E-Learning Maturity Model Version 2.2

Process Descriptions

26th July 2006

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26th July 2006

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This research is supported by the New Zealand Ministry of Education Tertiary E-Learning Research Fund.

MINISTRY OF EDUCATION

Te Tāhuhu o te Mātauranga

Contents

Glossary

ANTA	Australian National Training Authority
ADEC	American Distance Education Consortium
ADL	Advanced Distributed Learning
ALA	American Library Association
CanREG	Canadian Recommended E-learning Guidelines
Capability	Capability, in the context of this model, refers to the ability of an institution to ensure that e-learning design, development and deployment is meeting the needs of the students, staff and institution. As well, capability includes the ability of an institution to sustain e-learning support of teaching as demand grows and staff change
CMM	Capability Maturity Model
eMM	e-Learning Maturity Model
IHEP	The Institute for Higher Education Policy
LMS	Learning Management System
MLE	Managed Learning Environment
Practice	Activities undertaken by institutions, that contribute to capability in individual processes
Process	A high-level activity that has been found through research and evaluation of e-learning to positively contribute to institutional e-learning capability
Process area	A collection of individual processes that share related institutional capability outcomes
SCORM	Sharable Content Object Reference Model
SPICE	Software Process Improvement and Capability dEtermination
W3C	World Wide Web Consortium
WAI	W3C Web Accessibility Initiative
WCET	Western Cooperative for Educational Telecommunications
WWW	World Wide Web

Acknowledgements

A large body of research such as this is dependent on the support and assistance of a number of people. Most importantly are the staff of the various participating institutions who generously gave of their time in the completion of the capability assessments used to validate the eMM. While you cannot be named, your assistance was vital for the success of this project and is much appreciated; it is hoped that the outcomes of the analysis are of value to your institution.

The model owes much to the work of Dr Geoff Mitchell and his contribution and ongoing friendship remain key to the ongoing research. Also important was the contribution made by my research assistants, Charlotte Clements, Darren Hoshek and Warren Sellers.

The support of colleagues in New Zealand, Australia and the UK, including the ACODE member organisations and Professor Paul Bacsich, is greatly appreciated. Dr Jim Petch and colleagues at the University of Manchester provided invaluable assistance in reviewing the processes and practices and in generating the questions used to elicit evidence.

The support of the New Zealand Ministry of Education's Tertiary E–learning Research Fund and staff in enabling this research is acknowledged with gratitude.

Intellectual Property Statement

Introduction

This *eMM Process Guide* provides a detailed description of the processes and practices that underpin the e-learning Maturity Model (eMM) methodology (Marshall and Mitchell, 2004).

The processes and practices listed here are from version 2.2 of the eMM, the most recent version is always available from http://www.utdc.vuw.ac.nz/research/emm/. Details of the eMM methodology are provided in Marshall and Mitchell (2006), and in greater detail in Marshall (2006a). Practical assistance and worksheets for conducting self-assessments are provided in the *eMM Process Assessment Workbook* (Marshall, 2006b). Electronic copies of all of these documents are available from the eMM website: http://www.utdc.vuw.ac.nz/research/emm/.

This document is divided into five sections, corresponding to the five eMM process areas, *Learning*, *Development*, *Support*, *Evaluation* and *Organisation*. Within these sections the individual processes are described along with a review of the evidence supporting their inclusion in the eMM.

The evolution of the eMM that has resulted in the current set of processes and practices is provided in Marshall (2006a). Over time it is hoped that this document will grow and evolve, incorporating evidence from assessments conducted using the eMM in a wide variety of institutions and contexts as well as the rich and growing international body of research on e-learning.

Changes from version one of the eMM

The eMM has evolved since its initial conception (Marshall and Mitchell, 2003), this evolution was informed by an initial assessment of capability in the New Zealand sector (Marshall, 2005), extensive consultation and workshops with colleagues in New Zealand, Australia and the UK, and an extensive literature review examining a wide set of heuristics, benchmarks and e-learning quality research (Marshall, 2006a). As well as a significantly improved set of processes and practices, the current version of the eMM differs most significantly in the change from levels of process capability to dimensions (Marshall and Mitchell, 2006; see below).

Key eMM concepts

The assessment of capability in a complex area such as e-learning is difficult and necessarily involves reducing large amounts of detail into a broader overview that supports management decision making and strategic planning. It is inevitable that this approach will fail to single out the subtle nuances and innovative work of individuals that motivate teaching staff to work on individual projects. Institutions and individuals will always have the ability to choose to invest time and other resources in innovative, unique opportunities. The focus of the eMM is aimed at a less lofty goal, that of changing organisational conditions so that e-learning is delivered in a sustainable and high quality fashion to as many students as possible. As noted by Fullan:

> "The answer to large-scale reform is not to try to emulate the characteristics of the minority who are getting somewhere *under present conditions* … Rather, we must change existing conditions so that it is normal and possible for a majority of people to move forward" (Fullan, 2001, page 268)

The framework used in this analysis is based on the Capability Maturity Model (CMM, Paulk *et al*., 1993) and SPICE (Software Process Improvement and Capability dEtermination, El Emam *et al*., 1998; SPICE, 2002). The underlying idea is that the ability of an institution to be effective in a particular area of work is dependent on their capability to engage in high quality processes that are reproducible and able to be sustained and built upon. The characteristics of an institution that enable high quality processes are to some extent able to be separated from the details of the actual work undertaken that will vary depending on particular circumstances. This separation means that the analysis can be done independently of the technologies selected and pedagogies applied, thus allowing for a meaningful comparison across the sector.

Capability, in the context of this model, refers to the ability of an institution to ensure that e-learning design, development and deployment is meeting the needs of the students, staff and institution. Capability includes the ability of an institution to sustain e-learning support of teaching as demand grows and staff change.

Processes

Building on the SPICE model, the eMM divides the capability of institutions to sustain and deliver e-learning up into five major categories or process areas (Table 1). The key difference from the original SPICE model is the introduction of the *Learning* area, which replaces the *Customer/Supplier* area used in software engineering. Processes define an aspect of the overall ability of institutions to perform well in the given process area, and thus in e-learning overall. The advantage of this approach is that it breaks down a complex area of institutional work into related sections that can be assessed independently and presented in a comparatively simple overview without losing the underlying detail.

Process category	Brief description
Learning	Processes that directly impact on pedagogical aspects of e-learning
Development	Processes surrounding the creation and maintenance of e-learning resources
Support	Processes surrounding the oversight and management of e-learning
Evaluation	Processes surrounding the evaluation and quality control of e-learning through its entire lifecycle.
Organisation	Processes associated with institutional planning and management

Table 1: eMM process categories (revised from Marshall and Mitchell, 2003)

An obvious requirement of this model is that the processes chosen are based on empirical evidence and represent 'common truths' about e-learning capability:

> "are there common practices or ways of creating e-learning resources and learning environments that are accepted, useful and able to be described in a way that others can adopt them and improve their own e-learning capability?" (Marshall and Mitchell, 2003, page 4)

The processes used in version one of the eMM were developed from the 'Seven Principles' of Chickering and Gamson (1987) and 'Quality on the Line' benchmarks (IHEP 2000) as outlined in Marshall and Mitchell (2004). These have the advantage of being widely accepted as guidelines or benchmarks for e-learning delivery (Sherry, 2003), however extensive feedback through the workshops and from collaborators in New Zealand, Australia and the UK as well as the experience of applying the first version of the eMM identified a number of additional aspects of capability that needed assessment (Marshall, 2006a) and this has resulted in the set of processes in Table 2, and which are described in detail in this document.

Dimensions of capability

A key development that arose from the evaluation of the first version of the eMM is that the concept of levels used was unhelpful (Marshall and Mitchell, 2006). The use of levels implies a hierarchical model where capability is assessed and built in a layered way. The key idea underlying the dimension concept in contrast, is holistic capability. Rather than the model measuring progressive levels, it describes the capability of a process from synergistic perspectives. An organization that has developed capability on all dimensions for all processes will be more capable than one that has not. Capability at the higher dimensions that is not supported by capability at the lower dimensions will not deliver the desired outcomes; capability at the lower dimensions that is not supported by capability in the higher dimensions will be ad-hoc, unsustainable and unresponsive to changing organizational and learner needs.

In thinking about the relationship between the dimensions it is helpful to consider them arranged as in Figure 1 below. The matrix of boxes used on the left to display capabilities is helpful when performing comparisons but it can imply a hierarchical relationship that is misleading when interpreting results.

Learning: ***Processes that directly impact on pedagogical aspects of e-learning***	
L1.	Learning objectives are apparent in the design and implementation of courses
L2.	Students are provided with mechanisms for interaction with teaching staff and other students
L3.	Student skill development for e-learning is provided
L4.	Information provided on the type and timeliness of staff responses to communications students can expect
L5.	Students receive feedback on their performance within courses
L6.	Research and information literacy skills development by students is explicitly supported
L7.	Learning designs and activities result in active engagement by students
L8.	Assessment of students is designed to progressively build their competence
L9.	Student work is subject to specified timetables and deadlines
L10.	Courses are designed to support diverse learning styles and learner capabilities
Development: ***Processes surrounding the creation and maintenance of e-learning resources***	
D1.	Teaching staff are provided with design and development support when engaging in e-learning
D2.	Course development, design and delivery are guided and informed by formally developed e-learning procedures and standards
D3.	Explicit linkages are made in the design rationale regarding the pedagogies, content and technologies chosen
D4.	Courses are designed to support disabled students
D5.	All elements of the physical e-learning infrastructure are reliable, robust and sufficient
D6.	All elements of the physical e-learning infrastructure are integrated using defined standards
D7.	Resources created are designed and managed to maximise reuse
Support: ***Processes surrounding the support and operational management of e-learning***	
S1.	Students are provided with technical assistance when engaging in e-learning
S2.	Students have access to a range of library resources and services when engaging in e-learning
S3.	Student enquiries, questions and complaints are collected formally and managed
S4.	Students have access to support services for personal and learning issues when engaging in e-learning
S5.	Teaching staff are provided with pedagogical support and professional development in using e-learning
S6.	Teaching staff are provided with technical support in the handling of electronic materials created by students
Evaluation: ***Processes surrounding the evaluation and quality control of e-learning through its entire lifecycle***	
E1.	Students are able to provide regular formal and informal feedback on the quality and effectiveness of their e-learning experience
E2.	Teaching staff are able to provide regular formal and informal feedback on quality and effectiveness of their e-learning experience
E3.	Regular formal independent reviews of e-learning aspects of courses are conducted
Organisation: ***Processes associated with institutional planning and management***	
O1.	Formal criteria used to allocate resources for e-learning design, development and delivery
O2.	Institutional learning and teaching policy and strategy explicitly address e-learning
O3.	A documented specification and plan guides technology decisions when designing and developing courses
O4.	A documented specification and plan ensures the reliability, integrity and validity of information collection, storage and retrieval
O5.	The rationale for e-learning is placed within an explicit plan
O6.	E-learning procedures and which technologies are used are communicated to students prior to starting courses
O7.	Pedagogical rationale for e-learning approaches and technologies communicated to students prior to starting courses
O8.	Course administration information communicated to students prior to starting courses
O9.	The provision of e-learning is guided by formal business management and strategy

Table 2: eMM Version Two Processes and Process Areas

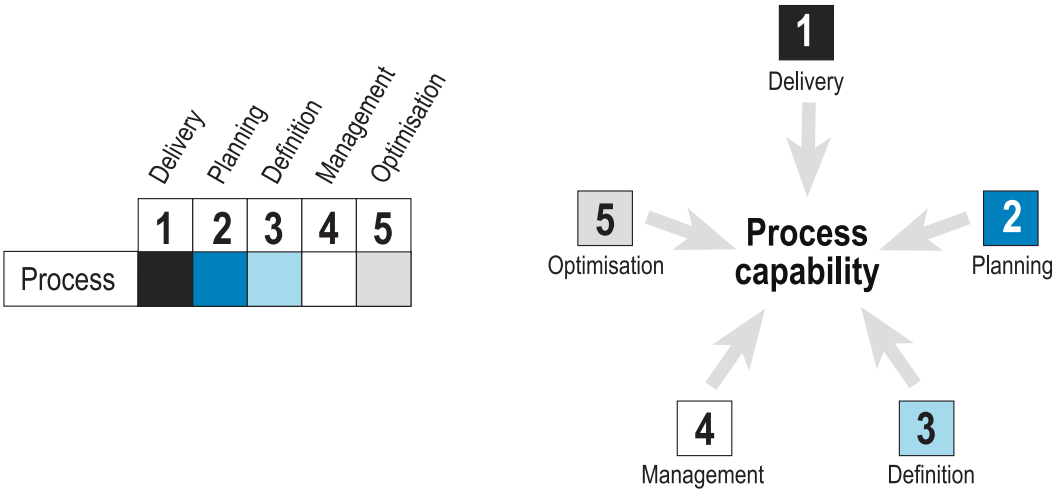

Figure 1: eMM Process Dimensions

Dimension 1 (Delivery) is concerned with the creation and delivery of process outcomes. Assessments of this dimension are aimed at determining the extent to which the process is seen to operate within the institution. It is important to emphasise that institutions can have extremely effective processes operating within this dimension, but in the absence of capability in other dimensions there is risk of failure or unsustainable delivery and wasting resources through needless duplication.

Dimension 2 (Planning) assesses the use of predefined objectives and plans in conducting the work of the process. The use of predefined plans potentially makes process outcomes more able to be managed effectively and reproduced if successful.

Dimension 3 (Definition) covers the use of institutionally defined and documented standards, guidelines, templates and policies during the process implementation. An institution operating effectively within this dimension has clearly defined how a given process should be performed. This does not mean that the staff of the institution follows this guidance.

Dimension 4 (Management) is concerned with how the institution manages the process implementation and ensures the quality of the outcomes. Capability within this dimension reflects the extent of measurement and control of the outcomes and the way in which the practices of the process are performed by the staff of the institution.

Dimension 5 (Optimisation) captures the extent an institution is using formal approaches to improve capability measured within the other dimensions of this process. Capability of this dimension reflects a culture of continuous improvement.

Practices

Each process is further broken down within each dimension into practices that are either essential (listed in bold type) or just useful (listed in plain type) in achieving the outcomes of the particular process from the perspective of that dimension. These practices are intended to capture the key essences of the process as a series of items that can be assessed easily in a given institutional context. The practices are intended to be sufficiently generic that they can reflect the use of different pedagogies, technologies and organisational cultures. The eMM is aimed at assessing the quality of the processes - not at promoting particular approaches.

The use of these detailed lists of practices provides a way of making explicit the essential aspects of the eMM processes which can then be used to develop action plans and strategies addressing aspects of particular weakness or opportunity for a sector or institution. They are also essential in enabling self-assessments as set out in Marshall (2006b).

Learning: Processes that directly impact on pedagogical aspects of e-learning

This process area has as its goal the attainment of the highest quality learning outcomes possible for students. The individual processes are directed at preserving the essential aspects of an effective learning environment that apply regardless of the technologies used, the pedagogical approaches incorporated or the disciplinary domain.

Learning: ***Processes that directly impact on pedagogical aspects of e-learning***	
L1.	Learning objectives are apparent in the design and implementation of courses
L2.	Students are provided with mechanisms for interaction with teaching staff and other students
L3.	Student skill development for e-learning is provided
L4.	Information provided on the type and timeliness of staff responses to communications students can expect
L5.	Students receive feedback on their performance within courses
L6.	Research and information literacy skills development by students is explicitly supported
L7.	Learning designs and activities result in active engagement by students
L8.	Assessment of students is designed to progressively build their competence
L9.	Student work is subject to specified timetables and deadlines
L10.	Courses are designed to support diverse learning styles and learner capabilities

Table 2: eMM Version Two *Learning* Processes

Process L1.

Learning objectives are apparent in the design and implementation of courses

Process Background

It is commonly accepted that having clearly defined learning objectives and learning outcomes is integral to effective teaching and to student achievement. Bloom (1956) has contributed significantly to this understanding. His cognitive taxonomy hierarchically arranges knowledge in relation to cognition as 'analysis, synthesis and evaluation' to frame educational objectives for learning outcomes. However, recent revisions have adapted, expanded and extended this model to account for new knowledge about learning processes (Anderson *et. al.*, 2001; Dettmer, 2006; Tomei, 2005). Anderson et al. (2001) reframe knowledge and cognition into two dimensions to better reflect their interrelationship and to provide a matrix table for more effective planning. They also update the terminology and structure by changing 'comprehension' to 'understanding' and 'analysis, synthesis, and evaluation' to 'analyze, evaluate and create' (p. 268). The verbalizing of these descriptions emphasise the interactions involved. Dettmer (2006), with a concern for constructivist pedagogy and interactive learning approaches, enhances the established cognitive, affective, psycho(sensori) motor domains by adding a social domain to attend to inter-intrapersonal relations. Together these synthesize 'into a unified domain of thinking, feeling, sensing/ moving, and interacting to optimize potential and self-fulfilment for all students' (p. 70). Tomei (2005) adopts Bloom's (1956) taxonomy of 'domains of teaching' (p. 1) but defines a new technology domain that accommodates instructional objectives. This technology domain involves six levels: literacy – understanding technology; collaboration – sharing ideas; decision making – solving problems; infusion – learning with technology; integration – teaching with technology; tech-ology the study of technology (p. 90). In short, these new works adapt traditional structures to suit current knowing and learning processes and are significant and important for the detailed planning of objectives and outcomes in e-learning situations.

However, there is some confusion over the terminology regarding objectives and outcomes in that they are often used interchangeably, but this can be partially resolved by considering objectives as intentions of instruction and outcomes as products of learning.

Learning objectives are the 'pre-specified intended outcomes of a course, program, process, or policy…. Objectives tend to be more specific than goals' (Wheeler and Haertel, 1993, p. 96). Their purpose is to clarify the scope, extent, and effects of teaching and learning so they must be 'precise, challenging and complete' (Laurillard, 2002, p. 183). Typically, they comprise the stated learning aim and a list of defined actions the learner will take and/or perform to produce and/or achieve the outcomes of the aim for assessment. A learning objective must clearly communicate not only the content of the aim and the action to be taken, but also how what it describes can be assessed as having been achieved (Laurillard, p.182).

Harden (2002) also clearly differentiates between objectives and outcomes. He identifies five areas of difference (specification detail, specification emphasis, mode of classification, regard for result, ownership) in which objectives are characterised against outcomes, and the latter consistently show more utility for teaching and learning. Those characteristics are: intuitive and user friendly; flexibility; recognises authentic practice; assesses achievement; engages ownership. He concludes 'that both terms…describe educational intentions and achievements…what is more important than the term employed is what it is used to describe', that is, the characteristics he describes as 'learning outcomes' (pp. 154-5). This then suggests that learning objectives relate to process, and outcomes define expected results. However, although writers try to address objectives and outcomes separately, they inevitably acknowledge their interrelationship.

Learning outcomes are 'the products of instruction or exposure to new knowledge or skills' (Wheeler and Haertel, 1993, p. 82). When documented for a course or programme of learning, they 'specify what learners' new behaviours will be after a learning experience. They state the knowledge, skills, and attitudes that the students will gain…[they] begin with an action verb and describe something observable and measurable' (British Columbia Institute of Technology, 2003/1996, p. 2). Further, learning outcomes should be specified in relation to an appropriate teaching-learning taxonomy model that includes all relevant domains, dimensions, and levels of knowledge and learning processes. This points to the interrelationships between learning objectives and outcomes.

Prosser and Trigwell (1999) specify what this means for student achievement. Referring to research that relates learning approaches to outcomes, they report that students who achieve high-quality learning outcomes have more complete and more complex understandings of a subject, which are transferable to new contexts, than students who achieve lesser quality learning outcomes (p. 109).

Joanna Allan (1996) also contributes to our understanding of the objectives/outcomes relationship. She observes that '[o]utcomes may subsume learning objectives, but the two are not synonymous and learning outcomes are not fettered by the constraints of behaviourism…which is antithetical to higher education' (p. 3 & 104). She calls for 'uncoupling…the assessment of learning outcomes from the notion of a standard of performance [which] places a greater emphasis on the specification of assessment tasks and the criteria by which judgements will be made, thereby forcing both the student and the teacher to examine and articulate the relationship between learning outcomes, assessment and the experience of learning' (p. 104). She differentiates between 'generic academic outcomes' that 'make use of information' (understanding), 'analyse' (analysis), 'think critically' (evaluation) and 'synthesise ideas and information' (synthesis), and involve 'key transferable skills' that identify abilities including literacy, numeracy, organising and gathering information, technology use, autonomy, and cooperation (pp. 107-8). Allan concludes that 'The more subject-specific, personal transferable and academic outcomes are clearly expressed, the more the learner is able to concentrate on what he/she needs to know in order to succeed on a given course or module…. The challenge…is now to harness the use of learning outcomes to view learning from the perspective of the learner, rather than the lecturer, and thereby to enrich the quality of the learning experienced' (pp. 104-5). This learner-learning focus highlights the significance of Dettmer's (2006) concern for inter/intra relationships in the *Four Domains of Learning and Doing*.

In considering the importance of objectives for online learning, Salmon (2000) sets out practitioner resources and advises that objectives should do the following: Be explicit about instructional strategies, and underpinning ideals and values; look at learning processes rather than testing for transmitted content; accept diverse outcomes rather requiring uniform results; recognise effective achievement of tasks and outcomes; consider team as well as individual success; acknowledge interdisciplinary work and understandings of complexity (pp. 120-1).

Further to this, Holmes (2004) presents a comprehensive guideline to understanding, writing and using learning outcomes. Firstly, learning outcomes need to relate generically and specifically to a particular programme or course level. Specific outcomes are assessed as achieved or not, but grades may be assigned to represent quality of work for feedback purposes (p. 4). Secondly, outcomes components should involve an aligned teaching learning strategy that includes: an explicitly stated learning intent; processes and resources that enable achievement and demonstration of the outcome; assessment criteria for determining completion of achievement and level of performance (p. 5). Thirdly, an outcome statement comprises an active verb, its object, and a contextual or conditional phrase. Fourthly, outcomes are either declarative and demonstrate knowledge, or performative and show skill/knowledge synthesis capabilities (p. 10). Fifthly, outcomes are categorised as either 'knowledge and understanding' or 'skills and other attributes', noting that 'knowledge and understanding are more difficult to express using learning outcomes than skills and other attributes' (p. 14).

Practices

Learning outcomes are results of learning that mainly derive from educational intentions or learning objectives, which clearly describe the learning content, the actions to be taken or performed, and how these will be assessed (Laurillard, 2002). Quality learning objectives clearly and explicitly specify both pedagogical approach and content, are accompanied by a flexible and responsive teaching attitude to diverse learning processes and styles, and assess authentic practice, which engages learner ownership (Harden, 2002). High-quality learning outcome achievement accompanies a more transferable and higher level of understanding of a subject (Prosser and Trigwell, 1999).

Good documentation of learning objectives is explicit about pedagogical strategies, ideals, and values, looks for learning processes rather than testing for content knowledge, accepts interdisciplinary work and diverse outcomes, and considers team as well as individual achievement (Salmon, 2000). Clear, explicit specification of personal, transferable subject outcomes is commensurate with quality of learning experience and learner success (Allan, 1996). The writing of learning outcomes must relate generically and specifically to the level of the programme or course, and achievement is assessed to be either complete, or not, but grades may provide feedback on the quality of work. Outcome statements constitute an active verb and its object in a contextual or conditional phrase and describe either declarative knowledge, or performative skill/knowledge synthesis capability, which are categorised as 'knowledge and understanding' or 'skills and other attributes' (Holmes, 2004, p. 14). Finally, detailed planning for learning outcomes can benefit from revisions of Bloom's (1956) cognitive taxonomy that afford access to more current, complex and complete knowledge of learning processes (Anderson *et al.*, 2001; Dettmer, 2006; Tomei, 2005).

Table L1-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Information on student achievement of learning outcomes is used to inform and support the current and future design and (re)development of courses, programmes and degrees.** Strategic planning of teaching and learning across the institution is used to determine new or modified objectives that are promulgated to courses, programmes and degrees.
4: Management	**Courses are regularly reviewed to ensure that staff are incorporating learning objectives in course design and delivery consistent with the expectations of the institutional policies, guidelines and standards.** **Performance of students against the expected outcomes measured using a variety of qualitative and quantitative metrics.** Information is collected on the extent to which courses are providing learning objectives that address the full range of cognitive outcomes appropriate to the course and students. Regular reviews of course learning objectives undertaken to ensure currency and effectiveness. E–learning design and (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Financial costs and benefits of delivering course learning objectives regularly assessed and reported on. Feedback collected regularly from students regarding the effectiveness of the course e-learning activities and tasks. Feedback collected regularly from staff regarding the effectiveness of the course e-learning activities and tasks.

