstrating alignment with these priorities would be allotted support and resources accordingly. However, to mitigate the risk that other innovations would continue to develop outside of the institutional radar, it was recognized that some form of incentive to register the innovation was required. While the framework would encourage and support mainstream innovations that clearly furthered the university's strategic teaching and learning goals (thus concentrating on strategic priorities), it would also offer limited support to other innovations that could not demonstrate clear strategic alignment with the university's mission (as a way to ensure that these innovations were known across the institution and to others with similar interests).

The Innovations Framework for Technology-Supported Learning Environments was developed with the assumptions that:

- Innovation exists within and beyond the existing mainstream teaching and learning technologies at the university.
- Innovation occurs across a broad spectrum of virtual learning spaces, including, but not limited to, the learning management system.
- Using centrally supported systems for technologically supported learning environments does allow for efficiencies in support (both technical and pedagogical), ease of reporting on learning management system activities, and increased dissemination of results.
- Risk associated with innovations can be minimized through the management of innovative spaces and quality assurance approaches.

1.7   Innovations Framework Principles for Technology-Supported Learning Environments

Although early researchers used a linear model to describe innovations, more recently, the innovation process has been described using a cyclical model or network approach (Buijs 2003; Cutler and Dodgson 2006). In both models, the core elements of innovation in learning environments take place via a number of stages that include idea generation, technical and market assessment, development, testing and refinement, and deployment (which cycles back to idea modifications). Whether linear or cyclical, the case study described here aimed to provide a framework that clearly supported each stage of the innovation process. Hence, in this instance, the university's developed framework aimed to:

- Clarify and create a common understanding of the link between the purpose of encouraging innovation and the achievement of the institution's learning and teaching goals (i.e., *set goals* for the innovations)
- *Encourage* innovative approaches and technologies at an early stage of development
- *Manage the risk-taking* that experimentation involves while minimizing organizational risk
- *Support the maturation* of successful emergent innovations
- *Enable the sharing of innovation outcomes* beyond the learning and teaching team from which the innovation originated throughout the wider Queensland University of Technology (QUT) learning and teaching environment and beyond
- *Mainstream innovations* into the centrally supported learning and teaching environment and support the change management inherent in such widespread adoption
- Develop *criteria for assessing the cost/benefit outcomes* of innovations

Sharing or disseminating the outcomes of innovations affords many benefits both for those directly involved in the innovations and for others within the university and in other learning, research, and applied communities. The process of communicating ideas to others can assist innovators in refining their understanding of innovations. Regular dissemination of innovations also encourages the cross-fertilization of ideas.

1.8   The Process of Developing the Framework

The Innovations Framework Working Party was comprised of faculty representatives, members of the existing related steering committees, representatives from central IT, and teaching support staff. The first step for the Working Group was to establish best practices regarding innovation development, support, and management.

Central themes that arose in the Working Group's discussions revealed that although numerous IT strategic plans and roadmaps were readily available, there were limited documented examples illustrating "controlled innovation." A review of other universities and educational institutions revealed little in the way of specific frameworks or strategies for encouraging, supporting, and mainstreaming technological innovation in teaching and learning. There were however several examples of IT strategic plans and roadmaps for overall technologies such as student management systems, e-mail, and file servers.

While the lack of documented examples could be seen as a barrier, the Working Group responded by expanding the network of involved stakeholders to ensure all components of the proposed framework would be included. For example, it was recognized that an Innovations Framework had little value unless the innovators themselves saw the benefits in using the framework as it relied on these individuals to flag their activities, make use of the resources, and share the results of their innovations to be successful. Input from identified early adopters was also sought to help develop a statement of framework outcomes that resulted in the following:

The Innovations Framework will provide structured support for teaching staff exploring creative ideas for improved learning outcomes through:

- A process for maturing their innovation
- A mentor and/or expert panel to help shape ideas and support ideas to maturation
- A virtual space to host various concepts or prototypes during development
- Interaction with a community of innovators who are developing their ideas in parallel or have developed their creative ideas in technology-supported learning environments in the past
- A database of ideas and contacts for ideas being developed as well as the results of previous innovations
- Technical support such as installation and maintenance (for identified innovations) and backup of data
- Support in marketing, the creation of support material to ensure dissemination, and, where applicable, the mainstreaming of the innovation
- Incentives, reward and recognition schemes, competitions, and access to financial support and/or expertise (Heathcote et al. 2006)

1.9   Insights/Results

Central to the Innovations Framework was the "Strategies for innovations support" Table (see Table 1.1) that outlined each stage of the innovation process (i.e., set goals, encourage experimentation, develop innovation, share outcomes, and mainstream and embed) alongside various support mechanisms that would facilitate the innovation process from conception to mainstreaming within the university.

There are three distinct dimensions to this support process. The definition, development, implementation, dissemination, and mainstreaming of innovative approaches

Table 1.1 Elements of supporting innovation in technology-enabled learning environments

The Innovations Framework: Recommended strategies for innovations support for teaching staff at each stage and level are outlined.

	Set Goals	Encourage Experimentation	Develop Innovations	Share Outcomes	Mainstream and Embed
Pedago-gical	The innovation framework should: • Provide clear pedagogical goals and learning goals and areas of focus in the strategy documents of the institution; • Clarify the pedagogical criteria for support under the innovations framework; • Inform students of the role of innovation in improving teaching	The innovation framework should: • Provide clear pedagogical goals for innovations; • Develop scholarship of learning and teaching in teaching staff, especially with a view to innovative contexts; • Disseminate information about experimental learning approaches (at QUT and elsewhere) amongst teaching staff (see the online resource under "Share Outcomes"); • Encourage teaching staff to involve students as co-	The innovation framework should: • Share pedagogical approaches in innovative spaces amongst teaching staff who are novice innovators (e.g., through staff seminars); • Provide strong support for innovative spaces, including expert panels with a faculty representative to evaluate the innovations in light of QUT's stated pedagogical goals; • Provide tools to teaching staff, and support from the central teaching unit to collect and analyze detailed	The innovation framework should: • Evaluate the potential (and actual) pedagogical impact of innovative learning and teaching environments (and information and support of evaluation approaches); • Develop an online resource of literature on innovation in learning, learning design and development (including online examples of innovation in learning) specific to the goals of the Innovation	The innovation framework should: • Annually select the most promising innovations for mainstreaming and embedding into the culture and practice of teaching and learning at QUT through evaluation of the pedagogical value, breadth of applicability, and impact of the innovation by a relevant panel of experts; • Provide development opportunities for staff and students to make use of the innovation within

and learning and implications this might have on their studies, via statements in course/unit outlines.	innovators and to build on student' skills and expertise with experimental environments • Mentor innovators including strategies for sharing ideas via expert panels (see below); • Involve a panel of experts from around the university as required (e.g., faculty representatives, educational researchers, Teaching Fellows, learning designers, librarians, and IT staff) as collaborators in the experimentation.	information on students' experiences in innovative spaces; • Encourage further research by teaching staff and learning advisors in the use and outcomes of innovative spaces; • Recognize and reward the innovations of teaching staff that yield positive student learning outcomes (or potential) through reward and recognition, performance planning and promotions processes and university awards; • Set up awards and acknowledgements that celebrate innovative practices.	Framework and the projects therein; • Set up an accessible database on learning innovation activities across the university; • Develop venues to publish and share ideas, outcomes, and issues around innovation; • Conduct workshops, events, and conferences to showcase innovative environments; • Ensure that support staff, including learning designers and learning and teaching consultants, are highly familiar with innovations.	the technology-supported learning and teaching environment including workshops, exemplars, and online resources on pedagogical usage; • Provide access to the innovations in a just-in-time contextualized manner for teaching staff and students, together with examples and support resources.