Dimension	Practices
3: Definition	**Institutional policies require that a formal statement of learning objectives is part of all course documentation provided to students.** **Teaching staff are provided with training, guidelines and examples for developing learning objectives that address the full range of cognitive outcomes appropriate to the discipline, pedagogical approach and students.** **Training, templates, examples, standards and guidelines are provided on how to use learning objectives explicitly in the design and delivery of course learning activities and assessment in order to assist student learning.** Teaching staff are provided with training, guidelines and examples in assessing student outcomes and the extent to which learning objectives are being met. Insitutionally defined graduate attributes exist and are referenced in policy guiding course, programme and degree design, development and delivery. A researched evidence base of effective learning objectives and associated e-learning activities undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development.
2: Planning	**Statements of learning objectives are mandated in institutional templates for course summaries and documents such as course prospectuses or syllabi.** **E–learning design and (re)development activities reference the learning objectives and use them to determine the nature and relationship of content, activities and assessment used.** **E–learning design and (re)development activities reference the course learning objectives when selecting and implementing e-learning technologies and pedagogies.** Programme or degree planning and review processes consider the relationship between learning objectives of individual courses with those of the programme or degree as a whole. E–learning planning and review documentation explicitly refers to the learning objectives when assessing the course and making any decisions about the course structure, learning design and content. E–learning design and (re)development activities reference a researched evidence base of effective learning objectives and associated e-learning activities. E–learning design and (re)development activities formally link learning objectives and decisions regarding e-learning technologies and pedagogies with the institutional e-learning strategies and associated operational plans. Assistance in course design and (re)development is provided to staff engaging in course design and (re)development activities.
1: Delivery	**Learning objectives are provided explicitly in the formal descriptions of the course provided to students, including the summary versions provided prior to enrolment as well as within detailed course prospectuses or syllabi.** Learning objectives are linked explicitly throughout learning and assessment activities using consistent language. Learning objectives for individual courses or modules are explicitly linked to wider programme or degree objectives and institutional graduate attributes. Learning objectives are aimed at supporting student cognitive outcomes that go beyond recall and acquisition of knowledge. Course workload expectations and assessment tasks are consistent with the learning objectives.

Table L1-1: Descriptions of process practices by capability dimension

Process L2.

Students are provided with mechanisms for interaction with teaching staff and other students

Process Background

Interaction is key to effective learning, particularly when not engaged in face to face teaching (Anderson, 2003). A common criticism of e-learning is the isolation students suffer from and the need to provide effective communication channels. Interaction is a complex educational process that is particularly important for effective e-learning and which has complex meanings that must be defined to enable its effective practice (Anderson, 2003). Moore (1989) defines three types of interaction: learner-content, learner-instructor and, learner-learner. The latter is 'inter-learner interaction, between one learner and other learners, alone or in group settings, with or without the real-time presence of an instructor' (p. 4). Anderson and Elloumi (2004), working towards an online learning theory, offer a similar model of educational interactions between learner content and teacher that they categorise as 'student-teacher; student-student, student-content' (p. 53). They also include teacher-teacher, student-student, and content-content interactions, and all interactivity is situated in learner centred, knowledge centred, assessment centred, and community centred contexts (p. 35). For Hillman *et al*. (1994) interaction also involves a medium, and they propose a further learner-interface interaction category is required.

Vrasidas and McIssac (1999) provide some ideas on what this might involve. They discuss factors influencing online interactivity, which they identify as 'learner control, transactional distance…feedback, and social presence' (p. 24). Learner control is said to consist of: 'independence, power and support' (p. 24); with independence relating to freedom of choice; power relating to capabilities for engaging with learning; and support relating to resources that enable participation. Transactional distance (Moore, 1973) refers to the psychological and physical effects of teacher-learner geographic separation, which are influenced by structure – design of a course – (more structure increases transactional distance), and dialogue between teacher-learner (more dialogue decreases transactional distance). Feedback describes responses to students about their learning assignments and activities, and has direct effects on student satisfaction. And, social presence indicates how much a learner feels part of an online community (p. 24). Vrasidas and McIssac (1999) conclude: Firstly, that there is need for mandatory training in the conventions, etiquette, and operations of online conferencing systems, and that a survey of student capabilities would help to identify those most in need of support; secondly, that lack of prompt feedback to students discouraged and limited their online discussion participation: 'Unless students receive immediate feedback, they feel they are posting to the network without any response' (p. 33).

Salmon (2000) highlights the importance of interactivity, proposing a model of online teaching and learning, which characterises interactivity over five steps of learning. At stage one, access and motivation, interaction is minimal and focused on the learner resolving technical and operational issues and the teacher welcoming and encouraging the learner. Stage two, online socialisation, sees the sending and receiving of messages contribute to learners' familiarisation with the technical, cultural, and social environments. Stage three, information exchange, involves increased interaction with both people and course content, and in 'searching [and] personalizing software [for] facilitating tasks and supporting use of learning materials' (p. 26). Stage four, knowledge construction, is intensively interactive and engages teacher and learners in conferencing for facilitating collaborative learning processes. At stage five, development, interaction decreases as learners attend more to 'individual learning responsibilities, using links beyond closed conferences, and teaching/learning interaction focuses on supporting and responding activities (p. 26). Salmon observes that although the online environment, with its lack of visual cues, is 'new and potentially alien…for many participants', others find that it provides freedom, for expression, and from distractions (p. 28).

Picciano (2002) proposes that the relationship between learning outcomes and interaction is a 'complex pedagogical phenomenon in need of further study' (p. 33). He reports that 'research literature regarding the importance of interaction in education especially in Web-based distance learning is extensive' (p. 22). His work on the distinction between interaction and presence is cited by Garrison and Cleveland-Innes (2005) who note that 'simple interaction, absent of structure and leadership, is not enough' (p. 145).

Their research looks at relationships between approaches to learning (deep and surface) and interactivity. Citing studies on the relation between teaching presence and perceived learning they propose that learner – teacher interaction is stronger than learner – learner and that learning approaches 'provide a framework for understanding the complex web of relations between learning context and learning processes that result in particular outcomes for individual students' (p. 137). They demonstrate an interrelationship between learning approaches, interaction, and outcome quality that is affected by the 'confluence of social, cognitive, and teaching presence—that is, interaction among ideas, students, and the teacher [where] [t]eaching presence provides the structure (design) and leadership (facilitation/ direction) to establish social and cognitive presence (i.e., community of inquiry)' (p. 144). Referring to earlier work (Garrison and Anderson, 2003) on design, facilitation, and direction, they set out 'guidelines for creating and sustaining cognitive presence in an online educational environment' (p. 145). They call for more study of qualitative aspects of online interaction and identify 'reflective and collaborative properties of asynchronous, text-based online learning [as] well adapted to deep approaches to learning' (p. 145).

In discussing interaction and immediacy in online learning, Woods and Baker (2004) propose an alternative framework that adds proximity to the notions of presence and transactional distance. They define immediacy as behaviours that reduce perceptions of distance and foster a sense of closeness between people, and they add a learner–environment category to Moore's (1989) learner–content, learner–teacher, and learner–learner situations. Woods and Baker argue that interaction and immediacy are intertwined and comment that much of the research focus on interaction concerns its dyadic subjects and objects rather than its complex processes. There is a need, they say, for a more nuanced model to distinguish between dyadic (transactive) and more dynamic (interactive) communication. In their view transaction is a limited singular engagement for a specific need or purpose, whereas interaction is an ongoing plural engagement that exceeds a transaction. They conclude that there is need to distinguish between 'particular dyadic communication and…genuine interpersonal and contextual interaction…to improve the online educational experience'. The challenge here is to increase understandings of this more dynamic interpretation of interactivity.

Bouhnik and Marcus (2006) also follow the notion of four types of interaction: learner-content; learner-teacher; learner-learner; learner-system. They propose a model that envisions a content and system environment within which the teacher is situated at the peak of a learning pyramid which interconnects teacher-learner and learner-learner communication (p. 304). They note that all interactions are interrelated and 'intertwined with the course content' and comprise 'interconnected roads on the e-learning map' (pp. 303-4).

For Anderson and Elloumi (2004) the plurality of the many modes and styles of interactivity is a critical function of online learning that they see enhancing the learning experience (p. 55). Situating effective learning in learner centred, knowledge centred, assessment centred, and community centred contexts (p. 35), they propose three primary forms of interaction (student-teacher; student-student, student-content), but also include secondary teacher-teacher, student-student, and content-content interactions. They describe the latter as a new mode in which content interacts with information sources and afford other capabilities (p. 48). They argue that 'deep and meaningful learning' is achievable provided a high level of one of the three primary interaction forms is available (p. 54).

To summarise, interaction is a complex but key process for e-learning (Anderson, 2003) and understanding the complexity of interactivity is crucial for its effective practice (Moore, 1989). Three main vectors of interactivity are described: types, influences, and intensity. Interaction types include: learner-content, learner-instructor, learner-learner (Moore, 1989); a learner-interface type (Hillman *et al.*, 1994); and a learner-environment type (Woods and Baker, 2004). Influencing factors include learner control, transactional distance…feedback, and social presence (Vrasidas and McIsaac, 1999). Learner control being the independence, power and support available to the learner, transactional distance (Moore, 1973), concerning separation of teacher-learner interaction, or immediacy (Woods and Baker, 2004), and feedback being responses to students' work, which can affect satisfaction and performance. Salmon's (2000) five step model sees the intensity of learners' interactivity increase from obtaining access and motivation, through gaining online socialisation skills, to exchanging information, then intensifying in discussing knowledge, before decreasing with the learner awareness of individual responsibilities.

Discussions of learning community interactivity emphasise collaborative approaches to interaction that encourage deep learning (Garrison and Cleveland-Innes, 2005; Muirhead, 2004; Ng and Murphy, 2005; Picciano, 2002). Furthermore, a 'metaknowledge' can help interacting learners to generate new collaborative views of information, which 'rise above' (Scardamalia and Bereiter, 2003) previous understandings and open to 'idea improvement' through critical thinking (van Alst, 2006). Interaction types are interrelated and intertwine content to form 'interconnected roads on the e-learning map' (Bouhnik and Marcus, 2006). Interaction and immediacy also intertwine learner-environment interactivity, which fosters learners' perceptions of their close proximity to content, teaching, learning and other learners, in dynamic, plural, ongoing engagement (Woods and Baker, 2004).

Practices

In this process, evidence of the use of a variety of communication modes or channels and encouragement for students to engage with peers and teaching staff is used to determine capability. It is not sufficient that tools be provided, there must also be activities designed to encourage their use and support of effective engagement such as set out by Salmon (2000). Students should be provided with information on how to access and use different communication channels or modes. They should be given a clear explanation as to why the channels or modes have been included within the course and how they will assist in achieving the learning objectives of the course.

As with a traditional face-to-face class, it is the responsibility of the teaching staff to set the 'ground rules' and expectations for the communication undertaken in a particular course (Ramsden, 2003). Particularly, while many students are unfamiliar with e-learning, it is necessary for them to get clear information on how to use the communication channels effectively and appropriately (Palloff and Pratt, 2001; Harasim *et al.*, 1995). Communicating expectations early is also essential if staff workloads are to be managed (Waterhouse and Rogers, 2004).

Table L2-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Interaction between students and teaching staff has been measured with the results used to plan and resource particular forms of communication.** **Interaction between students and teaching staff has been measured with the results used to ensure that staff and students have received sufficient training and support**. Interaction between students and teaching staff has been measured with the results used to identify effective teaching and learning strategies for reuse when designing and (re)developing other courses. Interaction between students and teaching staff has been measured with the results used to inform strategic planning relating to future e-learning initiatives.
4: Management	**Measures are collected of student and staff use of different forms of interaction available in courses.** **Feedback collected regularly from students regarding the effectiveness of the different communication channels.** **Feedback collected regularly from staff regarding the effectiveness of the different communication channels.** Measures are collected of the impact the use of communication channels are having on student learning. Measures are collected of the timeliness and effectiveness aspects of the communication between staff and students. Regular reviews of student's experiences of the different channels conducted to ensure compliance with policies and standards. Financial costs and benefits of the different communication channels regularly assessed and reported on.

Dimension	Practices
3: Definition	**Policies and standards provide guidelines for staff responsiveness to student communication.** **Formal communication to all teaching staff of institutional expectations that they support student engagement through a mix of different types of interaction.** **Training provided to teaching staff on effective ways of using the different communication channels to support student learning.** **Examples and templates provided of ways in which different communication channels can be used to support student learning.** Standard communication channels are defined for use in all courses offered by the institution. Institutional policies describe expectations for appropriate use of standard communication channels by staff and students. A researched evidence base of effective e-learning communication and interaction examples and initiatives undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development.
2: Planning	**Course outlines and descriptions provided to students include descriptions of the range of communication channels that will be used in the course.** **Course outlines provide information to students on how the different channels will support their learning linked with course activities and assessments.** **Course designs or rationales include a structured interaction design incorporating a variety of communication channels.** Course outlines incorporate a formal requirement or expectation that students use communication channels during the course Course outlines provide information as to what uses are appropriate for the different channels. Course outlines include expectations about the purpose for which different communication channels are to used by staff and students. Plans for monitoring all of the channels used by the courses are in place in order to ensure that students are supported and motivated to engage appropriately. Course design and (re)development activities reference a researched evidence base of effective e-learning communication and interaction examples. Programme or degree planning and review processes consider the effectiveness of the interaction designs and communication channels in use by individual courses.
1: Delivery	**Courses provide alternative mechanisms for interaction between staff and students, including, but not limited to providing LMS tools such as discussion forums, face-to-face lectures and tutorials.** Email contact information is provided for teaching staff. Technical support information provided for the various communication channels in use. Information on how to use the communication channels for learning is provided. Introductory material provided within each communication channel to guide student use. Information on appropriate use of each communication channel is provided.

Table L2-1: Descriptions of process practices by capability dimension

Process L3.

Student skill development for e-learning is provided

Process Background

Students' capability for effective e-learning is related to their information, communication and technology (ICT) proficiency and skill level, thus there is a crucial need to assess, and understand the ICT proficiency and skill level, and support its development, for all students (Hillesheim, 1998). Given that e-learners experience difficulty adapting to online learning, and require guidance and support, the technology should be as functionally and psychologically transparent to the user as possible (Bouhnik and Marcus, 2006). Furthermore, Organisational and administrative support system infrastructures must be in place to develop and maintain effective, responsive, and complete online e-learning experiences for students (Ragan, 1999).

Calls for wide ranging support for technology skill development appear to be decreasing as a more techno-savvy generation enters higher education and institutional resourcing for e-learning support begins to improve. Results of a survey by Concannon *et al*., (2005) of 446 campus-based students found only 14 percent of students had very limited computer experience, yet there were no reports of difficulties with online systems. They attribute this user satisfaction to the system's 'inherent usability', which suggests 'generic computer training is not required…' (p. 506). However, constraints on students home-study circumstances, such as a need to share computer access and low bandwidth connections, need to be considered (Kirkwood and Price, 2005). Furthermore, there is an identifiable need to continue support for steadily increasing numbers of mature learners, who often lack the necessary technology skills and/or confidence to effectively undertake e-learning. Moreover, Hrabe *et al*., (2005) have observed that students who regard themselves as technically proficient may have formed habits that could impede their online learning.

In addition to the need for comprehensive support for technical skill development there is also a need to support and develop students' information and communication literacy skills and understandings of e-learning educational principles. Kirkwood and Price (2005) note that although ICT enables new forms of learning to occur, it does not ensure the achievement of effective and appropriate learning outcomes: 'It is not technologies, but educational purposes and pedagogy, that must provide the lead, with students understanding not only how to work with ICTs, but why it is of benefit for them to do so' (p. 257). Therefore, they contend that teachers and decision-makers must better understand ICT use issues to avoid innovations being technology driven. Use issues include not only technology characteristics but also 'pedagogic models and processes they serve; and…contexts within which learners engage with ICT' (p. 270).

As well as the practical difficulties involving access to and use of ICT, Kirkwood and Price list the following issues as most important: The influence of course design on novice learner experiences; ICT-based learning user competence levels are neither high nor wide-ranging, despite increased demand for access; familiarity with email use is not an indicator of online discussion and debating expertise; learners need to understand what is expected of them and why, and how their actions will benefit them; web-based materials and resources must be effective and appropriate for the learner and the medium; teachers and learners must understand the effects of, and distinguish between, asynchronous and synchronous modes of communication; effective use of resources needs to be embedded in the course pedagogy and linked to assessment. The most important factor in an educational programme is not the medium but how its pedagogical approach and resources are creatively and constructively aligned (p. 270). As Kirkwood and Price put it: 'The educational benefits that students perceive as gains from using ICT are more significant than the intrinsic characteristics of any particular medium' (p. 272). This view emphasises the dynamic interrelationship between learner motivation, expectations, understandings and experiences and the facilities, resources and support for them that are made available.

Communication processes that promote learning, rather than technology, are the research focus of Visser and Visser (2005). In the first of two exploratory studies they identified three needs areas: cognitive communication and support; affective, motivational support; and communication strategies to ensure

that students maintained involvement in the courses. The research demonstrated the need for more than traditional feedback and conventional encouragement and the quality of teacher communication and the content was found to be important. The second study explored communication issues more extensively and concluded that there were obvious and sometimes 'critical' communication shortcomings that fail to meet student expectations regarding 'the quality of the interaction and the degree of comfort and motivation provided' (p. 28). Suggestions are made to help address the shortcomings including: providing training and documentation; establishing student expectations and requirements; incorporating communication exercises in introductions to courses; ensuring communication media is used to interact meaningfully; use teaching approaches that are relevant and appropriate to e-learning; ensure that communication creates a shared experience, rather than shares an experience; use language to communicate collaboratively; use concrete elements to formatively assess quality/frequency of communication and students' perceptions of these (pp. 28-9).

Visser and Visser conclude that effective communication demands considerable attention to how, when, and what to communicate, and that interactive technologies have potential to increase interpersonal conversation and interactive participation in enriching learning processes and pleasurable experiences. However, this is mostly achieved by 'dedicated and caring' teachers who ensure that 'all available communication means are used effectively to increase the quality of the learning and teaching environment' (p. 29). Visser and Visser highlight the insight that student communication process capability development necessarily precedes technological skill development.

In order to attend to the 'personal and intimate nature of learning…to ensure success' Carmody and Benge (2005) propose an Existential Elements model that relates four e-learning methods – student-centred, subject-centred, teacher-centred, and teaching centred, to Salmon's (2000) five stage online learning model – access and motivation, online socialization, information exchange, knowledge construction and, development; and to Maslow's hierarchy of needs – physiological and safety needs, belongingness, love and esteem, understanding and aesthetics, self-actualization and, transcendence (Huitt, 2004). Carmody and Benge argue that effective online teaching engages all of six existential dimensions: physical, social, emotional, psychological, intellectual, and spiritual, and they present on several tables how these elements are compared to and characterised across Salmon's, Maslow's, and their own model, and in the four methods of online learning. Although they conclude that no one model is effective for all situations their study points to the student-centred approach as being more supportive of an environment for students to exercise independent initiative and resourcefulness for learning. The existential elements and other model attributes that relate to a student-centred approach include: flexibility towards physical engagement and encouragement to become familiar with the environment; encouragement to engage socially and emotionally by self-identification and personal statements of motivation or expectations; information exchange and discussion engages a psychological understanding; a social element is inherent; intellectual dimension is commensurate with fulfilling the students individual needs or expectations; a spiritual element engages all dimensions holistically for change and growth. Carmody and Benge caution that the student-centred approach may not be well-suited to some situations, such as work place environments where students are subject to mandatory requirements and less intrinsically motivated. In such situations they recommend a 'social discussion technique', which makes allowances for these limitations. This model affords an understanding of relationships between recognised learning methods and emerging dimensions of learning experience.

Drawing on Maslow's (1943) hierarchy of needs, listed above, and Smith and Ragan's (1999) instructional design principles – appeal, effectiveness, efficiency, Katy Xinquan Cao (2005) proposes a model that addresses student motivation and satisfies both needs and principles. The model identifies three levels of motivation in instruction – inclusion, entertainment, and edification. She discusses ten points for e-learning motivation: tone/climate, feedback, engagement, meaningfulness, choice, variety, curiosity, tension, peer interaction, and goal driven (Bonk and Dennen, in press), and cites Chickering and Gamson's (1987) seven principles of good practice to identify characteristics that support her model. She differentiates her model by emphasising the active-initiating role of the teacher to build interpersonal relations with learners, and to satisfy student needs. However, she cautions that the model is hierarchical and that inclusion and entertainment necessarily contribute to edification, without which there is little significance for

teaching-learning interaction. Inclusion involves the establishment of trusting individual teacher-learner relationships and good community spirit among learners. Entertainment describes an educational approach that encourages students to relax in order to better concentrate on the learning process. Edification, which has intellectual, moral, and spiritual domains, is defined as improved understanding leading to positive change in thinking and/or behaviour. Motivation towards intellectual edification looks for individual capacities, capabilities, and preferences for acquiring knowledge and skills. Motivation for moral and spiritual edification seeks to realise personal potential, or 'self-actualization' (p. 4). Cao's model is helpful for understanding approaches to motivating learners.

To summarise, there are two dimensions to the support of knowledge and skill development for e-learning: Technical knowledge and skills; and information and communication literacy skills, which include an understanding of e-learning educational principles (Kirkwood and Price, 2005) and motivation (Cao, 2005).

A student-centred learning method affords a supportive environment for independent initiative and resourcefulness for learning (Carmody and Berge, 2005). Motivation affecting skill development involves teachers building interpersonal relations with learners and the establishment of community spirit, and, inclusion, entertainment, and edification are factors that influence motivation. Inclusion concerns trusting teacher-learner relationships and good learning community spirit, entertainment encourages a relaxing environment that is more conducive to concentrated learning and, edification involves the cumulative effect of both factors to generate self-actualisation for individual learners(Cao, 2005).

Practices

Students' capability for effective e-learning is a combination of their skills as learners and their abilities to make effective use of the various information sources and technologies provided by institutions generally, and specifically in particular courses and programmes. Some degree of technical aptitude and experience can now be generally assumed although this does not mean that students are effective online learners (Hrabe *et al*., 2005). Care must be taken when designing the pedagogical elements of e-learning to ensure that students are provided with clear and explicit guidance of how the technologies should be used to support their learning. A strong constructive alignment of learning outcomes, technologies and pedagogies must be clear in the design and delivery of e-learning courses and programmes (Kirkwood and Price, 2005). Communication tools are a key aspect of engaging students provided that their use is focused in a way that generates shared experiences and effective connections between the students, the teaching staff and the course or programme domain (Visser and Visser, 2005).

Evidence of capability in this process is shown by clear communication to students of the pedagogical strategy of courses and programmes. The contribution of technological tools in assisting students in attaining the learning objectives of the course or programme should be clear. Students should be supported in understanding what is expected from them as learners and in gaining the necessary generic and specific learning skills, including attaining competency with the associated technologies. Teaching staff should be supported in developing their own skills as learning facilitators able to engage the students in effective learning built on a foundation of practice, demonstrated competency and guided reflection.

Table L3-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Information on the extent to which courses are providing learning activities that are progressively building student capabilities for learning is used to identify effective teaching and learning strategies for reuse when designing and (re)developing other courses.** Information on the extent to which courses are providing learning activities that are progressively building student capabilities for learning is used when designing and (re)developing courses and programmes. Performance of students as learners used to inform strategic planning relating to future e-learning initiatives. Information on the extent to which courses are providing learning activities that are progressively building student capabilities for learning is used to ensure that staff and students have received sufficient training and support.
4: Management	**Courses are regularly reviewed to ensure that staff are incorporating learning activities that are progressively building student capabilities consistent with the expectations of the institutional policies, guidelines and standards.** **Feedback collected regularly from students regarding the effectiveness of the support facilities.** **Feedback collected regularly from staff regarding the effectiveness of the support facilities.** Performance of students as learners measured regularly using a variety of qualitative and quantitative metrics. Student use of support facilities is measured and reported on regularly. The impact the use of support facilities are having on student learning outcomes is measured and reported on regularly. Regular reviews of student's experiences of the support facilities conducted to ensure compliance with policies and standards. Financial costs and benefits of support facilities regularly assessed and reported on.
3: Definition	**Institutional policies require that assessment tasks be designed to support incremental development of student skills and capabilities for learning.** **Teaching staff are provided with training, guidelines and examples for developing learning activities and assessment tasks that support incremental development of student skills and capabilities for learning.** Teaching staff are provided with training, guidelines and examples in assessing student's capabilities for learning. Teaching staff are provided with training, templates, examples, standards and guidelines on how to use a variety of effective strategies when building student capabilities to learn. Insitutionally defined policies, standards and guidelines describe available student support for learning.
2: Planning	**Support staff appointed and tasked with providing students assistance in their learning.** **Assessments of individual student capabilities undertaken early in the course and used to guide activities and support during the remainder fo the course.** Learning activities and assessment tasks designed to build and develop skills and understanding rather than knowledge acquisition and recall. Course outlines provide students with an explicit description of the pedagogical approach being used.
1: Delivery	**Relationships between the individual components and activities within the courses are made explicit to students.** **Opportunities for student practice with e-learning technologies and pedagogies built into course design and activities.** Contact information provided to students for access to support through a variety of communication channels, formats and facilities aimed at addressing learning issues. Opportunities for substantive feedback on student's individual performances built into course design and activities.

Table L3-1: Descriptions of process practices by capability dimension

Process L4.

Information provided on the type and timeliness of staff responses to communications students can expect

Process Background

Effective management of student expectations regarding the means and manner of teaching staff responses to communications from learners is an essential factor for perceptions of quality in distance education courses (Ortiz-Rodriguez *et al*., 2005). Responsiveness is defined by Blignault and Trollip (2003) as the number of teacher to student responses about a specific discussion question, and timeliness is the time taken to make a response (p. 166). Response time, however, is conditional and dependent on whether a response is needed and/or purposely delayed for the benefit of other participants. In proposing a taxonomy of faculty responses for online discussion environments, they set out six categories: Administrative (no academic content); affective (no academic content); other (no academic content); corrective (with academic content); informative (with academic content); Socratic (with academic content) (p. 157). Although a survey of responses found high variability between teachers and across the categories, the taxonomy provides a useful insight into the types of responses that need to be managed for e-learning. Dillon and Greene (2003) discuss a problematic aspect of responsiveness – the absence of information about how the student reacts to the teacher's response – and suggest that a high level of feedback, intended to stimulate the learner, may be interpreted as criticism (p. 241).

Student satisfaction with e-learning environments affects not only learner outcomes, but also retention rates. Teacher availability and response time is an important predictor of student satisfaction, participation, and motivation, therefore regular, timely feedback is necessary to avoid student frustration (Bolliger and Martindale, 2004).

Busch and Johnson (2005) report on teachers making a transition to online instruction affords several insights into the complexities inherent in responses to student communications. For example, they report on their subjects' realisations that written instructions without verbal explanations can be misinterpreted and questions that would be resolved for all students with verbal answers required further, often individual, clarification that demanded great care to avoid further and escalating confusion. They also report that 'the start-up communication for the course took hours and required volumes of informational emails to students. The start-up time for the students was equally intense, and at least 1 to 2 weeks of instruction were sacrificed in allowing students to access the online program and discover the hardware requirements necessary to effectively participate' (p. 32). Busch and Johnson conclude that careful preparation and thoughtful management of communication is required to meet the complex needs of the e-learning environment.

The online environment demands flexibility in managing interpersonal communications. This requires planning to maximise the effectiveness of interactions and consideration of alternatives in the event of excessive time constraints (Anderson, 2003, p. 134) Teachers' expertise in, and effective management of, interaction with students is vital for other types of interaction that happen in a learning content-system environment (Bouhnik and Marcus, 2006). Bouhnik and Marcus propose a model of interactivity, which they characterise as 'interconnected roads on the e-learning map' (p. 304). The teacher's role is to guide students towards successfully negotiating and exploring all paths for interactivity.

According to Ortiz-Rodriguez *et al*., (2005), 'effective communication, giving and receiving feedback, and providing extended interaction' are main factors in quality distance education (p. 99). Their research reported students' comments that quality communication comprises timely teacher feedback and effective use of messaging and discussion tools (p. 101). Students identified feedback as the most essential factor affecting quality, and emphasised the importance of receiving timely feedback to questions and prompt attention to assignments. One student described the increased anxiety resulting from extremely slow responses, and another commented that feedback provided assurance about learning being 'on the right path' (p. 102). Frequency of email communication was also identified as important for successful communication. Ortiz-Rodriguez *et al*. conclude that adequate and timely teacher-learner feedback increases and enhances the quality of communication for e-learning. They recommend that institutions provide communication tools

training, strong technical support, and the facilitation of effective communication skills and methods (p. 103).

The preparation and presentation of e-learning communication policy statements that articulate what teachers expect from learners and what learners can expect from teachers, significantly improves e-learning course management (Waterhouse and Rogers, 2004, p. 28). Acknowledging that an e-learning environment can be problematic for timely teacher-learner responses, Waterhouse and Rogers recommend anticipating students' needs by posting comprehensive policy statements. They discuss nine policy categories: Course syllabus; privacy; email; discussion groups; software standards; assignments; technical help; code of conduct; intellectual property (pp. 28-9). Under the email category they observe that teachers overwhelmed by student emails have difficulty managing their course. They recommend a policy statement that introduces its rationale, details the types of email you will and will not be responded to, and that sets the timeframe for responses. The statement also reminds students of their obligations to regularly check for emails, postings, and notices (p. 30).

Finally, Dennen (2005) describes two methods of communicating expectations of responsiveness: by making explicit statements; and by modelling appropriate interactive discussion and response practices to demonstrate how these will operate and their timeliness. Dennen reports that where guidelines were unclear 'student participation floundered. Students did not know how much they were to contribute or what their messages should look like. As a result, their use of discussion areas gravitated toward seeking help on their other assignments' (p. 139).

Practices

Responsive and timely teacher-learner communications significantly effect positive learning experiences and outcomes (Blignault and Trollip, 2003; Bolliger and Martindale, 2004). Effective interactive communication requires careful planning and thoughtful management to ensure responses meet student expectations and are unambiguous (Busch and Johnson, 2005). To this end, a taxonomy of response types (Blignault and Trollip (2003) is useful for engaging with the complex needs of the e-learning environment. Training in the use of communication tools and strong technical support are also necessary (Ortiz-Rodriguez *et al.*, 2005). Furthermore, concise policy statements, setting out what is expected of learners and what they expect of teachers, improves course management (Waterhouse and Rogers, 2004). And, Dennen (2005) reports teacher modelling of appropriate online responses and discussions is another method of communicating effective practices that has the additional benefit of demonstrating the communications process.

Evidence of capability in this process is shown by clear commitments to provide feedback and responses within a designated time period. This may include formal processes for how the different channels are used and a description of how teaching staff will respond on these channels (if at all). A clear design is apparent in the selection of the range of channels and the integration with course activities and the information provided to students on type and timliness of responses is consistent with that design. Performance is monitored in order to ensure that the commitments being made are adhered to and resourced appropriately.

Table L4-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**The type and timeliness of interaction between students and teaching staff used to ensure that staff and students have received sufficient training and support.** **The type and timeliness of interaction between students and teaching staff used to identify effective communication strategies for reuse when designing and (re)developing other courses.** The type and timeliness of interaction between students and teaching staff used to plan and resource particular forms of communication. The type and timeliness of interaction between students and teaching staff used to inform strategic planning relating to future e-learning initiatives.
4: Management	**Measures are collected of the timeliness and effectiveness aspects of the communication between staff and students.** **Feedback collected regularly from students regarding the effectiveness of the communication channels and staff responses.** **Feedback collected regularly from staff regarding the effectiveness of the communication channels.** Regular reviews of student's experiences of the different communication channels conducted to ensure compliance with policies and standards regarding type and timeliness of staff responses. Reports generated about usage of different communication channels by students and the timeliness and effectiveness of staff responses on those channels. Financial costs and benefits of the staff use of different communication channels regularly assessed and reported on.
3: Definition	**Policies and standards provide guidelines and minimum expectations for staff responsiveness to student communication.** **Training provided to teaching staff on how different communication channels can be used by staff to engage in effective and timely communication with students.** **Guidelines and support materials provided to students to assist them in making effective use of staff feedback and responses through the communication channels in their learning.** Examples and templates provided of ways in which different communication channels can be used by staff to engage in effective and timely communication with students. Policies and standards are provided that prescribe staff and student conduct while using the communication channels. Policies and standards are provided that define and protect the privacy of staff and student information provided and collected through the communication channels. Policies and standards are provided that ensure intellectual property laws, licences and individual staff and student rights are observed during course use of the communication channels.
2: Planning	**Plans for monitoring all of the channels are in place in order to ensure that students are appropriately responded to in a timely manner.** **Course designs or rationales include a structured interaction design incorporating the available communication channels which defines how each channel is to be used.** **Assessment tasks and communication channels are linked explicitly in the task descriptions and supporting materials.** Teaching staff provide virtual 'office hours' to students in the course outline. Course outlines incorporate a formal requirement or expectation that students use communication channels in order to accomplish specified activities or tasks and achieve defined learning objectives.
1: Delivery	**Course outlines provide expected response times students can expect from staff when using the communication channels provided in the course.** **Course outlines provide information as to what uses are appropriate for the different communication channels.** Course outlines provide information as to what type of response staff will provide on different communication channels.

Table L4-1: Descriptions of process practices by capability dimension

Process L5.

Students receive feedback on their performance within courses

Process Background

Feedback comprises formal and informal responses to learners' actions from teachers and from other students. It allows actual performance to be compared with a specified standard of performance (Mory, 2004). Timely, constructive feedback can significantly affect a student's participation, performance and engagement on a course, and the subsequent learning outcomes (Laurillard, 2002). Optimal feedback seeks a balance between student needs and teaching management (Dennen, 2005), and must enhance understanding rather than just indicating correctness (Garrison, 1989). Despite the intent to be constructive, feedback can also be critical, and can have adverse effects unless skills in using feedback are appropriately cultivated (Hudson, 2002). Feedback is an interactive process involving knowledge and skills that must be understood by both teachers and learners (Duhon *et al.*, 2006), and involving numerous models that centre around a 'feedback triad' (Kulhavey and Wagner, 1993). Feedback specificity (Goodman and Wood, 2004) is also an issue with complex effects, which benefits good performers, but not poor performers. The implications of feedback-seeking behaviours that can arise in the notion of *kiasu* are discussed by Hwang and Arbaugh (2006).

Mory's (2004) comprehensive review of feedback in an educational context offers various definitions and identifies a wide range of models. Definitions of feedback, drawing on Kulhavey and Wagner's (2003) 'feedback triad' include notions of: motivation – to improve performance; reinforcement – to correct responses; and information – to reduce errors (Mory, 2004). Drawing distinctions between objectivist and constructivist epistemological assumptions and feedback uses, and, citing Butler and Winne (1995), Mory identifies a 'synthesis model of feedback with self-regulated learning' (p. 773). She views the model as having the potential to not only bridge the gap between differing educational approaches, but to also synthesise intrinsic and extrinsic feedback in self-regulated learning that is suited to e-learning practices and principles.

Without feedback, action is largely unproductive for learning. Therefore receiving and using feedback is very important for learners, according to Laurillard (2002), who proposes that intrinsic feedback is a 'natural consequence' of action, and extrinsic feedback is an 'external comment' upon it, which is not necessarily meaningful or helpful (pp. 55-6). Extrinsic feedback is distinguished by not being situated in the action, and, because it involves a description, it is open to misinterpretation without continuing interaction (p. 56): 'To use feedback students must be able to make sense of it. The teacher has to devise situated actions that elicit meaningful intrinsic feedback for the student, or redescribe the student's description in a way that gives meaningful extrinsic feedback to the student' (p.58). Laurillard identifies a unity between action, feedback, and integration that is prefigured by a learning goal, or outcome. Only by understanding the relationship between these factors can a learner reflect on what links them for new learning (p. 58).

Reporting on research into factors that affect online learning participation, Dennen (2005) found that a high level of student dialogue occurred when teachers provided substantive and timely feedback student (p. 139). Discussing the question of optimal feedback, which seeks to balance the demands of student needs against the pressures of teaching management, she observes that 'lurking' has an effect on the quality of discussion: 'if lurking is acceptable, then feedback in many ways becomes a non-issue. If quality discussion is expected, however…students are going to need some marker of their success or progress' (p. 146). Respondents also noted that, rather than extensive individual teacher responses, general feedback comments to all students were often sufficient.

Adverse effect of critique as a constituent of constructive feedback is discussed by Hudson (2002), who comments that because the online environment intensifies the effects of criticism, there is a need to 'protect the online psyche' (p. 58). Using the analogy of 'candlepower' to characterise a more subtle intimacy that arises in online dialogue 'like a face seen across a candlelit table' (p. 77), Hudson proposes that critical dialogue needs to be cultivated rather than managed, to draw out the subtexts that the online medium successfully conveys (p. 59). He suggests that critical dialogue 'is a form of storytelling—a paced unfolding narrative in a somewhat mysterious process that defies normal logic but leads to a satisfying surprise' (p. 85)

An experiential exercise in feedback to enhance student skills (Duhon et al., 2006), although conducted face-to-face, points to helpful information that is applicable for online strategies. The authors identify the importance of understanding differences between, and appropriate uses of constructive, positive, and negative feedback types, and comment on some people's impulsive resistance to positive feedback (pp. 142-3). They recommend inviting student responses to the teaching and caution against reacting defensively, instead, they advise the teacher to express appreciation and to offer a summary of their understanding of the feedback received. In concluding, they comment that effective feedback knowledge and skills derive from 'actual experience and…[the teacher's] modeling behavior' (p. 144).

The impact of feedback specificity on learning opportunities is discussed by Goodman and Wood (2004), who report that although specificity can benefit immediate performance, it can also undermine learning related to independent performance. Their findings indicate that the effects of feedback on learning are contextual and conditional. For example, whereas more specific feedback benefits learning responses in those who perform well, it is detrimental to learning responses in those who perform poorly. They conclude that 'those who receive feedback of varying specificity learn different things, through different means. Simple notions about feedback being beneficial or detrimental to learning need to be augmented by more complex models' that recognise different task aspects. They suggest future research should explore how rules of responding to poor performance are learned and 'differences in learning processes for good versus poor performance' (p. 820).

Practices

Evidence of capability in this process is seen through the use of informal feedback through various communication channels complemented by formal assessment feedback processes such as marking rubrics. Policy should require prompt and useful feedback aimed at improving student capability in related tasks rather than just the immediate goal and teaching staff should be provided with guidelines and assistance in the provision of more effective feedback.

Feedback that learners' receive from teachers and from other students enables comparison of actual performance with expectations (Mory, 2004). Timely, constructive feedback affects students' participation, performance, and engagement on a course, and learning outcomes (Laurillard, 2002). Optimal feedback looks for balance between student needs and teaching management (Dennen, 2005), and must enhance understanding rather than just indicating correctness (Garrison, 1989). Feedback links knowledge and skills for understanding (Duhon *et al*., 2006). It involves numerous models that centre on a 'feedback triad' (Kulhavey and Wagner, 1993) of motivation, reinforcement, and information (Mory, 2004). Because feedback and action link to productive learning, extrinsic and intrinsic feedback is crucial for learners (Laurillard, 2002). A learning goal, or outcome, also prefigures unity between action, feedback and integration (Laurillard, 2002). Substantive and timely feedback improves online learning participation (Dennen, 2005). However, feedback also involves complex effects including: 'candlepower' (Hudson, 2002), which characterises the subtle intimacy that arises in online dialogue and concerns effects of critical dialogue; and 'feedback specificity'. Although more specific feedback benefits learning responses in those who perform well, it is detrimental to learning responses in those who perform poorly (Goodman and Wood, 2004). *Kiasu* (a predominantly Asian attitude to diligent academic performance) has both positive (diligence to outperform others) and negative (diligence to prevent/hinder others outperforming) forms that impact on e-learning feedback practices (Hwang and Arbaugh, 2006).

Table L5-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Student satisfaction with feedback and measures of feedback types and quality are used to ensure that staff and students have received sufficient training and support.** **Student satisfaction with feedback and measures of feedback types and quality are used to identify effective teaching and learning strategies for reuse when designing and (re)developing other courses.** Student satisfaction with feedback and measures of feedback types and quality are used to determine ongoing resourcing and training requirements for staff and courses. Student satisfaction with feedback and measures of feedback types and quality are used when designing and (re)developing courses. Student satisfaction with feedback and measures of feedback types and quality are used to plan and resource particular forms of communication. Student satisfaction with feedback and measures of feedback types and quality are used to inform strategic planning relating to future e-learning initiatives.
4: Management	**Measures are collected of the extent to which feedback is delivered in response to student work.** **Feedback collected regularly from students regarding the effectiveness of the feedback provided.** **Feedback collected regularly from staff regarding the effectiveness of the mechanisms and support for providing student feedback.** Measures are collected of the use of formative assessment techniques. Compliance with institutional expectations for the quality and type of feedback reviewed regularly. Financial costs and benefits of feedback regularly assessed and reported on.
3: Definition	**Institutional expectations for the quality and type of feedback to be provided to students are formally defined and communicated to staff.** **Guidelines, examples templates and training provided to teaching staff on how to use feedback to improve student learning.** **Guidelines and support materials provided to students to assist their making effective use of staff feedback in their learning.** Guidelines and training provided to teaching staff on how to use formative as well as summative assessment.
2: Planning	**Course designs or rationales include a structured feedback design incorporating the available communication channels.** **Staged assessment tasks are used with opportunities for feedback and reflection provided in a structured way.** Course outlines provide information to students on the timeliness, type and extent of feedback they can expect from teaching staff. Assessment marking rubrics with spaces explicitly provided for formative feedback are used and provided to students in advance.
1: Delivery	**Individual courses have mechanisms for students to be provided with feedback beyond the marks assigned for assessed work.** Students are provided with feedback which addresses motivation. Students are provided with feedback which reinforces learning. Students are provided with feedback which corrects errors and supplies information in context. A variety of communication channels used to provide in-depth and contextual feedback.

Table L5-1: Descriptions of process practices by capability dimension

Process L6.

Research and information literacy skills development by students is explicitly supported

Process Background

Information and communication technology (ICT) has revolutionised the meaning of literacy and research. ICT has not only changed ways and means of accessing and using information, it is changing how information is understood. Information literacy, alone, is insufficient, information competency is now required. Learners must think critically and coherently about finding, evaluating, using, and managing information: 'As information resources and the tools to find them grow and increase in complexity so, too, do the means by which we help our students understand how to find and use them effectively' (Goetsch and Kaufman, 1998, p. 162).

According to McKnight (2003), information support services are playing an increasing partnership role in online teaching and learning to ensure explicit curriculum content is well-resourced, and that students are properly supported (p. 380). Observing that reader education and information literacy instruction has long been a function of libraries, she characterises the role of librarian changing from a 'custodian of books to being a true partner in learning and teaching' (p. 381). In concluding that differences between curriculum materials and supporting information resources are unnoticed by students, McKnight foresees librarians as members of a collaborative multidisciplinary team 'creating new learning resources and environments for the seamless delivery of the curriculum and support materials' (p. 384). Reiterating the collaborative partnership view of library media specialists contribution to learning, Neuman (2004) emphasises the links inherent to information use and learning, which point to the significance of information literacy for furthering understandings of student achievement (p. 517). Porter (2005) and Liber (2005) both discuss the specialised expertise that library and information service personnel can collaboratively contribute to learning process and partnerships.

The popularity of common Internet search engines is both seductive and deceptive for students, according to Scott and O'Sullivan (2005). The problem, they say, is not access to information but efficiently and effectively finding specific and suitable information. Further, they comment on the difficulty students have in defining the information they are seeking and they point to the need for better understanding of 'hypertext literacy'. Citing their earlier work (Scott and O'Sullivan, 2002) they propose that the Internet creates a 'cognitive divide' between those who can and cannot navigate and negotiate hypertext and hypermedia. The authors conducted a hypertext evaluation action research study that required students to navigate a specified Internet site, to locate a particular piece of information, and, by addressing a series of questions, to describe their experience in doing this task. The study found that most students experienced difficulties and had little understanding of systems or strategies for searching, and relied on a basic keywords phrase tactic. They conclude that their study 'highlights the critical need to incorporate exercises and instruction in navigating this hypertext environment' (p. 24). However, they also emphasise the importance of students understanding that the Internet is only one information retrieval tool in a suite of many that are needed to avoid underutilising and misusing information.

Referring to the most cited definition of information literacy, 'To be information literate, a person must be able to recognise when information is needed and have the ability to locate, evaluate, and use effectively the needed information' (American Library Association Presidential Committee on Information Literacy, 1989), Johnston and Webber (2003) note the emphasis on integrating personal abilities for recognising, locating, and evaluating, which distinguishes literacy capability from information searching or finding skills (p. 337). They propose that information literacy education requires more than a surface learning approach, rather, they suggest that 'a framework for information literacy education through a student's career is needed' (p. 347).

Citing Webber and Johnston's (2000) view that the lack of a student perspective in information literacy teaching results in inappropriate pedagogy, Maybee (2006) argues for the adoption of a user-centred approach that 'reflects the complexities inherent in the current information environment' (p. 79). Maybee focuses on a relational approach to learning (Ramsden, 1988), which better allows for complexity than other approaches. He concludes that relational learning that embeds information literacy values helps

students to increase their ability to conceptualise increasingly complex ways to use and understand information more deeply and comprehensively (p. 84).

To summarise, what becomes evident from the literature is a raft of issues that reflect the complex relationships involved. These issues include the notions that: critical thinking is integral to information literacy with effective note-taking, for example web-based, being a factor in bringing these together; the librarian's role is becoming increasingly proactive in regard to online teaching and learning and, as such, contributes significantly to student achievement; students need to be taught information literacy skills within any given discipline to be able to access appropriate information and to make meaning from that information – such information literacy education must be ongoing; and a relational approach (Ramsden, 1988) to e-learning is the most appropriate pedagogically because it is user-centred and produces deeper learning.

Practices

Evidence of capability in this process is seen through the provision of resources on conducting research, resources on finding content and other information via links to suitable databases, instructions on where to find suitable books and support materials provided by groups such as libraries on information literacy skills. Development of skills in identifying useful materials and more general research skills should also be reflected in the assessment tasks of a course and the associated marking and feedback rubrics. Information literacy and research skill development should be reflected in the learning objectives either implicitly or explicitly. Teaching staff are provided with templates, examples, training and support in using the range of information resources available to support student learning. Explicit guidance and support should be provided to staff and students with policies and examples on intellectual property aspects, particularly copyright and plagiarism.

Table L6-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Measures of the ability of students to conduct research, access and assess content resources are used to determine standards for course design as well as resourcing for support facilities.** **Information on the effectiveness of information resources and tools is used when designing and (re)developing courses and programmes.** Measurements of when students access information resources and tools are used to plan and resource the hours of operation of the information facilities and their support. Effectiveness of information resources and tools is used to inform planning relating to future e-learning initiatives.
4: Management	**Measures of students' abilities to conduct effective research collected and reported on regularly.** **Feedback collected regularly from students regarding the effectiveness of the information literacy and research resources and services provided.** **Feedback collected regularly from staff regarding the effectiveness of the information literacy and research resources and services provided to students.** Measures of student ability to access content resources effectively are collected and reported on regularly. Measures of the use of information resources and tools collected and reported on regularly. Financial costs and benefits of information literacy and research resources and services regularly assessed and reported on.
3: Definition	**Institutionally defined standards for student research skills and information literacy are available and supported through groups such as the library.** **Teaching staff are provided with training, guidelines and examples on how to use library services to support student research and information literacy development.** **Standard bibliography and citation formats defined and made available for use by students and staff along with examples and training in their use provided.** Teaching staff provided with training, guidelines and examples on how to support students using information resources appropriately to avoid plagiarism and violations of intellectual property. Formal institutional policies require that students have course work on conducting research throughout their studies. Standards are defined for how course content and resources are stored and made available to students with consistent methods of access and support. Templates and examples provided that illustrate how to link course learning outcomes explicitly to the range of information resources provided. Templates provided for use in course materials describing how to use the range of technologies available to locate and make use of information resources. A researched evidence base of e-learning projects and initiatives undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development.