Table 1.1 (continued)

	Set Goals	Encourage Experimentation	Develop Innovations	Share Outcomes	Mainstream and Embed
Technical	The innovation framework should: • Provide clear technical roadmaps to serve as guides for technical support for innovations; • Clarify the technical criteria for support under the innovations framework (e.g., technical documentation for tools developed).	The innovation framework should: • Prioritize technical support for experimental learning spaces beyond what is offered by Faculty Computer Systems Officers; • Provide flexible spaces for open experimentation; • Avoid restrictive technology policies at the experimental stage; • Be proactive in identifying promising development technologies and environments, and purchase licenses for their use; • Provide central IT developers to address design, compliance, and authentication issues without burdening teaching staff.	The innovation framework should: • Host a central innovations space for the continued trial of innovative learning environments, beyond what is available from Faculties; • Make tools available for the development and maintenance of innovative learning environments both within and outside of the learning management system; • Develop clear programming guidelines for innovative learning environments to ensure consistency of users' experiences, compliance with applicable standards, and ease of mainstreaming innovations; • Provide central IT support for innovative environments to ensure consistency and	The innovation framework should: • Pursue the integration of innovative learning environments with QUT systems in a flexible and cooperative (rather than prescriptive) manner; • Provide support to develop innovative learning environments identified as relevant for mainstreaming, so all teaching staff can take advantage of the innovation; • Clearly identify that the aim of integration is a consistent and compliant experience for students across all learning and teaching environments, whether inside or outside the learning management system;	The innovation framework should: • Resource the mainstreaming (either within the centrally-supported learning environment or as a tool available within the central environment) of selected innovations; • Transfer hosting and maintenance of the innovation to a central support service in order to relieve the innovator of ongoing support for the outcomes post-development.

compliance without burdening teaching staff; • Provide "getting started" tips on compliance, accessibility, and copyright; • Develop a shared repository (where appropriate, open source under creative commons licenses) for technologies and support materials to encourage the sharing of ideas, materials, and technological resources among interested teaching staff.	• Host virtual innovations spaces that include virtual supports for sharing innovative practices; • Provide central IT support for the integration of innovative environments into a wider learning and teaching framework to ensure consistency and compliance without burdening teaching staff.

(continued)

Table 1.1 (continued)

	Set Goals	Encourage Experimentation	Develop Innovation	Share Outcomes	Mainstream and Embed
Administrative	The innovation framework should: • Provide metrics for alignment of creative ideas with QUT teaching and learning priorities for innovation; • Publish examples of the types of innovation to be encouraged.	The innovation framework should: • Ensure innovations align with QUT's stated pedagogical goals; • Ensure faculty and school awareness and support for the proposed innovation; • Provide reward and recognition for experimenters in innovative learning environments (encouraging experimentation rather than merely rewarding eventual success); • Offer grants to support experimenters; • Recognize experimentation through the workloads management process by allocating additional time to support staff engaged in learning and teaching experimentation;	The innovation framework should: • Keep track of past and current innovation projects (e.g., by providing innovations network space access); • Allocate funding to setting up the innovations framework to support innovations in the first year; • Allocate 5% p/a base learning systems funding (i.e., within the current funding allocation) thereafter; • Ensure that online learning and teaching system development will value-add development on existing base learning tools; • Offer grants to support the development of experiments into mature innovations;	The innovation framework should: • Allocate existing IT funding to setting up the innovations framework in integrating, disseminating, and mainstreaming innovations in the first year; • Allocate 5% p/a base funding (i.e., within the current funding allocation) thereafter; • Provide support for external marketing and promotion of innovations.	The innovation framework should: • Resource the marketing and the training of support staff and helpdesks to ensure the breadth of impact and take-up; • Review organization-wide policies and procedures that are impacted by mainstreaming innovations; • Provide time for staff to learn to apply relevant innovations in their teaching mix; • Support commercialization of the outcomes where applicable.