Dimension	Practices
2: Planning	**Information literacy and research skills development sessions or tutorials organised and provided to all students as part of the course.** **Assessment task marking rubrics include aspects that relate to the quality of research and information use undertaken by students.** Designated library staff contact information supplied to students in the course outline. Summaries of useful library resources provided on a course or discipline basis. E–learning design and (re)development activities reference a researched evidence base. Course outlines include policies and guidance for students on intellectual property and plagiarism issues. Systems provided for automatic detection of plagiarism and collusion.
1: Delivery	**Detailed instructions are provided to students on the range of information sources available, and how they should be used to assist in attaining the learning outcomes.** Students provided with instructions on where and how to get assistance on research methods. Students are provided with instructions on where and how to access course content and resources. Students are provided with lists of starting points for their own research and information collection activities rather than pre-defined and complete reading lists.

Table L6-1: Descriptions of process practices by capability dimension

Process L7.

Learning designs and activities result in active engagement by students

Process Background

The nub of the idea of engaging 'active learning', which features in the CanREGS (Barker, 2002) and Chickering and Gamson's (1987) Seven Principles, concerns learning with and through experiencing. This notion can be traced back to Chickering's (1976) contributions to experiential learning, which he defined as 'learning that occurs when changes in judgments, feelings, knowledge, or skills result for a particular person from living through an event or events' (p. 63). He elaborates that such learning may result from a lecture, but would do so from the experience rather than the content of the lecture. It may also result from 'an encounter group or an exam, discussion or demonstration, work or play, travel or sitting on a stump' (p. 63). However, he also identifies some challenges for experiential learning, which require teachers to have clear understandings about the outcomes of their programme, their teaching approach, and students' motives and learning styles. 'When such concepts are clear, learning setting pertinent to particular purposes can be identified or created, activities to foster desired outcomes can be specified, and evidence of progress can be recognized' (p. 63). Chickering's main theme of developmental change as a major outcome (of experiential learning) also draws in notions of interdisciplinary studies as helpful for concretizing abstractions. For example, the success of laboratory experiences and experiments for science education, and the extension of such participatory activities to other disciplines: 'The best approach lies in relatively simple modifications of activities and areas of study already underway that can trigger changes in judgments and feelings as well as knowledge through significant events and experiences' (p. 107).

Twenty years later, Chickering and Ehrmann's (1996) 'principle' of active learning techniques in a technological context rehearses much of Chickering's original thinking. In articulating Principle Three *Good Practice Uses Active Learning Techniques*, they emphasise that learning is not passive. Rather, students must be actively engaged in vocalising and writing about their learning, integrate past experiences, and apply it to their daily lives: 'They must make what they learn part of themselves' (p. 4).

However, Chickering and Ehrmann update experiential learning to take account of assistive technologies, which they categorise into three areas, namely 'tools and resources for learning by doing, time-delayed exchange, and real-time conversation' (p. 4), all of which are being increasingly supported by the development of integrated, extended purpose software, or worldware (for example, CleverPHL (Schroeder and Spannagel, 2006)). They also update the earlier notions of apprentice-like participatory learning experiences by relating these to newer technology. The examples include activities that not only use technology, such as computing and statistical research, but also activities where technology can simulate environments that may be risky or inaccessible, or that can 'visualise' invisible effects such as electromagnetism.

Recent research shows support for the positive effects of active learning experiences. In a survey of graduates perceptions of the development of a range of capabilities during their period of study, Kember and Leung (2005) observed that part time students perceived higher gains in capability than did full time students (p. 155). Further investigation showed that teaching approaches engaging active student involvement and understanding had greatest effect, which leads them to suggest that graduate capability development ensues from active learning approaches. They concluded that didactic teaching appears to be less effective for learning than teaching and learning that actively engages students (p. 167).

Vonderwell and Turner (2005) are similarly emphatic about active learning, teaching practices, and environments. They argue that the findings of their case study of online learners' experiences 'imply that the online learning/teaching environment requires reconstruction of student and instructor roles, relationships and practices' (p. 65). Citing Simons (1997), they discuss active learning as involving two concepts, one concerned with learning, the other with thinking. The first involves learner decisions about their learning approach, the second refers to intellectual challenges the learner encounters. Vonderwell and Turner use active learning to mean 'learner engagement and involvement with the instructional content and learning processes such as thinking, questioning, reflection, metacognition, collaborative, and cooperative activities' (p. 67). Referring to the theoretical framework of their study they cite Grabinger

and Dunlap's (2000) Rich Environment for Active Learning (REAL) and its aggregating five attributes of 'student responsibility and initiative, generative learning activities, authentic learning contexts, authentic assessment strategies, and cooperative support' (p. 67). From their study, Vonderwell and Turner conclude that learners need to be prepared for an active learning role that requires not only understanding the importance of autonomy but also how to work collaboratively. Teachers also need to be thoroughly conversant with research and theory that grounds the individual and group dynamics and interactions that they facilitate. Finally, Vonderwell and Turner refer to a raft of strategies and activities that can be integrated into learning and teaching to support the reconstruction they call for.

An often cited summary characterising active learning (Bonwell and Eison, 1991) proposes that 'strategies promoting active learning be defined as instructional activities involving students doing things and thinking about what they are doing' (¶ 2). Bonwell and Eison comment that although research studies demonstrate that active learning is comparable to lectures in promoting content mastery, it develops superior thinking/writing skills. Adding that 'some cognitive research has shown that…individuals have learning styles best served by pedagogical techniques other than lecturing. Therefore, a thoughtful and scholarly approach to skilful teaching requires that faculty become knowledgeable about the many ways strategies promoting active learning have been successfully used across the disciplines' (¶ 3). They summarise various strategies that demonstrate active learning principles and observe that the literature provides teachers with a wide variety of applicable alternative learning approaches (¶ 6). However, Bonwell and Eison also note that the approach involves risk factors: 'that students will not participate, use higher-order thinking, or learn sufficient content, that faculty members will feel a loss of control, lack of necessary skills, or be criticized for teaching in unorthodox ways' (¶ 9). They counter that each of these can be overcome with diligent planning. They call for a wider recognition of this approach both in terms of its resources and in rewarding its incorporation in practice. They also call for more research, particularly empirical studies that consider student characteristics such as gender, learning diversity, and cognitive development. Finally, they lament the fragmentation and lack of coherence in the literature and resources that inhibits the goal of interactive classrooms, but they look optimistically to more coordinated future efforts (¶ 14).

Practices

Student learning success is significantly affected by the creation of an e-learning environment that provides active engagement in experiential contexts. This requires teachers to clearly understand programme outcomes, teaching approach, students' motivation and learning styles, all of which depends on diligent planning. Also, students need to be able to link their learning to their life experiences. Technology plays a significant role in this and requires that the online teaching/learning environment undergo a reconstruction of student and teacher roles, relationships and strategies – students need to become active players in their own learning in regard to learning approach and intellectual challenges (Grabinger and Dunlap, 2000). Teachers need to be conversant with current research and theory and familiar with the complexities of human interactions with ICT, so that as users they are not detached from students. Teachers and learners need to be cognisant of their embodiment in technology relations that integrates knowing acting and being. Such embodied knowing opens understandings of the mind-body/machine nexus (Dall'Alba and Barnacle, 2005).

Evidence of capability in this process is seen through course and programme designs that provide students with authentic and personally relevant contexts for their learning. E-learning technologies and pedagogies should be flexibly designed so as to allow incorporation of student experience and knowledge. Analysis and reflection should be encouraged and practised rather than recall and information retrieval. Teaching staff should be supported in developing the skills needed to facilitate e-learning approaches that build engagement through active learning pedagogies rather than replicating passive, traditional learning environments.

Table L7-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Information on the extent to which courses are providing learning activities that are actively engaging students is used when designing and (re)developing current and future courses and programmes.** **Active engagement of students as learners used to inform strategic planning relating to future e-learning initiatives.**
4: Management	**Courses are regularly reviewed to ensure that staff are incorporating learning activities that are actively engaging students consistent with the expectations of the institutional policies, guidelines and standards.** **Feedback collected regularly from students regarding the effectiveness of the e-learning activities and tasks.** **Feedback collected regularly from staff regarding the effectiveness of the e-learning activities and tasks.** Engagement of students as learners measured regularly using a variety of qualitative and quantitative metrics. Regular reviews of student's experiences of the courses conducted to ensure they are engaging actively with their learning. Course design and (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Financial costs and benefits of e-learning activities regularly assessed and reported on.
3: Definition	**Teaching staff are provided with training, guidelines and examples for designing and developing learning activities and assessment tasks that support active engagement by students.** **Teaching staff are provided with training, templates, examples, standards and guidelines on how to deliver courses using a variety of effective strategies that support active engagement by students.** Institutional policies require that courses be designed to support active engagement by students in learning. A researched evidence base of e-learning projects and initiatives undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development.
2: Planning	**Students are provided in the course outline with an explicit description of the pedagogical approach being used.** **Learning activities and assessment tasks designed to build and develop student engagement.** Course design and development includes active engagement as a formally stated objective and learning activities are selected accordingly. E–learning design and development is guided by and delivers an authentic context for student learning. E–learning design and (re)development activities reference a researched evidence base. Assistance in course design and (re)development is provided to staff engaging in course design and (re)development activities.
1: Delivery	**Learning activities are designed to encourage analysis and skill development rather than recall and knowledge acquisition.** Students are provided with opportunities to describe and reflect upon their own learning. Students are able to integrate previous experience and knowledge into course activities and tasks. Students are provided with opportunities for cooperative and collaborative learning tasks. Learning activities and tasks are placed within an authentic context for student learning.

Table L7-1: Descriptions of process practices by capability dimension

Process L8.

Assessment of students is designed to progressively build their competence

Process Background

Assessment, which is about understanding student learning (Ramsden, 2003), affects the nature, effectiveness, and importance of learning (Hannafin *et al.*, 2003): 'Given that students orient their study towards their perception of the assessment, the solution offered is to find more challenging forms of assessment' (Laurillard, 2002, p. 204). Assessment that communicates high expectations challenges learning approaches and builds competency for outcomes. Learning outcomes and assessment are inextricably linked and should reveal capabilities rather than just technicalities. There is, however, debate over forms of assessment as to whether they should assess students' 'surface learning' knowledge, or 'deep learning' capabilities (Laurillard, 2002; Ramsden, 2003). Rather than summative and formative assessment being about 'simple dualities such as grading and diagnosis', assessment needs to consider the complex relationships among teachers and teaching, and learners and learning: 'It concerns the quality of teaching as well as the quality of learning…It is not only about what a student can do; it is also about what it means he or she can do' (Ramsden, 2003, p. 177).

Observing that the value of learning technologies is partly attached to some ability to perform limited automated assessment (p. 206), Laurillard (2002) recommends a series of assessment qualities for learning technologies. These include (p. 207):

- design assessment in terms of objectives;
- design questions to be open, non-technical and conceptual;
- ensure that learning through new media is assessed and accredited;
- design group assessment to fit objectives and modes of collaborative learning;
- involve students in the design and assessment of marking;
- reinterpret assessment criteria explicitly for learning from new media;
- use the productive media to test the new learning activities that are being encouraged;
- communicate assessment requirements clearly.

Similarly, Conrad and Donaldson (2004) propose that because engaged learning requires higher level thinking, assessment should comprise more than traditional exams and should include 'activity rubrics, team assessment, and reflective self-assessment' (p. 34). They add that assessment focus should be on establishing that the stated objectives for the course have been met, and that students have been engaged in the learning process.

Focus on assessment process and practices is also a concern for Clyde and Delohery (2005) who present five scenarios relating to using assessment and feedback to improve learning. These cover student confusion, student self- and peer-assessment, student presentations, team performance, and, feedback on course activities (p. 177). Clyde and Delohery also emphasise four points that contribute to their view of assessment's increasing dominance in education: 1. studies indicating the need for education reform; 2. adoption of total quality management principles; 3. research focused on the value and strategies of educational assessment; 4. demand for rigorous assessment from accreditation and legislative bodies (p. 177). The authors discuss each of the five scenarios in terms of traditional solutions, technology alternatives, which include illustrated examples, and potential pitfalls. They identify key technology elements for assessment as being online quizzes, surveys, gradebooks, and e-portfolios.

Assessment practices define both what is and what is not important regarding performance and grading, according to Hannafin *et al.*, (2003). They observe that: 'While it may not be the teacher's intent to signal or otherwise limit what a student should learn, some aspects of…work "count"…others do not' (p. 256). If formal assessment is the only measure of progress in an online environment this can be problematic. Hannafin *et al.* are concerned that there is a tendency to value quantity over quality of activity by using practices adapted from traditional approaches that may not be suitable or may be of limited effectiveness for the environment. Of other strategies available, they note the advocacy of portfolios, but say that guidance on their use is lacking. Collaboration is 'valued highly…but we tend to assess the products rather than the collaboration processes per se' (p. 256). They conclude that although Web-based activities promote

problem-solving and critical-thinking, practices for their assessment are unsatisfactorily limited, and, that due to the distance nature of e-learning, it is important to determine ways to implement observational and participatory assessment practices (p. 256).

Young (2004) recommends that assessment should be 'seamless, continuous', and functionally valuable for learners and assessors (p. 175). He cites Young *et al*., (1997) describing such practices as focusing assessment on 'learner-environment interaction, rather than using the individual or the class as the unit of analysis' (p. 175). Further, citing Kulikowich and Young (2001), he refers to an ecologically-based assessment methodology purporting to directly assist learners engagement with learning contexts 'much like the instruments of a fighter jet enhance the pilot's abilities…' (pp. 175-6). He identifies the assessment of the student's actual goals that guide and organise the student's learning behaviours as primary criteria for assessing the student's progress and, where appropriate, for determining remedial learning actions (p. 176).

Reporting that research in online assessment tends to focus on automated scoring, Hill *et al*., (2004) argue that this model has, long-term, been commonplace in some forms of assessment, such as 'bubble sheets'. They discuss some novel aspects of certain techniques such as the addition of feedback information on distracters in multiple choice questions thereby providing 'cost effectiveness' through enabling prompt responses to learners without instructor interaction. Beyond this, much as with lectures (Angelo and Cross, 1993), it is necessary for teaching staff to consider how to use a variety of assessment techniques that are tailored to the objectives of the course. These should go beyond multiple choice questions to include assessment that builds on the available online communication and collaboration tools.

Practices

To be effective, assessment needs to be integrated throughout the teaching-learning process in visible but seamless ways. That is, effective assessment will communicate ongoing high expectations through affirming competencies and capabilities, as well as technical and specific knowledge using a variety of approaches, such as 1. traditional, 2. activity oriented, 3. group, and 4. self-reflective and readily accessible practices, such as online quizzes, surveys, gradebooks and e-portfolios. Whatever methods are utilised, students need a rigorous understanding of qualitative and quantitative aspects of their assessment to ensure e-learning success.

Evidence of capability in this process is seen through the use of assessment programmes designed to support students in achieving the learning objectives and which build learner capability progressively with opportunities for feedback and reflection. Policy and guidelines should encourage the use of a mix of assessment techniques throughout the course and encourage the use of challenging tasks to motivate performance and learning.

Table L8-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Information on the extent to which courses are providing assessment activities that are progressively building student capabilities is used when designing and (re)developing current and future courses and programmes.** Performance of students as learners used to inform strategic planning relating to future e-learning initiatives.
4: Management	**Feedback collected regularly from students regarding the effectiveness of the assessment tasks, support and feedback.** **Feedback collected regularly from staff regarding the effectiveness of the assessment tasks, support and feedback mechanisms.** Courses are regularly reviewed to ensure that staff are incorporating assessment activities that are progressively building student competence consistent with the expectations of the institutional policies, guidelines and standards. Student workload information is collected regularly and used to ensure that standards are maintained in all programmes. Course design and (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Financial costs and benefits of assessment activities regularly assessed and reported on.
3: Definition	**Teaching staff are encouraged to design e-learning assessment programmes with sufficient time for feedback from staff and reflection by students to meaningfully occur.** **Training, staff development, templates and examples are provided to support teaching staff designing more effective assessment programmes in their courses.** Teaching staff provided with training, guidelines and examples on how to support students completing assessment tasks appropriately to avoid plagiarism and violations of intellectual property. Standards exist for e-learning assessment requirements that are used to sustain high expectations through linked assessments. Guidelines and training provided to teaching staff on how to design e-learning assessment programmes with a mix of formative and summative aspects. Guidelines, templates, examples and training provided to teaching staff on how to use feedback to improve student learning. Guidelines and support materials provided to students to assist their making effective use of staff assessment feedback in their learning. A researched evidence base of e-learning assessment activities undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development.
2: Planning	**Course outlines provide students with a clear overview of the programme of assessment and the relationship between the individual assessment tasks and other learning activities.** **The assessment programme is designed to make effective and consistent use of e-learning technologies used in other course activities.** The assessment programme is designed to build on student skills and experience attained in previous work. There is an explicit relationship between the individual assessments and other timetabled activities. Assessment design and (re)development activities reference a researched evidence base. Assessment tasks provide guidance for students on intellectual property and plagiarism issues. Systems provided for automatic detection of plagiarism and collusion.
1: Delivery	**Assessments are described in terms of course and programme objectives and requirements.** **Students are provided with opportunities to discuss assessment tasks with each other and the teaching staff before attempting marked work.** **Students are provided with opportunities to practice assessment tasks before attempting marked work.** Students are provided with timely feedback while engaging in assessed work. A range of assessment formats are used in courses.

Table L8-1: Descriptions of process practices by capability dimension

Process L9.

Student work is subject to specified timetables and deadlines

Process Background

The flexibility of an e-learning environment requires that particular attention is paid to timeliness in the planning, performing and completion of students' work, and teachers' responses to it (Laurillard, 2002; Salmon, 2000). Flexibility of delivery should also be extended to negotiating agreements over the ordering and timing of course elements. Clearly communicated course timetables and assignment deadlines, with explicit expectations and guidelines, encourage and motivate learners to make the most effective use of time, and enable teachers to facilitate effective time management by learners (Clarke, 2004).

Time management for e-learning differs from conventional learning. Whereas a conventional course timetable, which sets out attendance times, largely determines the learning plan, an e-learning course presents an estimate of the anticipated hours of study required and the duration of the course. The learning plan is left to the learner to schedule and manage: A conventional course provides a supportive but limiting structure, e-learning is more flexible but less supportive (Clarke, 2004, p. 122). Clarke emphasises the following as points that e-learning students need to consider: Course structure; personal objectives and schedule; personal priorities; individual learning style preference; good learning practices; health and safety; family responsibilities (pp. 122-3). Clarke also discusses practical ways to implement personal learning structures and gives activity exercises and examples of how to use computer applications to aid time management. He emphasises the crucial importance of planning to ensure productivity and to reduce stress (p. 127).

Allowing adequate time for the accomplishment of online learning interaction activity is also an important issue for Conrad and Donaldson (2004), who note that e-learning requires the allocation of more time than similar communication in classroom-based situations. They say discussion activities need a minimum of a week for development, and that team projects need to commence planning six weeks ahead of a due date (p. 19). They add that because online discussion is conducive to more depth of reflective thought than is found in reactive classroom discussion situations, the quality of discussion activities should take priority over the quantity (p. 20).

According to Kramarae (2003), studies indicate that students often find online discussion very time-consuming. Emphasising research that shows differences in time parameters for female and male students, she recommends more research that studies time as a gendered concept: 'women with spouses and children often must accommodate themselves to extra home-time responsibilities, a fact that has an impact on when and where they can study' (p. 270).

Reporting on research into time demands on teachers and learners in online environments, Spector (2005) identified several significant issues. He found that student time commitments increased according to the advancing level of the course and that student outcomes increased according to the amount of participation in course activities. He also noted that the overall time pattern of student activity varied through peaks and valleys during the course, and he concluded that although students appreciated the time flexibility of online courses, their level of experience with online instruction affected their perceptions of its effectiveness. Furthermore, while different forms of communication and collaboration presented varying time demands on students and teachers, overall, 'the perception of the benefits of online instruction improves with experience in online environments' (p. 18).

Practices

E-learning provides a time flexible environment that demands attention to the management of timeliness in the conduct of teaching and learning on courses (Laurillard, 2002; Salmon, 2000). Negotiated agreements, between teachers and learners, concerning the ordering and timing of course elements must be clearly communicated in course timetables and assignment deadlines. Furthermore, explicit expectations and guidelines encourage and motivate learners to make the most effective use of time and enable teachers to facilitate effective time management (Clarke, 2004). As the e-learning environment imposes more self-regulated learning responsibilities on the student than they may have previously experienced, there is need for personal learning structures that ensure productivity and reduce stress (Clarke, 2004).

Evidence of capability in this process is seen by the provision of a clear timetable that relates all of the elements of a course together and communicates the logic underlying the design of the various activities. Particularly in online courses, there should be frequent pointers and reminders to students as to where they should be focusing their energies and the upcoming deadlines that they should be aware of. During the design of materials, explicit consideration should be given to student and staff workload expectations and the impact that this has on the timing of elements of the course.

Table L9-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Information on the impact of particular activities on student workload and course timetabling is used when designing and (re)developing current and future courses and programmes.** Student workloads and timetable constraints used to inform strategic planning relating to future e-learning initiatives.
4: Management	**Student workload information is collected regularly and used to ensure that standards are maintained in all programmes.** **Feedback collected regularly from students regarding the effectiveness of the timetables and deadlines.** **Feedback collected regularly from staff regarding the effectiveness of the timetables and deadlines.** Courses are regularly reviewed to ensure that activities and assessment are timetabled in line with the expectations of the institutional policies, guidelines and standards.
3: Definition	**Institutional policies and standards define expectations for student workloads within courses.** **Teaching staff provided with templates and examples of effective timetabling and workload approaches.** **Teaching staff provided with professional development in designing effective timetabling and workload approaches.** Institutional policies and standards cover the need to communicate deadlines and timetables clearly to students.
2: Planning	**Clear timetable for key activities and communication of deadlines provided in course outlines.** **Workload assessment used to plan extent and timing of course activities.** **Explicit process for negotiating variances to timetables and deadlines communicated to students in course outlines and documentation.** An explicit chronological relationship designed between the learning activities and the expectations on the students. Tutorials or other support on time management skills included in course design.
1: Delivery	**Students provided with details of the workload and time commitment required for course activities prior to enrolment.** **Deadline and timing information provided as part of the descriptions of individual assessments and activities.** **The relationships between activities such as assessment and other course elements are explicit and logical.** Timing information repeated throughout course materials as necessary. Students provided with regular reminders of upcoming deadlines as necessary during delivery of the course.

Table L9-1: Descriptions of process practices by capability dimension

Process L10.

Courses are designed to support diverse learning styles and learner capabilities

Process Background

Support for diverse student needs is becoming a mandatory requirement for quality education programmes. Diversity refers to capabilities, disabilities, and styles of learning that must be considered in providing for and supporting teaching and learning (Ragan, 1999; Salmon, 2000). Sensitivity to diversity means respecting 'values, orientations, learning styles, language factors, and traditions of learning from diverse cultural and ethnic backgrounds, as well as…special educational needs' (Reeves, 1997, p. 27). Gender is also a factor in diversity, including consideration of home-based learners who have childcare and housekeeping duties (Kramarae, 2003). Age is another significant factor (Witt and McDermott, 2004). Learning styles or preferences when engaging in different learning activities have also been suggested as having value in understanding the diversity of learner capabilities (for example Gardner, 1984; Kolb, 2005).

Learning styles have generally been considered important because of their potential positive impact on all aspects of teaching and learning, both as a means for understanding how students learn and as tools for guiding the design of courses and learning activities. There are tools to assess learning style preferences (Kolb, 2005), and numerous studies that research their effects on learning outcomes. However, the complex, contextual, and conditional nature of learning and learners leads to the view that 'variability in approaches…coexists with consistency' (Ramsden, 2003, p. 51). While some studies report that certain learning styles appear to be better suited to online learning environments (Fahy and Ally, 2005; Terrell, 2002), other researchers dispute learning style effects (Chall, 2000) or find them to be negative (Clark, 2003). There is also evidence that learners can adapt their learning styles to suit the context (Terrell, 2005). Therefore recommendations tend to support the holistic inclusion of all learning styles and types in approaches to e-learning (Chen *et al.*, 2005; Laurillard, 2002; Terrell, 2005; Wang *et al.*, 2001).

A longitudinal study that examined relationships between student age, gender, ethnicity, learning style and their effect on attrition from an online graduate programme found no significant effects of the differentials on outcomes (Terrell, 2005). However, Terrell does discuss possible contributory effects of intrinsic motivation that enables students to adapt their learning style preferences, and 'to balance their preferred learning style with the skills needed to succeed in the online environment' (Discussion ¶. 4). He also suggests consideration of 'the possibility of a change in preferred learning style over time…in order to compensate and adapt to an online learning environment' (Conclusions ¶, 3). In an earlier study, Terrell (2002) reports that students, mostly, can successfully adapt their individual learning styles to suit online learning environments, and, that students with learning styles that favour systematic planning and intellectual understanding are more likely to be successful than those who prefer concrete experiences and interaction (p. 345). The study also confirmed that the type of programme is a reliable predictor of student learning style preference, that is, that a majority of students in a web-based doctoral programme would be Converger or Assimilator types (sharing a preference for higher levels of Abstract Conceptualization) (pp. 350-1).

After examining differences in learning style in relation to online interaction, Fahy and Ally (2005) reported that some learning styles may dispose certain learners (Convergers) to more interactivity, while other learners find interaction unhelpful. They comment that social interaction variability according to learning style may have significant implications for teaching strategies: 'Not only might some participants find online interaction unnecessary to learning, they may…find it inimical' (p. 19). Reporting on a study of learning style changes, learning outcomes, and learner satisfaction, Wang *et al.*, (2001) found '[n]o changes in student learning styles and no significant differences in learning outcomes and learner satisfaction with regard to different learning styles' (p. 75). However, the results suggest that computer-supported collaborative learning environments support diverse learning styles (p. 75). Generally, the literature supports the view that learning styles are helpful for understanding the different approaches that students bring to their learning, and, that effective and successful e-learning incorporates all learning styles and approaches.

Noting that, in the US, women comprise the majority of undergraduate students, and online students, Kramarae (2003) raises the issue of gender equity and comments: 'Women in online education have the paradoxical experience of being simultaneously invisible—even while they are the core constituency of distance learning' (p. 270). Kramarae identifies three significant matters for women: Firstly, the psychological and organisational pressures on women students returning to study after interrupting their education to fulfil and maintain family responsibilities; secondly, the unacknowledged differences in discussion and communication approaches preferred by women; and thirdly, that women may not have economic control over access to technical resources needed for participation in e-learning. Kramarae argues that more research is necessary to ensure women's inclusive equity with men in the online environment.

Practices

Inclusion of diversity is the coherent and consistent theme throughout the research literature, regarding both accessibility and learning preferences. Inclusivity underpins the argument that efforts to improve accessibility and ways of learning for some benefit all. Being inclusive requires respecting capabilities, disabilities, and styles of learning (Ragan, 1999; Salmon, 2000). As well, it requires respecting values, orientations, language factors, cultural and ethnic traditions, and the special requirements of learners (Reeves, 1997). Inclusivity involves issues of gender (Kramarae, 2003) and age (Witt and McDermott, 2004). Overall, the consideration of inclusive design benefits all learners (Kinash *et al.*, 2004; Witt and McDermott, 2004).

Evidence of capability in this area is seen through course design and implementation practices that use a variety of complementary pedagogical approaches to support student learning, including a variety of media, assessment types and communication channels. Teaching staff should be enabled and supported in being open to flexible teaching and learning methods and should support and encourage students negotiating or using alternative learning approaches that are better suited to their personal circumstances. Policies and guidelines for courses should explicitly incorporate an expectation of diversity in learning styles and learner capabilities being supported proactively, rather than being reacted to in response to student complaints.

Table L10-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Effectiveness of attempts to provide support for diversity is measured and used to inform planning relating to future e-learning initiatives.** **Diversity requirements applied during the selection and implementation of new technologies for e-learning.** Information on the extent to which courses are providing activities and materials that support diversity is used when designing and (re)developing courses and programmes.
4: Management	**Course materials regularly reviewed to ensure that diversity policies are implemented where possible and appropriate.** **Feedback collected regularly from students regarding the effectiveness of the e-learning tasks and activities in supporting diversity.** **Feedback collected regularly from staff regarding the effectiveness of the e-learning tasks and activities in supporting diversity.** Students regularly provided with opportunities to provide feedback on diversity issues as well as on related institutional guidelines and standards. Extent of participation of students with diverse backgrounds and capabilities formally assessed and regularly reported on. Financial costs and benefits of supporting diversity regularly assessed and reported on.
3: Definition	**Diversity standards, guidelines and key principles for designing and participating within courses for diversity are provided to all staff and students.** **Institutional policy mandates compliance with standards, guidelines and key principles for supporting diversity in all course design, (re)development and delivery activities.** **Staff training and development provided to ensure that all staff are aware of the need to support diversity within courses and how they can provide alternatives for students.** Staff provided with templates and guidelines that illustrate how to support diversity. Institutional policy prohibits the use of inappropriate cultural bias and stereotypes in course materials and activities. Institutional e-learning strategy and associated plans formally include consideration of diversity aspects. A researched evidence base of diversity projects and initiatives undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development.
2: Planning	**Students provided with information in the course outline and documentation on the procedure to follow if course elements fail to meet their individual needs.** **Teaching staff provided with e-learning design and (re)development assistance that encourages and supports diversity.** **E–learning design and (re)development procedures include formal testing and review of diversity support with student participants.** Formal design and development approaches used to ensure variety and diversity of activities. Students are formally consulted regarding diversity aspects during the design process. Programme or degree planning and review processes incorporate diversity criteria in their analysis of courses and programmes. Student support facilities provided to specifically address diversity issues and requirements. E–learning design and (re)development activities reference a researched evidence base of diversity issues and requirements.
1: Delivery	**Students told of measures undertaken to support diversity and encouraged to make use of the provided alternatives.** Consistent use of variety in teaching and learning activities throughout the course. Consistent use of a variety of media throughout the course. Course materials and activities avoid inappropriate bias and stereotypes.

Table L10-1: Descriptions of process practices by capability dimension

Development: Processes surrounding the creation and maintenance of e-learning resources

The goal of this process area is efficient and effective use of resources in the creation and maintenance of e-learning infrastructure, materials and courses. The individual processes are directed at informing the development of resources and infrastructure and ensuring that this is done in a way that builds capability based on experience and success of e-learning deployment in the institution.

Development: ***Processes surrounding the creation and maintenance of e-learning resources***	
D1.	Teaching staff are provided with design and development support when engaging in e-learning
D2.	Course development, design and delivery are guided and informed by formally developed e-learning procedures and standards
D3.	Explict linkages are made in the design rationale regarding the pedagogies, content and technologies chosen
D4.	Courses are designed to support disabled students
D5.	All elements of the physical e-learning infrastructure are reliable, robust and sufficient
D6.	All elements of the physical e-learning infrastructure are integrated using defined standards
D7.	Resources created are designed and managed to maximise reuse

Table 3: eMM Version Two *Development* Processes

Process D1.

Teaching staff are provided with design and development support when engaging in e-learning

Process Background

Teaching staff are generally not familiar with the extensive literature and techniques of course design and development available to improve student learning outcomes. Support provided to teaching staff in effective learning design is vital if courses are to develop pedagogical approaches that reflect the state of current understanding, as opposed to traditional approaches (Ragan, 1999). By working with pedagogical experts teaching staff can be encouraged to consider pedagogies that may make more effective use of available technology or, alternatively, technologies that enable particularly effective pedagogical approaches that they may not have considered (Wingard, 2004).

The proliferation of technologies used in modern e-learning mean that it is almost impossible for any one person to be expert in all of them, particularly when they are employed to be expert in something entirely different. Provision of expert technical assistance is vital if institutions are to move away from ad-hoc developments and encourage the effective use of technology by staff (Butler and Sellborn, 2002). Use of experts greatly increases the likelihood that materials will be developed to support standards and will be designed for maintenance and reuse. Experts are also more likely to ensure that materials are designed with accessibility and flexibility in mind.

Teaching staff are generally more familiar with traditional approaches than with those enabled by e-learning technology and thus need training and support if they are to be effective with new technologies and the associated pedagogies (Buckley, 2002). Experience has shown that old approaches rarely make good use of technology - as demonstrated, for example, by the initially poor results from the use of classroom feedback systems without changes in classroom practice (Judson and Sawada, 2002).

A renaissance view of e-learning accompanies much of the literature that describes its potential. However, much less is written about its practice (Salmon, 2000). Unfamiliarity of teaching staff with e-learning processes and practices inhibits their preparedness to adopt and adapt to the new environment. While there is debate over the implications and impacts of organisational and pedagogic change that e-learning involves, there is resistance to it (de Freitas and Oliver, 2005, p. 93). Because technology environments can appear to provide user friendly interfaces for communication, interaction, and teaching-learning resource development, they can also inadvertently permit the transfer of poor practices. Staff must be not only trained and supported to develop strong computer, information literacy and management skills, but must also acquire relevant and appropriate pedagogical knowledge and skills, and, apply an informed critical perspective to using the knowledge and skills (Weaver, 2006).

In explaining the design of effective organisational infrastructure for e-learning Laurillard (2002) notes that, as prodigious technology use is not matched by understandings of it, prescriptive guidelines are ineffective. Rather, there is need for a systemic responsive-adaptive approach to 'this new organism. The biological metaphor is apt. The academic system has to learn, has to be able to respond to its environment…the higher education system needs a more robustly adaptive mechanism than it has had to develop hitherto' (p. 214). Laurillard emphasises six areas of academic management to address the considerable organisational logistics accompanying change, these are: 1. optimise the deployment of staff resources, 2. optimise the organisation of teaching, 3. encourage use of good materials developed elsewhere, 4. establish a programme of staff development, 5. set up multi-skilled development areas, 6. set up forum for teachers to discuss ideas, experiences (pp. 225-7).

Learning to adopt, adapt to, and use technology for teaching needs to be encouraged and supported. It is more an evolutionary process than a paradigm shift that can be better accomplished by understanding the personal relevance of tools and how to use them (Clyde and Delohery, 2005).

Executive leadership and commitment is identified as highly significant in enabling the constructive alignment of institutional mission, pedagogical practice and e-learning success (Abel, 2005). Abel specifies key leadership elements as being: long-term commitment, significant financial and resource investment, priority for effective programmes, and clear articulation of institutional e-learning mission (p. 76).

A recent review of e-learning's implications for higher education pedagogy and policy (Picciano, 2006) notes that e-learning is not a singularity; it is so multi-variant that 'students might not recognise any similarities in its use by different instructors in the same college' (p. 77). However, Picciano identifies three important pedagogical elements: instructional planning using course management systems (CMS); interactivity; and, reflective teaching. A CMS is useful for designing resources and for organising teaching delivery, learning assessment, and record management, provided the teacher understands its value as a flexible, facilitative tool. Online interaction is both innovative and problematic. Although it can innovatively motivate and enhance interaction by documenting exchanges and extending their timeliness, it can also engender feelings of alienation. Its effective use is carefully and thoughtfully managed. Reflective teaching concerns the strategic pacing of learning processes to allow for critical reflection and discussion. The significance of these pedagogical elements lies in their contribution to, rather than difference from, traditions of pedagogical practice. Picciano observes that increasing e-learning experience and expertise is causing teachers to produce new materials rather than modifying existing material. This is also generating greater interest in pedagogy that is benefiting both online and face-to-face learning (p. 84).

With regard to policy issues, Picciano points to various personnel, and intellectual property matters that need on-going attention and negotiation. Operational policy issues include matters such as choices between open system, and competing commercial CMS products; whether to allow single or multi-system implementation; and how to provide technical support. Looking forward, Picciano makes two important observations. Firstly, that the notion of e-learning as a sub-set of distance learning is being overtaken by of 'hybrid' or 'blended' learning concepts that equally apply to on-campus programmes. Secondly, that today's technologically capable graduates are tomorrow's teachers who will work in even more enhanced environments.

Practices

Evidence of capability in this process is seen in the availability of technical assistance and staff development for the full range of technologies that are provided as standard in the institution, along with expert assistance in the design of the pedagogical approaches for courses. Access to this support is managed to ensure efficient and equitable use of time and the achievement of strategic goals as well as short term requirements. Effective approaches in the institutional context are communicated through examples, case studies, standards and guidelines customized for the institution, as well as during training for teaching staff.

Table D1-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Information on the effectiveness of assistance provided to teaching staff and the outcomes of courses is used to guide the nature and type of assistance provided for current and future e-learning initiatives.** **Information on the effectiveness of assistance provided to teaching staff and the outcomes of courses is used to inform strategic and operational planning for current and future e-learning initiatives.** Type and availability of technical and pedagogical assistance is determined in response to the assessed skills of the teaching staff working with particular technologies. Type and availability of technical and pedagogical assistance is determined in response to measures of effectiveness of different technologies and associated pedagogies. Pedagogical support implications explicitly addressed when introducing new technologies to the institution. Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of design and development support and changing staff requirements arising from e-learning technologies and pedagogies being used.
4: Management	**Effectiveness and impact on course designs and implementations of templates, project supporting materials and quality assurance procedures used by teaching staff is measured and reported on.** **Course design and (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones.** **Feedback collected regularly from staff regarding the effectiveness of the e-learning design and development support.** Use of technical assistance by teaching staff is measured and reported on as to its effectiveness and impact on the final course design and implementation. Use of pedagogical assistance by teaching staff is measured and reported on as to its effectiveness and impact on the final course design and implementation. Measures collected of the effectiveness of pedagogical approaches adopted for particular technologies. Financial costs and benefits of technical and pedagogical support and assistance regularly assessed and reported on. Overlap and duplication of support and resources provided to staff engaged in e-learning design, (re)development and delivery is regularly reviewed and addressed in line with institutional e-learning strategy and technology plans.

Dimension	Practices
3: Definition	**Institutional standards are used to define the support resources and assistance available to teaching staff (re)developing courses.** **Teaching staff are provided with training and professional development opportunities when engaging in design and (re)development activities using e-learning technologies and pedagogies.** **Teaching staff are provided with project tools including standard contracts and licenses, checklists and quality assurance procedures to support design and development of e-learning projects and initiatives.** Standards and guidelines covering technical and pedagogical aspects of course (re)development are available and are used by the staff providing assistance. Formal processes for course (re)development explicitly consider the allocation and use of technical assistance. Formal processes for course (re)development explicitly include consideration of pedagogical issues. Formal processes for course (re)development explicitly consider appropriate licensing and use of intellectual property. A researched evidence base of e-learning projects and initiatives undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development. Institutional procedures for acquiring and maintaining e-learning technologies explicitly consider the technical support needs of teaching staff.
2: Planning	**Assistance in course development is scheduled or planned for throughout the process of course design and development.** Assistance in changing pedagogies explicitly included in the process of (re)developing individual courses. E–learning design, (re)development and delivery procedures include formal risk assessment and risk mitigation plans for staff skills in using e-learning pedagogies and technology. E–learning design, (re)development and delivery procedures supported by teams of specialist staff, academic colleagues and students.
1: Delivery	**Technical design and development assistance available to staff designing and (re)developing courses.**

Table D1-1: Descriptions of process practices by capability dimension

Process D2.

Course development, design and delivery are guided and informed by formally developed e-learning procedures and standards

Process Background

Ad-hoc development of resources has resulted in the proliferation of a variety of materials designed to support student learning. Many of these are developed without consideration of how they appear to students moving from course to course, how they can be reused over time, or how to learn from the experience of others in developing effective materials. Standards and guidelines can support more effective practice (Marshall, 2004) and their use can result in cheaper, more useful materials to support student learning.

There is general agreement that institution-wide successful implementation of effective e-learning depends on explicit institutional procedures and standards. There are, however, differing views on what constitutes 'success' and how institutional procedures and standards are promulgated and managed. As 'success' is mainly subjective its achievement is a matter of interested perception. Then, there is tension between central and local interests that, on one hand, pre-suppose a need for strong centralised management for institution-wide e-learning implementation, and on the other expect localised pedagogical independence for educational professionals (SURF Foundation, 2006). But, as Agre (2002) argues, decentralisation is not a simple thing, it 'requires a framework of standards, and standards require a center' (p. 163).

In another view, a top-down managerialist model that imposes structure and strategy over ICT implementation is contrasted with a bottom-up model that integrates individual roles and skills with process management to build core competencies that support ICT (Coen *et al.*, 2004). However, the consensus is that there is no single success formula, and that central and local, and top-down and bottom-up models need to function concurrently. Rather, cooperation and collaboration that works to build and support implementation of e-learning is preferred. Schauer *et al.* (2005) discuss a collaborative approach to implementation issues that brings administration, teaching, and learning together and recognizes how interactive and responsive processes contribute to a supportive and effective e-learning environment. They note that teachers cannot develop new skills and redesign courses without financial and organizational support from administration. But neither can administrators develop and maintain effective policy without input and feedback from teachers: 'As decisions are made at the college and central administration levels, the various models faculty are developing in different departments to best deliver their subject matter needs to be considered' (Summary ¶ 1).

Coordination of policy that addresses various sector calls for a systematic approach, or a framework, which needs to identify its concerns. Simonson and Bauck (2003) refer to several models for investigating distance education policy, and they identify seven policy areas that are significant: 1. Academic; 2. Fiscal, geographic, and governance; 3. Faculty; 4. Legal; 5. Student; 6. Technical; 7. Philosophical (p. 418). Although Simonson and Bauck define and elaborate each of these categories, they emphasise the importance of integrated policies that 'seamlessly incorporate the concept of distance delivery' (p. 424). One example of a framework is the TASCOI model (Espejo *et al.*, 1999, cited in Liber, 2005), which concerns transformation, actors, suppliers, customers, owners, and intervenors (p. 43). By identifying the relevant concerns of different departments in each category, potential problems between the departments can be revealed and ways to help manage and resolve issues them can be devised (p. 43). Another example is Khan's (2005) e-learning framework, which he envisions as an octagonal figure comprising pedagogical, technological, interface design, evaluation, management, resource support, ethical, and institutional factors (p. 14). The framework is seen in relation to features and components of e-learning environments, such as ease of use, interactivity, multiple expertise, collaborative learning, authenticity, and learner-control (pp. 11-12). This model is also used to 'identify the critical issues of an e-learning environment, and provide guidance on addressing them' (p.18). Yet another example is the Lifestyle and Learning Style Design Framework, which involves six design levels: institutional, infrastructural, program, course, unit/learning activity, and assessment This model allows for contributions from a wide range of institutional personnel, but its 'multi-level process keeps the process practical and realistic' (Boettcher, 2004, p. 25).

In a case study that relates e-learning implementation to organisational change, de Freitas and Oliver (2005)

found that policy can drive change in both personnel organisation and pedagogic practice, and, that while the implications and impacts of change are being debated and understandings reached, there is resistance to it (p. 93). However, involving parties in collaborative discussion was found to help the change process. de Freitas and Oliver observe that the process 'is not simple or one-way; changed pedagogic practices — and, importantly, attempts to prevent changes to practice — must be taken account of in policies for staff to be willing to engage with them' (p. 94).

Practices

Evidence of capability in this area is seen through the use of consistent, documented practice that reuses previous experience within the institution to build capability. Formal standards are used where available to inform and guide practice and ensure quality and reusability of materials. These standards and guidelines are communicated widely within the institution to encourage wider adoption by teaching staff.

Table D2-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Information on the effectiveness of e-learning procedures and standards and the outcomes of courses is used to inform strategic and operational planning for current and future e-learning initiatives.** **Content of e-learning technical and pedagogical standards and procedures are determined in response to measures of effectiveness of teaching staff use of different technologies and associated pedagogies.** Changes to e-learning procedures and standards are explicitly addressed when introducing new technologies to the institution. Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of e-learning procedures and standards and changing staff requirements arising from e-learning technologies and pedagogies being used.
4: Management	**Use of e-learning procedures and standards by teaching staff is measured and reported on as to its effectiveness and impact on the final course design and implementation.** **Feedback collected regularly from staff regarding the effectiveness of the e-learning design and development support.** Effectiveness and impact on course designs and implementations of e-learning procedures and standards used by teaching staff is measured and reported on. E–learning design and (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Financial costs and benefits of e-learning technical and pedagogical procedures and standards regularly assessed and reported on. Overlap and duplication of support and resources provided to staff engaged in e-learning design, (re)development and delivery is regularly reviewed and addressed in line with institutional e-learning strategy and technology plans.
3: Definition	**Standards and guidelines covering technical and pedagogical aspects of course (re)development are available and are used by the staff providing assistance.** **Teaching staff are provided with training and professional development opportunities when engaging in design and (re)development activities using e-learning technologies and pedagogies.** **Teaching staff are provided with project tools including checklists and quality assurance procedures to support design and development of e-learning projects and initiatives.** Teaching staff provided with training, guidelines and examples on how to design and (re)develop e-learning resources appropriately to avoid plagiarism and violations of intellectual property. Formal processes for course (re)development explicitly consider the allocation and use of technical assistance. Teaching staff are provided with templates, examples, training and support in using the e-learning procedures and standards. Formal processes for course (re)development explicitly include consideration of pedagogical issues. A researched evidence base of e-learning projects and initiatives undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development. Institutional procedures for acquiring and maintaining e-learning technologies explicitly consider the technical support needs of teaching staff.

Dimension	Practices
2: Planning	**Guidelines and procedures for changing pedagogies explicitly referred to in the process of (re)developing individual courses.** **Teaching staff are provided with time, recognised, rewarded and supported in their engagement with innovative e-learning initiatives and experiments.** Assistance in course development is scheduled or planned for throughout the process of course design and development in line with the e-learning procedures and standards. E–learning design, (re)development and delivery procedures supported by teams of specialist staff, academic colleagues and students. E–learning design, (re)development and delivery procedures include formal risk assessment and risk mitigation plans for staff skills in using e-learning pedagogies and technology. E–learning design, (re)development and delivery procedures include contracts and agreements covering the ownership and use of intellectual property when designing and (re)developing courses.
1: Delivery	**Technical design and development guidelines, procedures and standards provided and used by staff designing and (re)developing courses.**

Table D2-1: Descriptions of process practices by capability dimension

Process D3.

Explict linkages are made in the design rationale regarding the pedagogies, content and technologies chosen

D3

Process Background

The learning objectives/outcomes and active learning literature make it clear that effective e-learning requires the complex links between pedagogical approach, course content, and use of technologies to be constructively aligned to defined learning objectives and outcomes (Laurillard, 2002; Ragan, 1999). The constructive alignment of pedagogy, content, and technology calls for an understanding of each of the components and their interactions. Learning design is an iterative process (Boettcher, 2004; Khan, 2005; Laurillard, 2002) It involves the definition of learning outcomes that contribute to the selection of the media prototype for development, which proceeds through design-test-redesign cycles until a satisfactory design is achieved (Laurillard, 2002, p. 197). The learning conversation occupies the foreground in relation to the technology: 'the iterative dialogue between teacher and learner…with the delivery infrastructure always in support of it' (p. 241). Contexts and perspectives also influence the design process. What and how teachers think about the teaching-learning environment, expectations, resources, and outcomes impacts on what and how students learn (Boettcher, 2004, p. 24). Laurillard explains how relations in the e-learning environment are suited to a biological metaphor, which characterises the reciprocal, adaptive, interactions between its constituents as 'like any organism adapting to its environment…[it] has to be capable of adaptive learning' (p. 215). The complexity of learning objectives, content requirements, technology and organisation infrastructure call for an approach that integrates diverse viewpoints and allows for conflicting demands (Jochems *et al*., 2004). Jochems *et al*. propose an educational systems approach that shows integrated e-learning as a triadic model comprising pedagogy, organization and technology that come together through enabling a balance of complex learning, flexible learning, and dual learning (p. 7).

Pedagogical approach, content, and learning outcomes are complexly interrelated and interdependent. Although there is no single 'correct' way to undertake design and development, there are guiding principles and practices (Ragan, 1999). Ragan identifies three educational components: learning objectives and content presentation; interactions; and assessment; and he articulates principles for each category. Learning objectives are the foundation for an educational event that forms a contract between teacher and learner and helps to ensure the selection of instructional strategies for content presentation that successfully delivers defined outcomes. Interactions are the ways teachers and learners engage with each other as geographically distant members of a learning community. Assessment also serves both teachers and learners purposes by monitoring progress that enables the teacher to feedback formative information to the learner, and, the learner to provide feedback on the course design to the teacher.

The distance and time constraints of e-learning require pedagogical practices to be pre-planned. Although there are courseware-based resource design and management tools available, some critics find them 'pedagogically negligent' (Bonk and Dennen, 2003, p. 332). Others express concern that while there is considerable literature on 'how to teach online…much…[does] not have a foundation based on sound research' (Tallent-Runnels *et al*., 2005, p. 26). There is also concern that institutional priorities promote information delivery over learning processes and that much more research into how people learn online is needed (Herrington *et al*., 2005). Herrington *et al*., argue that 'deep engagement of students with complex and realistic tasks is a preferable model to the information provision that is so characteristic of online courses today' (p. 366). Citing their current research they refer to teachers identifying a lack of pedagogical knowledge and significant time requirements as reasons for reverting to presenting information when confronted with the complexity of online teaching tasks (pp. 60-1). Furthermore, online teachers must be thoroughly prepared: 'the concept of winging it is much more difficult in an online course…"you need to try and have the whole course there right from the word go"' (pp. 361-2).

Technology choice, according to Shearer (2003), concerns how technology affects the behaviour of other elements in a systems environment 'where all of the elements or variables interact', and he lists four factors that involve variable elements in the e-learning environment: learner autonomy/control; interaction; access; and costs/economies of scale (p. 275). Learner autonomy/control refers to the importance of

establishing and maintaining an environment that enables the learner to work effectively and successfully at a distance and at their own pace. Interaction involves teacher, learner, and content and takes various forms that concern aspects of quality, frequency, and timeliness. Information and communication technology (ICT) brings new dimensions to the notion of access that include virtual as well as physical attributes and encompass aspects such as, gender, culture, financial, geographic, supply and demand, disabilities, preparedness, motivational, and language (p. 279). Analysis of e-learning costs and effects is complex and needs to consider a range of cost factors including implementation, training, development, delivery, support, and maintenance, which may be balanced against savings from reuse of modular content objects and computer downloadable resources (p. 280).

Practices

Evidence of capability in this area is seen with the use of explicit design processes and plans that link technology decisions with defined student learning outcomes and graduate attributes. This should also include making the underlying design rationale and pedagogy apparent to students when they are introduced to how the technology will be used in the particular course. Teaching staff are provided with templates, examples, training and support in using the range of technologies available to support student learning in a range of contexts and disciplines.

Table D3-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Changes in graduate attributes or guidance in developing learning outcomes reflected in technology planning processes.** **Information on the effectiveness of formal design and (re)development assistance provided to teaching staff and the outcomes of courses is used to inform strategic and operational planning for future e-learning initiatives.** Information on the effectiveness of formal design and (re)development assistance provided to teaching staff and the outcomes of courses is used to inform resourcing for ongoing and new assistance, and guides the nature and type of assistance provided. Type and availability of technical and pedagogical design and (re)development assistance is determined in response to the assessed skills of the teaching staff working with particular technologies. Type and availability of design and (re)development assistance is determined in response to measures of effectiveness of different technologies and associated pedagogies. Design and (re)development support implications explicitly addressed when introducing new technologies to the institution. Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of design and development support and changing staff requirements arising from e-learning technologies and pedagogies being used.
4: Management	**Courses are regularly reviewed to ensure that staff are providing explicitly designed linkages between the pedagogies, content and techologies consistent with the expectations of the institutional policies, guidelines and standards.** **Regular independent reviews of student's experiences of courses conducted to ensure they are aware of the relationships between course elements and the contribution those elements are making to them achieving the definded learning objectives.** A formal post-delivery review is a standard component of any formal course design and (re)development processes. Feedback collected regularly from staff regarding the effectiveness of any formal design and (re)development procedures. Course design and (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Financial costs and benefits of particular e-learning technologies and pedagogies regularly assessed and reported on.

Dimension	Practices
3: Definition	**Institutional policies require that a description of the explicit relationships between course elements is part of all course documentation provided to students.** **Institutional policies require that a formal statement of learning objectives is used as the starting point for course design and (re)development.** **Teaching staff are provided with training, guidelines and examples for creating design rationales that effectively link learning outcomes with the pedagogies, content and technologies used.** Teaching staff are provided with project tools including checklists and quality assurance procedures to support the creation of rationales linking pedagogy and technology. Templates and guidelines provided for individual technologies that convey what types of cognitive outcomes for students can be supported by the technologies. A researched evidence base of e-learning projects and initiatives undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development. Teaching staff are provided with training, guidelines and examples for creating design rationales that are informed, aligned with and support institutional e-learning strategies and technology plans.
2: Planning	**E–learning design activities reference the learning objectives and use them to determine the nature and relationship of content, activities and assessment used in the delivery.** **Programme or degree planning and review processes incorporate design rationales and planning documents in their analysis of courses and programmes.** **Explicit plan relating the learning outcomes to technology and pedagogy decisions used to guide the design and delivery of the course.** Formal design and (re)development procedures are followed. Students are formally consulted during the design process. A defined list of graduate and learning outcomes for the course and programme are defined prior to the design and (re)development process. Course design and (re)development activities reference a researched evidence base.
1: Delivery	**Activities, content and assessment used in the course design are linked with common learning outcome statements.** **The design rationale is explicitly stated and covers pedagogical and technological decisions taken during the design and (re)development process.** The design rationale is used to convey to students the explicit relationships between course elements.

Table D3-1: Descriptions of process practices by capability dimension

Process D4.

Courses are designed to support disabled students

D4

Process Background

Ensuring that materials are accessible to students with disabilities requires careful design and consideration of accessibility issues throughout the creation of materials, as well as the use of development tools to support student use of assistive technologies (Witt and McDermott, 2004). Ensuring that disabled students have meaningful opportunities to engage with courses is commonly a formal legal requirement on institutions. However, according to Dirr (2003), institutional awareness of obligations to disabled students is lacking: 'Some colleges…were surprised, for example, that they must include the virtual equivalents of wheelchair ramps on the Web sites when building online courses' (p. 472). Edmonds, (2004) reiterates the common view that implementing accessibility protocols and features for disabled learners inevitably benefits all online learners. He refers to examples such as the ability to keyword search alternative text, and video captioning providing support for students experiencing difficulties with the instructors speech, adding that for students 'whose primary language differs from the others in the class…additional textual content…may help students succeed academically' (p. 58). But he also observes that 'the legal and technical requirements to remove barriers to online learning for disabled learners are complex' (p. 60).

Accessible is not an absolute term and needs to be considered in the light of diverse individual differences that call for adaptability towards inclusivity (Hoffman *et al.*, 2005). Differences that affect accessibility extend beyond vision, hearing, and motor impediments to include learning disabilities. Whilst there is a general lack of research-based resources for diverse learners, new technology offers potential for greater accessibility and flexibility: 'The advantage of digital versions [of resources] is that these alternatives, and many others, can be available on an individual basis – available for students who need them, invisible or non-distracting for those who don't. They enable teachers to individualize materials in previously unimaginable ways' (Center for Applied Special Technology, 2004, p. 9). The Center for Applied Special Technology promotes universal design for learning, which calls for learners to have access to multiple means of knowledge and information representation, multiple means of demonstrating and expressing what they have learned, and multiple means of engaging with their interests to challenge and motivate them. Universal design, according to Kinask *et al.*, (2004), 'moves best design of online learning beyond a disability issue to enhancing educational technology for all learners' (p. 11).

Following a comprehensive review of intersecting online learning and disability literature, Kinask *et al.* report on the common theme that research and practical applications benefiting disabled learners extends to all learners. They notice that the pedagogical, geographical and technological relations of e-learning offer a serendipitous prospect for an emerging population of new and returning learners with very diverse needs and circumstances. Citing Optitz (2002) they present a range of examples of ways that improving accessibility for some benefits all. For example, text tags that elaborate image information, captions that support audio information, and layout simplification that improves readability (p. 6).

Edmonds (2004) is concerned about the integration of assistive technologies with information and communication technology (ICT). Noting differences between first generation access issues – access to web site pages – and second generation access issues – access to learning resource and support materials, he observes that the former are usually the domain of courseware and web developers, but the latter can be influenced to good effect by course creators and teachers (pp. 56-9).

Although assistive technologies are readily available to enable ICT access for those with disabilities, they often only help overcome the first of many barriers. Discussing the importance of universal design principles (The Center for Universal Design, 2006), Burgstahler *et al.*, (2004) say that '[w]hen designers apply these principles, physical environments, communications, and products they develop can be accessed by people with a variety of characteristics in categories that include height, age, race, ethnicity, gender, native language, and levels of ability to hear, see, move, and speak' (p. 236). Burgstahler *et al.* also point to the importance of implementing assurance and review requirements for e-learning design and content accessibility, adding that addressing accessibility is an 'ongoing effort, not a one-time project' (p. 243).

In conclusion they propose that by applying universal design principles as courses are created learning becomes 'accessible to anyone anywhere at any time' (p. 244).

Burgstahler *et al.*, (2004), reporting on a case study, argue that accessible distance learning courses need ongoing effort (p. 243). They nominate challenges for that effort, which include: interpreting ambiguous standards; coordinating diverse and large communities to cooperate consistently; gaining faculty and staff buy-in, and overcoming technical problems. They conclude that to assure accessibility for all students and teachers necessitates that administration buy-in and support, includes 'key stakeholders—including students with disabilities—in the decision-making process' (p. 243).

In a review of institutional compliance with United Kingdom accessibility legislation, Witt and McDermott (2004) comment that rigour and good practice attention focused on learning system environments needs to apply to all sites included in an institutions communication infrastructure: 'a holistic approach must be taken so that this awareness becomes embedded into an institution's practice and this in turn becomes embedded into the provision of all electronic media' (p. 46). Witt and McDermott also comment on the World Wide Web Consortium's (W3C) Web Accessibility Initiative (WAI), which is working strategically for the coordination of education and research and the development of guidelines and tools for accessibility. However, they caution that guidelines will not meet every need and recommend developers apply universal design principles to both the environment and the content development. Noting the availability of a wide range of software tools to test, evaluate, and 'certify' accessibility, they add that these should be used with caution as audits have shown them to be problematic, with most certification being self-declared. They conclude by cautioning against accessibility becoming a 'mechanistic or a QA process relying on checklists and evaluation tools which then treat accessibility as an afterthought' (p55).

Practices

Evidence of capability in this area is seen through design and implementation practices that use a variety of complementary approaches to support student learning, including a variety of media. Accessibility should be explicitly considered during the design process and standards such as those provided by the W3C (http://www.w3c.org/WAI/) used to ensure compliance. Formal and regular reviews involving students as key stakeholders should be conducted both of courses and the supporting standards, templates and staff development materials.

Table D4-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Effectiveness of attempts to provide support for accessibility is measured and used to inform strategic planning for future e-learning initiatives.** **Accessibility requirements applied during the selection and implementation of new technologies for e-learning.** Information on the extent to which courses are providing activities and materials that support accessibility is used when designing and (re)developing courses and programmes. Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of accessibility support and changing staff requirements arising from e-learning technologies and pedagogies being used.
4: Management	**Effectiveness and impact on accessibility within courses arising from the use of templates, project supporting materials and quality assurance procedures used by staff is measured and reported on.** **Students regularly provided with opportunities to provide feedback on accessibility issues as well as on related institutional guidelines and standards.** **Feedback collected regularly from staff regarding the effectiveness of the support for assisting disabled students.** Compliance with standards for accessibility is monitored prior to and during delivery of all courses. Course materials regularly reviewed to ensure that accessibility measures are implemented where possible and appropriate. Financial costs and benefits of complying with standards for disability access regularly assessed and reported on. E–learning design and (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones.
3: Definition	**Institutional policy mandates compliance with standards, guidelines and key principles for supporting accessibility when engaging in course design, (re)development and delivery.** **Standards, guidelines and key principles for accessibility are provided to all staff and students.** **Students are provided with a clear set of standard accessibility support services available in all courses.** **Teaching staff are provided with accessibility training and professional development opportunities when engaging in design and (re)development activities using e-learning technologies and pedagogies.** Staff are provided with project template documents and tools including checklists, workflow tools, and quality assurance procedures to support design and development of accessible e-learning projects and initiatives. A researched evidence base of accessibility projects and initiatives undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development. Institutional procedures for acquiring and maintaining e-learning technologies explicitly consider disability and accessibility aspects of use by staff and students.

Dimension	Practices
2: Planning	**Formal design and development approaches used to ensure variety and accessibility of activities.** **Students are provided with information in the course outline and documentation on the procedure to follow if course elements fail to meet their individual needs.** **E–learning design and (re)development procedures include formal testing and review of accessibility support with student participants.** Students are formally consulted regarding accessibility aspects during the design process. Programme or degree planning and review processes incorporate accessibility criteria in their analysis of courses and programmes. Student support facilities provided to specifically address accessibility issues and requirements. E–learning projects and initiatives include formal risk assessment and risk mitigation plan for accessibility and disabled student participation.
1: Delivery	**Students told of measures undertaken to support accessibility and encouraged to make use of the alternatives provided.** Consistent use of variety and alternatives in teaching and learning activities throughout the course. Consistent use of alternative forms of media throughout the course.

Table D4-1: Descriptions of process practices by capability dimension

Process D5.

All elements of the physical e-learning infrastructure are reliable, robust and sufficient

D5

Process Background

The physical infrastructure used to provide and sustain e-learning delivery must be as reliable and robust as the personnel infrastructure that depends on it. As noted by Chizmar and Williams (2001, p. 22) 'Faculty desire a network and technical infrastructure that never calls attention to itself, one that doesn't create barriers to entry for wary teaching staff and students because of its complexity. The infrastructure should be transparent, much as the utility infrastructure that powers our lights and our computers.' The ultimate goal of technology should be that it supports the activities of learning while not dominating the process, becoming essentially 'invisible' (Norman, 1999). In this context 'physical' includes the hardware, software and other facilities needed to deploy e-learning such as teaching rooms, cameras, servers etc.

Technology that is unreliable will rapidly destroy the confidence of students, will disrupt the process of building effective engagement and act as a significant barrier to the use of technology by staff (Butler and Sellborn, 2002). Students also want easy to use, fast, and reliable IT services: 'they express frustration when networks or servers are down, technical support is unavailable, or the technology gets in the way of completing their required coursework' (Kvavik and Caruso, 2005, p. 106).

In attempting to classify distance education technology Bates (1993) made two distinctions. Firstly, he distinguished between media (forms of communicating representations of knowledge) and technology (devices used to conduct the communications). And, he identified text, audio, video, and computing as the four significant media for distance education, noting that several technologies were available to each. Secondly, he distinguished between one-way (broadcasting) and two-way (interactive) technologies. Gunawardena and McIsaac (2004) draw on these and other classifications to propose six characteristics of media – distribution, control, interaction, symbols, presence, interface – that affect technology use (p. 373). They explain that these factors are not extrinsic entities but states of interaction that affect how geographic space is reconceptualised as cyberspace. These classifications and characteristics demonstrate the highly interdependent complexity of elements in the e-learning infrastructure and the consequent need for policies and agreements to establish and maintain reliability.

Jochems *et al*., (2004) promote integrated e-learning as an effective complete system and identify three interrelated dimensions in the e-learning domain – functional, organizational, technical. The first two mainly concern pedagogical and administrative issues, however, the technical dimension deals with a large number of infrastructural matters. To address these Jochems *et al*. stress the urgent need for interoperable reference architectures, but note that the plethora of incomplete architectures, protocols and standards presently make this problematic. They conclude that in their framework 'the most complex issues deal with the coherence, connectivity, and emergence of the different fragments of the model', and they propose a 'learning networks' perspective 'that is, self-organized, emergent, distributed systems created to facilitate learning and lifelong learning… [that] promise to change the way we learn in the future quite fundamentally' (p. 75).

Porter (2005) is also concerned with e-learning architectures, particularly for managed learning environments (MLEs). She argues that because MLEs are used in a variety of different ways and need to integrate with various systems, they are institution specific, variable systems environments. There is no universal architecture or particular model that can be applied to systems integration. Porter identifies three MLE models that typify applications: e-learning support; integrated staff and student user support; and streamlined administration, and notes that some institutions look to MLEs as a single access point, or portal, to provide a new entrance to legacy systems. Whatever model or combination is adopted the effective implementation and maintenance of an e-learning infrastructure needs collaborative agreements between stakeholders that address strategic objectives and define how they will be reliably and robustly met (p. 26).

Practices

Evidence of capability in this process is seen through the creation and use of an integrated infrastructure with hardware, software and teaching facilities able to be easily accessed by staff and student, design processes that include explicit consideration of reliability aspects when choosing technology and the basing of this decision on evidence of reliability collected in the institutional context whenever possible. Course designs include consideration of alternatives to be used by teaching staff when technology fails and ensuring there are support procedures in place to deal with potential failures. Standards and guidelines are used to communicate which technologies have been proven reliable and regular monitoring and reporting is used to prove and sustain reliability. The selection of new technologies is done with reference to formal standards and the ability for them to be integrated within the existing infrastructure.

Table D5-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Information on technology performance, reliability and compliance with service level agreements used to make decisions regarding the deployment and ongoing use of e-learning technologies.** **Effectiveness of the physical e-learning infrastructure is used to inform strategic planning for future e-learning initiatives.** Service level agreements and standards regularly revised as student e-learning needs and technology use evolve. Measures of performance of e-learning infrastructure and interoperability are used to develop characteristics and standards that determine the selection of new elements and the retention of existing technology. Institutional risk assessments and mitigation strategies are regularly updated to reflect the reliability and robustness and changing staff requirements arising from e-learning technologies and pedagogies being used.
4: Management	**Technologies used in the physical e-learning infrastructure are subject to automatic monitoring and reporting of performance.** **Formal e-learning infrastructure risk assessment and mitigation strategy review is undertaken, reported on regularly and the results endorsed by institutional leadership.** **Feedback collected regularly from staff on the ease of use, effectiveness, robustness and reliability of the e-learning infrastructure.** **Feedback collected regularly from students on the ease of use, effectiveness, robustness and reliability of the e-learning infrastructure.** Compliance with service level agreements for elements of the physical e-learning infrastructure regularly reported on. Standards for reliability and support are subject to regular review from the perspectives of the institution, teaching staff and students. Regular review undertaken of financial costs and benefits of e-learning infrastructure purchase and ongoing maintenance. Infrastructure (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Financial costs and benefits of the e-learning infrastructure regularly assessed and reported on. Institutional decisions to add new or modify existing e-learning infrastructure elements are informed by formal testing and review by student and staff users.
3: Definition	**Technologies used in the physical e-learning infrastructure, either institutionally provided or outsourced, are subject to regularly revised service level agreements that explicitly consider the impact of the technology on student learning.** **Institutional decisions to add or modify e-learning infrastructure elements are informed, aligned with and supportive of e-learning strategies and technology plans.** Standards for reliability and support of delivery technologies in place and used when selecting technologies used in the physical e-learning infrastructure. Service level agreements and associated support facilities used to ensure that technologies used are reliable and sufficient. Institutional decisions to add new or modify existing e-learning infrastructure elements are informed by defined standards for interoperability. A researched evidence base of e-learning infrastructure projects and initiatives undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning infrastructure design and (re)development.

Dimension	Practices
2: Planning	**E–learning design and (re)development procedures include formal consideration of e-learning technology reliability and support issues.** **E–learning design and (re)development procedures include formal risk analysis and planning for potential technology failure and strategies for alternatives to be used in the event of failure.** **Regular audits of all e-learning infrastructure elements are conducted to ensure the validity of backups and disaster recovery procedures.** **Explicit consideration of reliability made when selecting technologies used in the physical e-learning infrastructure.** Selection and deployment of new technologies used in the physical e-learning infrastructure is undertaken according to a formally defined plan. Selection and deployment of new technologies informed by formal support of innovation, exploration and experimentation. Explicit consideration is given to interoperability with existing elements when designing, planning and implementing additions or modifications to the e-learning infrastructure. Formal risk assessment and mitigation process undertaken when designing, planning and implementing additions or modification to the e-learning infrastructure. Regular and systematic upgrading and maintenance undertaken of all elements of the e-learning infrastructure.
1: Delivery	**Technologies used in the physical e-learning infrastructure are implemented with maintenance, reliability and support issues explicitly addressed.** **All user information captured by technologies is protected by regular backup processes.** Decisions to add new e-learning infrastructure elements are informed by the ability of the new technology to integrate with other pre-existing infrastructure.

Table D5-1: Descriptions of process practices by capability dimension

Process D6.

All elements of the physical e-learning infrastructure are integrated using defined standards

D6

Process Background

Ad-hoc development of e-learning environments has resulted in the proliferation of a wide variety of materials and systems designed to support student learning. Many of these are developed without consideration of how they appear to students moving from course to course, how they can be reused over time, or how to learn from the experience of others in developing effective materials. Standards and guidelines can support more effective practice (Marshall, 2004) and their use can result in cheaper, more useful materials to support student learning. Standards are also key to the 'services' model gaining currency as a tool for managing the growing complexity of the physical e-learning infrastructure.

The physical e-learning infrastructure, as discussed in process D5, is a complex environment in which various media facilitate a multitude of connections and interactions through highly interdependent technical elements (Gunawardena and McIsaac, 2004). Increasingly, e-learning is being provided and managed through commercial and open source centralised systems that include Managed Learning Environments (MLEs) – incorporating all institutional information systems and processes involving learning, and Virtual Learning Environments (VLE) – a system within an MLE that facilitates learning transactions and interactions (Joint Information Systems Committee, 2003b). The terms Learning Management System (LMS), and Course Management System (CMS) are also similarly used.

A MLE is now almost ubiquitous in tertiary institutions engaged in e-learning, with many different systems, both commercial and open-source, available for use. A centralised infrastructure offers significant benefits to students by simplifying access to e-learning resources and providing consistency, while freeing teaching staff to concentrate on learning and teaching aspects (Katz, 2003). The significant resources expended by the ADL Consortium in developing the SCORM framework (http://www.adlnet.org/index.cfm?fuseaction=scormabt) show that ad-hoc initiatives are unlikely to achieve the integration of technologies needed for future e-learning implementations.

The Joint Information Systems Committee identifies two challenges for MLEs: one cultural – involving institution-wide collaboration for change in pedagogical concepts; the other technical – concerning systems integration. They comment that '[f]ull integration…is most likely to come from a standards or specifications based approach… that requires the close collaboration of the entire community of colleges, support agencies and suppliers' (2003b, p. 1).

E-learning integration, for Jochems *et al.*, (2004), involves not only integrating learning using information and communication technology (ICT), but also integrating ICT in education, so that 'e-learning is not considered merely as an addition to instruction, but as an innovation, an integral part of the educational system' (p. 7). However, Jochems *et al.* find aspects of the system's technical dimension problematic. Arguing that interoperability specifications are crucial for large interconnected networks, they note that although there are several initiatives promoting specifications, there is also a plethora of incomplete architectures, protocols and standards to contend with. Furthermore, they comment that actual implementation of network interoperability mostly falls outside the influence of e-learning. Koper (2004) points to the importance of e-learning user interfaces, which govern much of the learning interaction and have quite specific requirements that differ from those of most common applications (pp. 69-70). In concluding, Jochems *et al.* observe that although perspectives of e-learning are often reduced to either interaction or delivery capabilities, integrated e-learning must take on a 'wider, organizational, systemic perspective' (p. 206).

Expanding on the problem of e-learning 'standards', (Hirumi, 2005) notes that these are rarely true standards, rather, they are usually 'guidelines, specifications, or statements of good practice' (p. 320) such as those used in the e-Learning Guidelines for New Zealand (http://elg.massey.ac.nz). One that is close to becoming a standard is the Shareable Content Object Reference Model (SCORM), which concerns the capability of learning materials to be shared and reused. The generic standard used by many creators of specifications is the Institute of Electrical and Electronics Engineers (IEEE) Learning Technology Standards Committee (LTSC) P1484, which is working towards International Standards Organisation

(ISO) accreditation for learning technology (p. 321). The Aviation Industry's involvement in computer-based training also gives it some sway over learning technology specifications. Reporting on his analysis of six major industry specifications, Hirumi identifies two main variables; learning content, and systems operating environment. Learning content is now focused on attaining high levels of time and information efficiency, resulting in the 'disaggregation of content into smaller instructional units [thereby] providing smaller chunks of instructions (referred to as learning objects) at the moment and location of need through the use of modern telecommunication technologies' (p. 322). Definitions of learning objects vary, problematically, from 'any entity digital or non-digital that may be used for learning, education, or training' to 'the smallest stand-alone piece of instruction that contains an objective, an activity, and an assessment, wrapped by descriptive metadata' (p. 322). Metadata being the indexing information used to describe the object's nature and purpose. According to Hirumi, good progress is being made on technical specifications that govern systems matters such as interoperability. However, he perceives difficulties in the separation of guidelines and specifications into educational areas (courses and programmes) and industrial items (objects and assets), and suggests that the conversations occurring in the quest for quality e-learning may be as, or even more, helpful than the standards they seek to determine.

Practices

Evidence of capability in this area is seen through the use of consistent, documented practice that reuses previous experience within the institution to build capability. Formal standards are used where available to inform and guide practice and ensure quality and reusability of materials. These standards and guidelines are communicated widely within the institution to encourage wider adoption by teaching staff.

Table D6-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**The effectiveness of institutional standards in influencing student outcomes and efficiency of e-learning courses is measured and this information used to maintain and introduce standards for use.** **Measures of performance and interoperability of e-learning infrastructure are used to (re)develop standards and guidelines.** Standards regularly revised as student learning needs and e-learning technology use evolve. New standards developed, either externally or internally, are reviewed when promulgated and introduced using a formal process if appropriate and useful. Institutional e-learning risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of e-learning projects and initiatives as well as changing standards and staff requirements arising from e-learning technologies and pedagogies being used.
4: Management	**Compliance with and use of defined institutional standards is measured and enforced through regular review of the physical e-learning infrastructure and individual courses.** **Feedback collected regularly from staff on the effectiveness, robustness and reliability of the e-learning infrastructure.** **Feedback collected regularly from students on the effectiveness, robustness and reliability of the e-learning infrastructure.** Standards are subject to regular review from the perspectives of the institution, teaching staff and students. The effectiveness of individual standards in enabling the physical e-learning infrastructure is regularly reviewed and reported on. Financial costs and benefits of compliance with the defined institutional standards regularly assessed and reported on. E–learning infrastructure (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Formal e-learning infrastructure risk assessment and mitigation strategy review is undertaken, reported on regularly and the results endorsed by institutional leadership. Institutional decisions to add new or modify existing e-learning standards are informed by formal testing and review by student and staff users.
3: Definition	**Institutional policies require the use of defined standards when designing, (re)developing or using the physical e-learning infrastructure.** **Staff are provided with training, guidelines and examples for working with institutional standards for the physical e-learning infrastructure.** Staff are provided with project template documents and tools including checklists, workflow tools, and quality assurance procedures to support design and development of e-learning projects and initiatives. Templates and guidelines provided for creating and modifying standards. A researched evidence base of e-learning standards relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development. Institutional decisions to add new or modify existing e-learning standards are informed, aligned with and supportive of institutional e-learning strategies and technology plans.

2: Planning	**A searchable repository of standards for the physical e-learning infrastructure is provided.** Course, programme or degree planning and review processes incorporate assessment of the contributions made by standards for the physical e-learning infrastructure. Reviews of the physical e-learning infrastructure include assessment of the risks introduced and mitigated by the use or not of standards.
1: Delivery	**The physical e-learning infrastructure is integrated seamlessly with other key institutional IT systems.** **Reference is made to institutional or external standards and guidelines when designing and (re)developing the physical e-learning infrastructure.** **Standards for the physical e-learning infrastructure are defined for all technologies used in the design, (re)development and delivery of courses.** Reference is made to institutional or external standards and guidelines when providing access to the physical e-learning infrastructure to staff and students.

Table D6-1: Descriptions of process practices by capability dimension

Process D7.

Resources created are designed and managed to maximise reuse

Process Background

It is argued that a major economic and efficiency advantage of e-learning is its potential for sharing and reusing learning materials (Jochems *et al*., 2004; Weller, 2004; Wiley, 2000). This view has given rise to a revision of learning materials as 'learning objects' in a 'learning object economy' (Campbell, 2003). The realm of learning objects is prominently promoted through the Sharable Content Object Reference Model (SCORM®) approach (Dodds and Thropp, 2004), which specifies a technical framework to standardise the creation, use, sharing, and reuse of learning objects. There are several definitions of learning objects, ranging from '…reuseable bits of learning content' (Sloep, 2004, p. 139) to '…any entity, digital or non-digital, which can be used, re-used, referenced during technology supported learning' (IEEE, 2005). The IEEE list of learning objects include: 'multimedia content, instructional content, learning objectives, instructional software and software tools, persons, organizations, or events referenced during technology supported learning' (IEEE, 2005). However Sloep (2004) notes that there are objections to the IEEE definition that do not consider the inclusion of people appropriate, and find the term 'technology supported learning' too exclusive (p. 142).

Wiley (2000) notes that the use of learning objects in e-learning is a far more complex process than the Lego metaphor, used by some, would imply: '"LEGO properties" of learning objects point toward a possible trend: the tendency to treat learning objects like components of a knowledge management system (perhaps the term "information objects" would be appropriate)' (p. 18).

Also critiquing the Lego metaphor for its oversimplification of the complexities, Littlejohn (2003) notes that, from a constructivist perspective, 'learning resources act as triggers for both internal (inner mental) and external dialogue (with tutors and peers)' (p. 2). This gives rise to the proposal that learning processes are also resources that should be regarded 'as templates (for example a framework for discussion or a learning task) that teachers could access and use…' (p. 3).

The reuse and sharing of learning objects relies on the ability to store and retrieve them effectively. To achieve this, the object's description – learning object metadata (LOM) – and content packaging (CP) specifications must be accurately documented. Although this information is extensive and agreement on its formulation is still to be reached, it will provide capability for learning objects to be not only stored and retrieved with ease but also manipulated by software such as authoring systems.

Koper (2004), identifies several issues concerning sharing and reuse that require further clarification. Firstly, there is a need to clarify types of objects that are reusable. The most reusable being small units of learning, thereby raising the issue of granularization (Duncan, 2003; Wiley, 2000), or the size of learning objects. A third issue concerns how objects are aggregated for use in learning units and activities, particularly with regard to automated processes, which, in turn introduces the issue of disaggregation, or how to deal with other course materials that are not appropriate for e-learning. Finally there is the issue of adapting learning objects, which concerns not only technical complexities, but also the intellectual and property rights involved.

The need for a systemic view of these issues introduces the notion of a learning object economy with drivers and barriers that will influence and affect local and global exchanges of learning resources (Campbell, 2003). Campbell envisions markets for both globalised commercial products and open source solutions in 'micro trading economies where resources are exchanged within and between recognised communities of practice' (p. 44).

Strijker and Collis (2006) describe an approach to identifying contextual dimensions of learning that assist with the clarifying the reuse capabilities of learning objects. There are five categories of dimension each with contexts ranging from systemic to personal. The dimensions are: cultural, ranging from systemic industrial through domestic, civic, opinion, and mercantile, to personal inspiration; learning approaches, ranging between acquisitive and participative; incentives, from organisational to personal; work processes from formal systems to personal habits; and storage that uses a repository system or

is held locally (p. 92). Strijker and Collis propose a profiling tool based on this approach that enables values to be plotted on each dimension and thereby providing strategic information about the potential reusability, or otherwise, of learning objects: 'The Learning Object Context Profiling Model can help increase awareness of stakeholders align the dimensions in a systems-oriented way…to make a reuse strategy successful' (p. 94).

Learning object sharing and reuse is, as Pegler (2005) discusses, a 'hot topic' that involves considering a wide range of conceptual approaches, including understandings of roles that learning objects may play in the future of e-learning (Bennett and McGee, 2005).

Practices

Evidence of capability in this process is seen through the creation and use of metadata standards and templates along with repositories for storing and accessing course resources for reuse. Teaching staff should be provided with training and support in the creation and resue of resources as well as incentives to both create reusable resources in the first place as well as enable reuse. Intellectual property aspects of resource creation and use should be addressed explicitly at a policy and employment level and all staff involved in the design, (re)development and delivery of courses must be trained and supported in understanding the implications of intellectual property in their work. Ongoing design and development of the physical e-learning infrastructure should be done with an awareness of reuse as well as an appreciation of the rapid pace of change and development in this area.

Table D7-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Information on the ability of particular technologies to support reuse used to make decisions about new technologies being made available and whether to allow the ongoing use of existing technology.** **Effectiveness of attempts to encourage reuse is measured and used to inform strategic planning relating to future e-learning initiatives.** Information on the extent to which courses are reusing resources is used when designing and (re)developing courses and programmes. Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of design and (re)development support for reuse and changing staff requirements arising from e-learning technologies and pedagogies being used.
4: Management	**The extent to which resources are being reused is measured and reported on regularly.** **The extent to which staff are creating reusable resources is measured and reported on regularly.** **E–learning resources intended for reuse are tested and reviewed by staff and student users.** **Feedback collected regularly from staff regarding the effectiveness of systems and procedures for encouraging and supporting reuse of course resources.** Effectiveness and impact on reuse of templates, project supporting materials and quality assurance procedures used by staff is measured and reported on. Compliance with standards for metadata creation is monitored prior to and during delivery of all courses. Financial costs and benefits of reuse are regularly assessed and reported on. Formal e-learning resource reuse risk assessment and mitigation strategy review is undertaken, reported on regularly and the results endorsed by institutional leadership.

Dimension	Practices
3: Definition	**Intellectual property agreements are defined and implemented with all staff engaged in the design, and (re)development of course resources.** **Staff are provided with training, guidelines and examples for creating and adapting reusable resources.** **Institutional strategies, policies, contracts and standards support and encourage the reuse of e-learning resouces.** Metadata templates and schemas are defined for use at a disciplinary and institutional level. Staff are provided with training, guidelines and examples for creating effective metadata for all resources they create or use. Standards, including pre-defined licenses and terms of use, for the storage and interoperability of content resources are defined. Institutional policies require that designed and (re)developed content resources be able to be reused beyond the immediate course context. Institutional policies and standards define procedures governing the archiving and orderly deletion of e-learning resources and information. A researched evidence base of e-learning projects and initiatives undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development.
2: Planning	**A searchable repository of reusable e-learning resources is provided.** **E–learning design and (re)development procedures include explicit consideration of licensing or purchasing and reuse of pre-existing resources before new resources are created.** **Incentives provided to teaching staff to create resources that can be effectively reused.** **Incentives provided to teaching staff that reuse resources sourced internally or licensed from external repositories.** **E–learning resources are explicitly designed to support ongoing maintenance and adaptation.** Metadata templates used when creating and using content resources during course design, (re)development and delivery. Ownership and use conditions stored in a consistent manner with content resources during course design, (re)development and delivery. Course e-learning resources are designed to support ongoing use and reuse by students. Plans for reuse of e-learning materials and resources include formal risk assessment and mitigation of risks arising from reuse.
1: Delivery	**E–learning resources packaged and stored for reuse beyond initial delivery.** Metadata is provided for all e-learning resources created and used in courses. Ownership and use conditions apparent for all e-learning resources delivered as part of courses.

Table D7-1: Descriptions of process practices by capability dimension

Support: *Processes surrounding the support and operational management of e-learning*

This process area covers the day-to-day management and support of e-learning delivery Particularly as they impact on the ability of students to engage effectively with e-learning and teaching staff to facilitate students achieving the intended learning outcomes. A goal of these processes is ensuring the efficient and effective day to day management of e-learning delivery. This means students and teaching staff can focus on the educational aspects of the course rather than peripheral issues. The individual processes are aimed at ensuring teaching staff and students are placed in the best possible way to succeed in use of e-learning pedagogies and technologies and are not hindered by lack of institutional information, support or training.

Support: ***Processes surrounding the support and operational management of e-learning***	
S1.	Students are provided with technical assistance when engaging in e-learning
S2.	Students have access to a range of library resources and services when engaging in e-learning
S3.	Student enquiries, questions and complaints are collected formally and managed
S4.	Students have access to support services for personal and learning issues when engaging in e-learning
S5.	Teaching staff are provided with pedagogical support and professional development in using e-learning
S6.	Teaching staff are provided with technical support in the handling of electronic materials created by students

Table 4: eMM Version Two *Support* Processes

Process S1.

Students are provided with technical assistance when engaging in e-learning

Process Background

The dependence of e-learning on technology means that students must be able to receive support to ensure they can make effective use of that technology whenever they choose to study (Ragan, 1999; Salmon, 2000; Laurilard, 2002). Access to support facilities has been shown to correlate with improved learning outcomes (Fredericksen *et al*., 1999) but this is obviously predicated on students getting a professional and timely service.

Recent research shows that students' need for technical assistance is no longer seen as a significant barrier to e-learning (Muilenburg and Berge, 2005). However, although more students are gaining improved computer literacy skills, many still believe they need additional training, and older students report that they need more training than do younger students (Kvavik and Caruso, 2005, p. 9). Kvavik and Caruso consider training to be an ongoing requirement as technology advances and changes, '[w]e cannot assume that students are prepared to take advantage of these technologies in the absence of planned, systematic, and just-in-time training that is based on a recognized level of required skills' (p. 19). They also recommend a policy approach that requires institutions to 'articulate concrete IT learner competencies and literacy for students' (p. 19). Finally, Kvavik and Caruso report that the reliability of IT services and support is most important for students, who 'express frustration when networks or servers are down, technical support is unavailable, or the technology gets in the way of completing their required coursework' (p. 19).

A study by Kedar *et al*., (2003) indicates that if technological and technical problems are not promptly resolved, students express dissatisfaction with e-learning systems (Bouhnik and Marcus, 2006, p. 303). Technical problems and learning difficulties are related, according to Clyde and Delohery (2005): '…half of the students claiming technical problems…have been experiencing problems with their own learning curve' (p. 38). They recommend, as do others (for example, Vonderwell and Zacharia, 2005), a preemptive approach to these problems that assesses students' technical capabilities to ensure that appropriate levels of institutional or specific training and support are made available as needed. For Conrad and Donaldson (2004), meeting the needs of online learners also involves the online facilitator getting to know students and identifying those needs.

According to Kirschner *et al*., (2004), there can be significant difference between intentions for support and users perceptions of them. They describe an iterative model for designing for e-learning that attends to six steps, including learner competencies, interactions, and tasks, towards 'determining how computer support can be best applied' (p. 31). The model pays close attention to actual and particular learner needs, including: how best to address and support those needs, the learner's perceptions of the support provided, how the support is actually used, and how effective the support is for actual learning achievement: 'We might be tempted to say that this is "the proof of the pudding"' (p. 30).

Salmon's (2000) 5 Step Model similarly proposes a staged approach to supporting learners' technology needs that begins by helping with setting up and accessing the system, sending and receiving messages, searching and personalizing software, conferencing, and links to other systems (pp. 25-37). Salmon notes the importance of providing encouragement and motivating learners by helping them to understand how efficiencies of integrated e-learning course are beneficial: 'It is a great mistake to assume that any participant will want to divert hours and hours to online conferences without good reason' (p. 27).

Practices

Evidence of capability in this process is seen in the provision of information on how to get assistance with technology. This should consist of contact information for both telephone and email support as well as self-help facilities such as web pages and documentation. It should convey how student requests will be treated and the timeframe within which they can expect assistance. Course specific information should be supplied when technologies are used other than those formally and normally required and supported by the institution. Policies and guidelines should communicate the extent of support available and the timeframes within which support is provided. Support staff are provided with templates, examples, training and support in using the range of resources available to assist students.

Table S1-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**The support needs of students are taken into account during new e-learning technology selection and deployment.** **The types and content of student requests are used to influence technologies introduced and supported, and to manage the process of introducing new technologies.** **The types and content of student requests for e-learning technical support are used to inform the risk assessments undertaken and mitigation strategies implemented for current and future e-learning projects and initiatives.** Measures of support performance used to determine resources provided to support students. Measurements of when students access e-learning services are used to plan and resource the hours of operation of support. Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of student support and changing student requirements arising from e-learning technologies and pedagogies being used. Formal risk assessments undertaken of e-learning initiatives and projects are used to identify requirements for new or changed technical assistance.
4: Management	**Measures of the demand for and effectiveness of the technical support provided to students are collected and reported on regularly.** **Feedback collected regularly from students regarding the clarity and effectiveness of the technical support provided.** **Feedback collected regularly from staff regarding the clarity and effectiveness of the technical support provided to students.** Measures of student support response times and effectiveness collected and reported regularly. Compliance of e-learning technical support with defined student support service level agreements monitored and regularly reported on. Compliance of e-learning technical support with institutional e-learning strategies and technology plans monitored and reported on regularly. Financial costs and benefits of technical support provided to students regularly assessed and reported on. E–learning support provided to students is subject to formal quality assurance reviews and re-prioritisation of resources and objectives. Measures of the demand for and effectiveness of the e-learning technical support provided to disabled students are collected and reported on regularly. Overlap and duplication of support and resources provided to students engaged in e-learning is regularly reviewed and addressed in line with institutional e-learning strategy and technology plans.
3: Definition	**Institutional standards and service level agreements for the type and extent of student technical support are defined in a way that is informed, aligned with and support institutional e-learning strategies and technical plans.** **Institutional procedures for acquiring and maintaining e-learning technologies explicitly consider the student support implications.** Staff involved in providing technical support to students are provided with templates, examples, training and support in using the range of resources available to assist students. Templates available for use by staff providing information on the support provided for commonly used technologies.

Dimension	Practices
2: Planning	**Course design and (re)development plans include information on likely support implications arising from technology use, including costs and workload implications for the organisation, staff and students.** **Clear, consistent instructions are available prior to enrolment to all students on what support they can expect from the institution when engaging in e-learning.** **The distribution of responsibility for student support between the teaching staff and institutional support services is explicit and communicated clearly to students.** **E–learning design and (re)development activities formally link decisions regarding e-learning technologies and pedagogies with the available support facilities.** E–learning design and (re)development plans include a formal assessment and mitigation plan for the risks associated with student use of technology for e-learning. Course outlines include defined procedures and contact information for technical support through a variety of communication channels. Students are provided with a clear description of the timeframe and procedures that will be followed to resolve any concerns or complaints they raise. Students are provided with technical support during the same hours that they are engaging in e-learning activities. Technical support facilities include a procedure and repository for storing the information supplied by students when seeking support. Service level agreements for the type and extent of student technical support are defined and owned by units responsible for providing the support.
1: Delivery	**Information for students on accessing technical support and training through a variety of communication channels is provided.** Technology support is linked to materials describing individual e-learning facilities such as on-campus computer laboratories. Technology support is linked to administration facilities such as systems for managing student usercodes and passwords.

Table S1-1: Descriptions of process practices by capability dimension

Process S2.

Students have access to a range of library resources and services when engaging in e-learning

Process Background

One of the significant benefits of campus-based learning is access to library and research facilities. Regardless of the mode of delivery, if students are to achieve the full benefit of their courses they need similar access (Lebowitz, 1997), particularly if they are to engage in research (process L6). The American Library Association guidelines for distance learning clearly state 'Access to adequate library services and resources is essential for the attainment of superior academic skills in post-secondary education' (American Library Association, 2004, Philosophy ¶ 1).

However, access to library services is as much a matter of literacy as it is one of resources and services: 'The instilling of lifelong learning skills through general bibliographic and information literacy instruction in academic libraries is a primary outcome of higher education. Such preparation and measurement of its outcomes are of equal necessity for the distance learning community as for those on the traditional campus' (American Library Association, 2004, Philosophy ¶ 2). The ALA's philosophical precepts also declare that e-learning library services must be regarded as additional to on-campus services, and that '[s]pecial funding arrangements, proactive planning, and promotion are necessary to deliver equivalent library services and to achieve equivalent results in teaching and learning, and generally to maintain quality in distance learning programs' (American Library Association, 2004, Philosophy ¶ 3). In addition to these considerations, the ALA advises that library facilities, resources, and services also need to include assistance and instruction for users to ensure optimum access and efficiency.

Access to library resources may involve multiple systems environments. Porter (2005) discusses varying degrees of integration between library and e-learning related systems environments, and differing views on how far that integration should go. She concludes that all major stakeholders need to be involved in strategic planning to ensure that implementation and maintenance of facilities, resources, and services meet shared objectives: 'In all cases the role of the LIS [Library and information services] should be carefully considered in order to maximize investment in library systems and to improve user support' (p. 26). Expressing a similar concern about the challenges of providing LIS resources, Liber (2005) comments on how 'technical innovation… accompanied by changes in organizational processes and structures…must involve the widest possible range of participants to identify how and which changes and uses of technology are best suited to their specific contexts' (p. 52).

Students' expectations of access to library materials are commensurate with technology developments. As Stubley (2005) notes 'increasingly when students have course content delivered online via the VLE, they will naturally expect that the bulk of their supporting reading should be made available in precisely this same way' (p. 125). A 'new partnership' between library and academic departments is needed to address this situation, in which 'the most important factor is the dialogue….If large-scale ownership and interest can be engendered, the chances of success are improved, even when this falls short of the creation of departmental policies' (p. 131). Stubley comments on the need to enable learner's to negotiate the enormous global information resource in ways that support different pedagogical approaches. He also notes that the increasing availability of full text electronic access to journals is opening potential for even more resources to be made directly available to students.

E-learning introduces a new way of understanding students' access to, and use of, library facilities, resources, and services. It involves three issues: the student's own capabilities for access; the organisation and management of the materials to be accessed; and, the organisation and management of the services and facilities and services used for access. Electronic access to materials presents challenges as well as opportunities, and the research literature supports a holistic, rather than a piecemeal approach to addressing both opportunities and challenges. The literature also emphasises the need for collaborative relationships between all stakeholders to engender ownership of a 'new partnership' to make the best possible services and support available to students.

Practices

Evidence of capability in this process is seen through the provision of a full range of library facilities and associated support and training information to assist students with their use. Information on using these services is provided both through the central library website as well as directly within courses where it is customized to reflect the needs of the particular discipline and learning outcomes.

Table S2-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Strategic changes to e-learning pedagogy and technology are integrated with the planning and support of library services.** **The effectiveness of library resources and services in supporting student learning is used to inform strategic planning for to future e-learning initiatives.** **Information on the effectiveness of library resources and services in supporting student learning is used when designing and (re)developing courses and programmes.** The range and type of library services provided is maintained and developed in response to the information collected on student usage and satisfaction. Measurements of when students access library resources and services are used to plan and resource the hours of operation of the library facilities. Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of library support and changing staff requirements arising from e-learning technologies and pedagogies being used. The effectiveness of library resources and services in supporting student learning is used to inform the risk assessments and mitigation strategies implemented for current and future e-learning projects and initiatives.
4: Management	**Measures of student ability to access library resources and services effectively are collected and reported on regularly.** **Feedback collected regularly from students regarding the effectiveness of the library resources and services provided.** **Feedback collected regularly from staff regarding the effectiveness of the library resources and services provided to students.** Measures of the demand for and effectiveness of library support provided to disabled students are collected and reported on regularly. Compliance of library support with institutional e-learning strategies and technology plans monitored and reported on regularly. Financial costs and benefits of providing library services to students engaged in e-learning regularly assessed and reported on. Library support services for e-learning are subject to formal quality assurance reviews and re-prioritisation of resources and objectives. Regular, formal, risk assessments undertaken of e-learning initiatives and projects so as to identify requirements for new or changed library services and support. Overlap and duplication of support and resources provided to students engaged in e-learning is regularly reviewed and addressed in line with institutional e-learning strategy and technology plans.
3: Definition	**Institutional policy, standards, service level agreements and licenses ensure that students have access to a full range of library resources and services when engaged in e-learning.** Institutional standards for the type and extent of student library support are informed, aligned with and support institutional e-learning strategies and technical plans. Decisions about the type and extent of library support provided to students are informed, aligned with and support institutional e-learning strategies and technical plans. Templates and examples provided for use in course materials describing how to communicate library services available to students in individual courses. Standard templates for library resource pages listing useful databases, journals etc. are provided and supported by designated course or discipline librarians. Staff are provided with training, guidelines and examples on how to use library services to support student learning.

Dimension	Practices
2: Planning	**Summaries of useful library resources provided on a course or discipline basis.** **Library staff are involved in the planning and (re)development of e-learning projects and initiatives.** **E–learning design and (re)development activities formally link decisions regarding e-learning technologies and pedagogies with the available library services and appropriately licensed resources.** **The institutional distribution of responsibility for student support services is explicit and communicated clearly to staff and students.** Library services designed for students engaged in e-learning are specified and provided along with support and instructions in enrolment materials and the library webpages. Individual courses have a designated librarian assigned on a course or discipline basis. Designated library staff contact information supplied to students in the course outline. Students are provided with a variety of mechanisms to access physical resources without having to go to a designated library. Students are provided with support and training in effective use of the full range of library services available to support their learning. Students are provided with library services and support during the same hours that they are engaging in e-learning activities. Library staff are involved in the (re)development of institutional e-learning policy and strategy.
1: Delivery	**A standard service for students engaged in e-learning is available through an institutional library, including web access to databases and other support resources.** **Links to library services accessible through a variety of formats and communication channels are provided in multiple places throughout course materials.** Students are given clear information on how to access the full range of library services available to support their learning. Students are provided with lists of starting points for using library services rather than pre-defined and complete reading lists.

Table S2-1: Descriptions of process practices by capability dimension

Process S3.

Student enquiries, questions and complaints are collected formally and managed

Process Background

The isolation of many students in e-learning situations calls for closer academic and administrative attention to all enquiries, questions, and complaints (Curry, 2003). While all institutions will have formal processes for student grievances, there are many other day-to-day concerns that need to be resolved quickly and professionally if they are to not to impair learning outcomes for students. Prompt, attentive responses to student enquiry communications ensure that motivation for learning is not compromised and lessens the potential for student incompletions (Moody, 2004). Dirr (2003) reports that students often resort to expressing their frustrations to each other concerning technical problems, poor support, and ambiguous course instructions. Citing Krauth and Carbajal (1999), Dirr (2003) highlights the success of institutions who have moved from a service provider approach, to a customer service approach that includes 'decision support systems that offer students a variety of opportunities for self-help and customized services' (p. 471).

Although formal procedures for addressing student enquiries, questions and complaints do not appear to be addressed directly in the literature, they are very much matters that concern e-learning quality management and evaluation researchers (Bouhnik and Marcus, 2006; Picciano, 2002). For example, Picciano (2002) commenting on measures of quality, notes that: 'Ultimately, student perceptions of their learning may be as good as other measures because these perceptions may be the catalysts for continuing to pursue coursework and other learning opportunities' (p. 22). Furthermore, Bouhnik and Marcus (2006) cite student dissatisfaction, which complains of: 'Lack of interpersonal, direct (nonmediated) interaction [and]…. In answering his or her students' questions, the teacher's ability to widen the scope of his or her answer is limited' (p. 300). Comments like these make it clear that formal documentation of all student enquiries, questions, and complaints needs to be mandatory in e-learning institutional policy.

Practices

Evidence of capability in this process is seen in the provision of instructions to students in all courses on where to communicate any concerns they might have about any aspect of their learning. This should either be a single student help desk or a clear list that provides alternatives and indicates how these are to be used, such as particular contacts for technical issues and others for learning concerns or complaints. Policy should require the provision of this information in some standard way and guidelines should be provided on how student communications are to be handled, including timeframes and record-keeping. Teaching and support staff are provided with templates, examples, training and support in handling student complaints.

Table S3-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Student complaint reports are used to inform technical and pedagogical support processes, resourcing and (re)development of new and existing e-learning technology and courses.** **Student concerns and complaints are incorporated into the process of strategic planning for future e-learning initiatives.** **Staff development and training resources are allocated in response to questions, concerns and complaints from students engaged in e-learning.** Student concerns and complaints are incorporated into the process of evaluating and selecting new e-learning technologies and pedagogies. Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of handling of student complaints and concerns as well as changing student requirements arising from e-learning technologies and pedagogies being used. The types and content of student concerns and complaints are used to inform the risk assessments undertaken and mitigation strategies implemented for current and future e-learning projects and initiatives.
4: Management	**Information on the type and resolution of student complaints and concerns are aggregated and reported regularly.** **Feedback collected regularly from students regarding the effectiveness of the collecting and resolution of student concerns and complaints.** **Feedback collected regularly from staff regarding the effectiveness of the collecting and resolution of student concerns and complaints.** Financial costs and benefits of collecting and addressing student enquiries, questions and complaints regularly assessed and reported on. Collection and resolution of student concerns and complaints are subject to formal quality assurance reviews and re-prioritisation of resources and objectives. Regular, formal, risk assessments undertaken of e-learning initiatives and projects so as to identify requirements for new or changed complaints handling procedures and standards. Compliance of the collection and resolution of student concerns and complaints with institutional e-learning strategies and technology plans monitored and reported on regularly. Overlap and duplication of support and resources provided to students engaged in e-learning is regularly reviewed and addressed in line with institutional e-learning strategy and technology plans.
3: Definition	**Standards and service level agreements for the handling of student complaints are defined along with detailed procedures that must be followed by staff receiving complaints or concerns.** **Teaching and support staff are provided with templates, examples, training and support in handling student complaints.** **Institutional expectations for the quality and type of feedback to be provided to students are formally defined and communicated to staff.** Institutional standards for the handling of student complaints are informed, aligned with and support institutional e-learning strategies and technical plans. A single repository for collecting student concerns and complaints is provided. Type and extent of responsibility for handling student complaints noted in teaching staff role descriptions.

Dimension	Practices
2: Planning	**A formal process for making complaints and having them resolved is communicated to students.** **Students are provided with a clear description of the procedures that will be followed to resolve any concerns or complaints they raise.** **Facilities for collecting and resolving student concerns and complaints are provided using a variety of alternative communication channels consistent with the course as a whole.** Students are provided with information on the timeframes for receiving responses to concerns and complaints. Records of complaints and the resolution of them are retained in a designated repository. Facilities for collecting and resolving student concerns and complaints operate over the same hours of the day that the course is being engaged with by students. Design and development of procedures for handling student enquiries, questions and complaints includes a formal risk assessment and mitigation plan. Course outlines provide information to students on the timeliness, type and extent of feedback they can expect from teaching staff in response to any complaints or concerns.
1: Delivery	**A mechanism for collecting complaints through a variety of communication channels and formats is provided explicitly in the course infrastructure.** **Students are provided with clear and comprehensive information on how they raise any concerns or complaints.** **Teaching staff are provided with information regarding e-learning student concerns and complaints and an opportunity to address them.** Institutional websites provide students with information on how to raise any concerns or complaints.

Table S3-1: Descriptions of process practices by capability dimension

Process S4.

Students have access to support services for personal and learning issues when engaging in e-learning

Process Background

The use of e-learning to remove the constraint that students attend courses face-to-face does not remove the need for institutions to provide as full a range of support services as possible (Sewart, 1993). As well as technical support for e-learning students need support with personal and learning issues. Tait (2000) describes such support as 'the range of services both for individuals and for students in groups which complement the course materials or learning resources that are uniform for all learners' (p. 289). He proposes that student support has cognitive, affective, and administrative concerns: '1. cognitive: supporting and developing learning through the mediation of the standard and uniform elements of course materials and learning resources for individual students; 2. affective: providing an environment which supports students, creates commitment, and enhances self-esteem; and 3. systemic: establishing administrative processes and information management systems which are effective, transparent and overall student-friendly' (p. 289). Tait observes that although support is usually considered an administrative process, all three concerns are 'essential and interdependent' (p. 289). He comments further that while the affective consequences of poor administrative support are usually recognised, there is less appreciation of the adverse affects of poor support on student's cognitive functions: 'Where the support of students mediates teaching embodied in courseware, then it clearly relates to learning, and…cognitive outcomes. It also…relates to…providing an environment where students feel at home, where they feel valued, and which they find manageable. In this way we can see that the three core functions are truly interrelated and interdependent' (p. 289). Tait envisions a student support framework that interrelates the management system, technological infrastructure, and course requirements with student cohort characteristics, geographical issues, and the scalability of the programme: 'The success of the planning process lies in identifying within the core elements of the study support system which specific compromises provide optimal results' (p. 297).

Mishra (2005) identifies seven roles that encompass activities for supporting students: assessor, coach, counsellor, demonstrator, mentor, supervisor, tutor. He reports that teachers' self-perception of the importance of each of the roles ranked counsellor first, assessor second, coach third, and tutor fourth, thus indicating their concern for the personal needs of students (p. 152).

Established distance learning institutions recognise the importance of strong student support. For example, the UK Open University has a tutor to learner ration of 20-25:1 and tutor responsibilities include 'maintaining personal contact with their students…and mediating the learning experience' (Daniel and Mackintosh, 2003, p. 819). And, the University of South Africa has a Department of Student Support that arranges face-to-face tutorials, although Daniel and Mackintosh note that resourcing this facility is a challenge.

Student support is not just a formal service to be delivered it is also an on-going informal dynamic process that students must involve themselves in, and it needs to be fostered. As Clarke (Clarke, 2004) advises, 'support is not limited to the formal support of your tutors but can include: other learners; study circles/groups; family; friends; learning centre staff; workplace instructors; mentors; tutors' (pp. 16-17). It is important for the student to be welcomed and made sufficiently comfortable with the e-learning environment so that they are able to express and explain their need for and what they require from support. Clarke describes five key elements that the online tutor provides to help to make this happen: welcome/confidence; support; feedback; facilitation; monitoring.

Practices

Evidence of capability in the process is seen in clear documentation, complying with a consistent institutional template, setting out the information necessary for accessing all available student services. Policy should require that this information be accurate, regularly reviewed and provided to students in advance of enrolment. Templates should be provided to ensure a consistent organisation and content. Elements that are standard to all courses should use wording prescribed by policy.

Table S4-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Measures of personal and learning support services' performance used to determine resources provided to support students.** **The types and content of student requests for personal and learning support inform the selection and deployment of new e-learning technologies.** Review information used to inform allocation of resources for services that support the students independently of the courses and programmes. Measurements of when students access e-learning services are used to plan and resource the hours of operation of support. Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of personal and learning support and changing student requirements arising from e-learning technologies and pedagogies being used. The types and content of student requests for personal and learning support are used to inform the risk assessments undertaken and mitigation strategies implemented for current and future e-learning projects and initiatives.
4: Management	**Measures of the demand for personal and learning support provided to students are collected and reported on regularly.** **Feedback collected regularly from students regarding the clarity and utility of the personal and learning support provided.** **Feedback collected regularly from staff regarding the clarity and utility of the personal and learning support provided to students.** Measures of personal and learning support response times collected and reported regularly. Measures of the demand for personal and learning support provided to disabled students are collected and reported on regularly. Compliance of the personal and learning support provided with institutional e-learning strategies and technology plans monitored and reported on regularly. Financial costs and benefits of providing support to students for personal and learning issues regularly assessed and reported on. Personal and learning support provided to students is subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Regular, formal, risk assessments undertaken of e-learning initiatives and projects so as to identify requirements for new or changed personal and learning support. Overlap and duplication of support and resources provided to students engaged in e-learning is regularly reviewed and addressed in line with institutional e-learning strategy and technology plans.
3: Definition	**Institutional standards and service level agreements for the type and extent of student personal and learning support are defined.** **Institutional standards and service level agreements for the type and extent of student personal and learning support are informed, aligned with and support institutional e-learning strategies and technical plans.** **Clear, consistent instructions are available prior to enrolment to all students on what personal and learning support they can expect from the institution when engaging in e-learning.** Clear, consistent instructions are available prior to enrolment to all students on how they can access personal and learning support. Staff involved in providing personal and learning support support to students are provided with templates, examples, training and support in using the range of resources available to assist students. Course outline templates available providing information on the personal and learning support provided.

Dimension	Practices
2: Planning	**E–learning design and (re)development plans include information on likely personal and learning support implications arising from technology use, including costs and workload implications for the organisation, staff and students.**
	Course outlines include a defined set of procedures for students to access personal and learning support services through a variety of communication channels.
	The institutional distribution of responsibility for student support services is explicit and communicated clearly to staff and students.
	Students are provided with a clear description of the procedures that will be followed to address their personal and learning support needs.
	Personal and learning support facilities include a procedure and repository for storing the information supplied by students when seeking support.
	Students are provided with a procedure to follow if responses to personal and learning support queries are unsatisfactory.
	Students are provided with information on the timeframes for receiving responses to personal and learning support service queries.
	Students are provided with personal and learning support during the same hours that they are engaging in e-learning activities.
	The distribution of responsibility for personal and learning support between the teaching staff and institutional support services is explicit and communicated clearly to students.
	Student personal and learning support services have in place a risk assessment and mitigation plan and strategy for e-learning projects and initiatives.
1: Delivery	**Information on personal and learning support services available to students through a variety of communication channels and formats is provided throughout course materials.**
	Institutional websites provide students with information on accessing personal and learning support services.

Table S4-1: Descriptions of process practices by capability dimension

Process S5.

Teaching staff are provided with pedagogical support and professional development in using e-learning

Process Background

Teaching staff need training and support if they are to be effective with new technologies and the associated pedagogies. This is a complex area and teaching staff need to be able to access a range of professional supports as they encounter issues during their work (Harasim *et al.* 1995). E-learning is not just a technological add-on that teachers need to learn how to use; it is a new educational system involving new pedagogical and professional procedures and processes that require support and professional development. As Salmon (2000) puts it: 'E-moderators are the new generation of teachers and trainers who work with learners online….Successful online learning depends on teachers and trainers acquiring new competencies, on their becoming aware of its potential and on their inspiring the learners, rather than on mastering the technology' (p. viii). Just as students benefit from the use of formative and summative assessment, teaching staff can also benefit from formal assessments of their capability that can be used to guide ongoing training and support as well as informing strategy and policy on resourcing for staff development.

Laurillard (2002) argues that teachers are responsible for generating the learning environment and students are responsible for taking advantage of it. However, the institutional environment is a very complex system that controls learning, thus, teachers' responsibilities are 'commensurate with the degree of control [they] exert over the learners' (p. 1). Laurillard's view is that e-learning involves rethinking 'teaching and the use of learning technology that is informed by a more elaborated understanding of what students do when they learn' (p. 7). However, thinking differently about acting differently is not enough: 'we must also be enabled to act differently. The institutional context must afford and encourage the actions we need' (p. 7). Under the heading 'academic management', Laurillard identifies several factors for development and support, including an induction programme for staff with the objectives of: 'raising awareness of current teaching practice and use of new technology in their field; elaborating their understanding of how students learn through different media; developing their expectations of, and critical approach to, new technology; developing formative evaluation skills for improving learning design; increasing the likelihood that they will make their own contribution to the field' (p. 226). Noting that academics show resistance to educational courses, Laurillard comments that development programmes need to be optimised and 'use the most extreme form of work-based professional updating possible….and encourage new and existing staff to gain teaching credentials' (p. 226). Two other suggestions are made: One, to form multi-skilled development teams that motivate and support collaborative development; the other to initiate a forum where academics and designers can share ideas and experiences.

Commenting that staff training often privileges the technical over the pedagogical, Khan (2005) also notes that many academic and administrative staff may have not experienced e-learning themselves. He recommends that they should undertake a course using the medium in order to better understand the learner's position (p. 35). Another problematic issue for Khan is teaching staff workload, which, particularly in the early stages of e-learning implementation, is very demanding because of the additional preparation and communication requirements. Careful consideration needs to given to balancing the management and support of staff development requirements with the added workload of staff in an environment of significant change.

Practices

Evidence of capability in this process is seen through the use of formal staff capability assessments during training and as part of the design and development process for courses and projects. Evidence from these assessments should be used to determine additional support and training allocations. Design and development plans should include formal processes for ongoing support of teaching staff and courses. Policy and guidelines should mandate staff capability assessments and require their use in ongoing staff development. Regular overview reports of capability should inform strategies for ongoing resourcing and development of e-learning.

Table S5-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Reports on the effectiveness and use of technological and pedagogical support are used to inform the process of resourcing e-learning projects, selecting new technologies and pedagogies and the provision of support when technologies are deployed.** **Measures of teaching staff capability to use e-learning technology and pedagogies effectively are used to determine resourcing for support.** **Pedagogical support implications explicitly addressed when introducing new technologies to the institution.** Reports on the effectiveness and use of technological and pedagogical support are used to determine resourcing and the type of support and assistance provided. Institutional e-learning strategies and technology plans include formal consideration of the e-learning design and (re)development support requests of teaching staff. Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of pedagogical support and changing staff requirements arising from e-learning technologies and pedagogies being used. The types and content of requests for pedagogical support and assistance are used to inform the risk assessments and mitigation strategies for current and future e-learning projects and initiatives.
4: Management	**Measures of the use and effectiveness of pedagogical support and assistance provided to teaching staff collected and regularly reported on.** **Measures of teaching staff capability to use e-learning technology and pedagogies effectively are collected and reported on regularly.** **Feedback collected regularly from students regarding the effectiveness of the teaching staff to make use of e-learning pedagogies to support student learning.** **Feedback collected regularly from staff regarding the effectiveness of the pedagogical support and training provided.** Compliance of e-learning pedagogy and technology support with institutional e-learning strategies and technology plans monitored and reported on regularly. Financial costs and benefits of providing staff with pedagogical support and assistance are regularly assessed and reported on. E–learning pedagogical support activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Regular, formal, risk assessments undertaken of e-learning initiatives and projects so as to identify requirements for new or changed e-learning pedagogical support. Overlap and duplication of support and resources provided to staff engaged in e-learning design, (re)development and delivery is regularly reviewed and addressed in line with institutional e-learning strategy and technology plans.
3: Definition	**Institutional standards for assessing teaching staff capability to use e-learning technology and pedagogies effectively are defined and applied.** **Formal processes for course (re)development explicitly include consideration of pedagogical issues.** Standards and guidelines covering pedagogical aspects of course design, (re)development and delivery are available and are used in the provision of support and training. Teaching staff are provided with project template documents and tools including checklists, workflow tools, and quality assurance procedures to support design and development of e-learning projects and initiatives. Decisions about the type and extent of technical and pedagogical support provided to staff are informed, aligned with and support institutional e-learning strategies and technical plans. A researched evidence base of e-learning projects and initiatives undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development. Institutional procedures, service level agreements and guidelines for acquiring and maintaining e-learning technologies explicitly consider the staff pedagogical support implications.

Dimension	Practices
2: Planning	**Pedagogical support and training for teaching staff in course design and (re)development reference a researched evidence base.** **Assessment of teaching staff capability to use e-learning technology and pedagogies effectively is done as part of course design and (re)development.** **Assistance for teaching staff in changing pedagogies explicitly included in the process of designing and (re)developing individual courses to incorporate e-learning technologies.** **Teaching staff are recognised, rewarded and supported in their engagement with innovative e-learning initiatives and experiments.** Assistance for teaching staff is scheduled or planned for throughout the process of course design and (re)development. Assistance for teaching staff is provided during the same hours that they are engaging in e-learning activities. E–learning projects and initiatives include a formal assessment of the risks arising from staff skills and experience in e-learning technologies and pedagogies. Selection criteria used to employ and reward teaching staff include an assessment of individual skills and experience in the use of e-learning technologies and pedagogies. E–learning design, (re)development and delivery procedures supported by teams of specialist staff, academic colleagues and students.
1: Delivery	**Teaching staff are provided with templates, examples, training and support in pedagogical aspects of the range of e-learning technologies available to support student learning.** **Teaching staff are provided with training and support in researching and reflecting upon their own practice with e-learning technologies and pedagogies.** **Teaching staff are provided wth support and training on how to assist students in developing effective skills for e-learning.** Formal arrangements are made in individual courses for ongoing support and assistance addressing potential technological or pedagogical issues. Pedagogical support in course development available to staff designing and (re)developing courses to incorporate e-learning technologies.

Table S5-1: Descriptions of process practices by capability dimension

Process S6.

Teaching staff are provided with technical support in the handling of electronic materials created by students

Process Background

E-learning involves a dynamic and complex information and communications environment that necessitates technical support for teaching staff to ensure students are able make best use of facilities and resources. Skills for effectively engaging in e-learning need to be learned and learners need to be supported and encouraged by teaching staff. Any technical problems or difficulties must be quickly and efficiently resolved to ensure students remain motivated. Salmon (2000) describes a five step method that progressively introduces students to increasingly complex technical elements and the skills they involve. Step one involves establishing access; step two, establishing communication; step three, finding and exchanging information; step four, participating in conferences; step five, developing experience and independence. This staged approach enables planned technical support.

Khan (2005) advises pre-planning an approach to technical support 'and coming up with meaningful solutions so that learners can easily follow them to fix technical problems and continue their learning process' (p. 354). He adds that students' motivation is easily disrupted by technical problems, and that '[h]elping learners during disaster times is the best help' (p. 354). Clyde and Delohery (2005) also recommend planning ahead for technical resources and support to ensure a positive learning experience for students (p. 85).

Laurillard (2002) discusses how e-learning support relies on academics defining service targets and contingency measures. She describes the provision of support staff for e-learning materials and services as analogous with library staff: 'They have to be institution-based…responsive to problems and act immediately to correct errors or breakdowns…able to deal with a range of subjects…knowledgeable about access to materials, rather than details about their content…manage the complexity of material and support decisions…ensure that the materials are operationally sound' (p. 234).

As Palloff and Pratt (2002) observe, traditional expectations of the teaching-learning process are overturned in e-learning, with students largely unaware of the challenges they will encounter. Thus there is a crucial need for students and teachers to become oriented to and understand this new relationship. The information and communication challenges of 'learning to learn online' (p. 179) are such that unexpected technical difficulties can overload challenges and turn students off. Strong technical support alleviates this problem: 'When faculty and students are provided with good training and support for online teaching and learning , the likely outcomes is excitement about about new ways of teaching and learning' (p. 182).

Practices

Evidence of capability in this process is seen with the provision of facilities and support during the design and development of projects, including documentation and training for staff as well as templates and other materials for use with students. Policy and guidelines should require and support this. Student attainment of skills in this area should be part of the overall learning objectives in line with their acquisition of research and information literacy skills.

Table S6-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Reports on effectiveness and use by staff of support resources for students' use of electronically accessed information determine resourcing and the type of support and assistance provided.** **Measures of teaching staff capability to support student use of electronically accessed and submitted information are used to determine support and resourcing for training and are used to plan for (re)development of courses.** Reports on student and staff effectiveness in using electronic information are used to inform the process of selecting new e-learning technologies. Institutional e-learning strategies and technology plans include formal consideration of the student electronic information use support requests of teaching staff. Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of staff support for student use of electronic information creation and changing staff requirements arising from e-learning technologies and pedagogies being used. The types and content of staff and requests for support regarding student use of electronic information are used to inform the risk assessments undertaken and mitigation strategies implemented for current and future e-learning projects and initiatives.
4: Management	**Measures of the effectiveness and uses of staff support resources for student use of electronically accessed information are collected and reported on regularly.** **Feedback collected regularly from students regarding the effectiveness of the electronic information creation and use support provided.** **Feedback collected regularly from staff regarding their effectiveness in supporting the use of electronically accessed and submitted information by students.** Measures of teaching staff capability to use e-learning technology and pedagogies effectively are collected and reported on regularly. Use of technical assistance by teaching staff is measured and reported on as to its effectiveness and impact on the final course design and implementation. Financial costs and benefits of providing staff with support in the handling of electronic materials created by students is regularly assessed and reported on. Staff support in the handling of electronic materials created by students is subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Regular, formal, risk assessments undertaken of e-learning initiatives and projects so as to identify requirements for new or changed technical support. Overlap and duplication of support and resources provided to staff engaged in e-learning design, (re)development and delivery is regularly reviewed and addressed in line with institutional e-learning strategy and technology plans.
3: Definition	**Institutional support standards for staff supporting the use of electronically accessed information and associated resources by students are defined and mandated for use when (re)developing courses.** **Teaching staff are provided with templates, examples, support and training in supporting the use of electronically accessed, created and submitted information by students, including intellectual property, plagiarism and assessment aspects.** **Formal procedures for course (re)development explicitly include consideration of the use, protection and privacy of electronically accessed and submitted information by students.** Institutional procedures for acquiring and maintaining e-learning technologies explicitly consider the student electronic information use support needs of teaching staff. A researched evidence base of e-learning projects and initiatives undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development. Decisions about the type and extent of technical support in the use of electronically accessed and submitted information by students provided to staff are informed, aligned with and support institutional e-learning strategies and technical plans.

Dimension	Practices
2: Planning	**Plans in place for each course to ensure that all student information supplied or collected electronically is stored in a validated backup system.** **Plans in place for each course to ensure that access to all student information supplied or collected electronically is authenticated and authorised.** **E–learning design and (re)development procedures explicitly consider the implications of students accessing and supplying information electronically during course activities and assessments.** Assessment of teaching staff capability to effectively support electronic information use by students is done as part of course design and (re)development. Support in the use of electronically accessed information and associated resources by students is allocated as part of planning for (re)development of individual courses. E–learning design and (re)development procedures include a formal risk assessment and mitigation plan addressing risks arising from the student creation and use of electronic materials. Systems provided for automatic detection of plagiarism and collusion
1: Delivery	**Teaching staff provided with resources and technical support in the use of electronically accessed or submitted information by students.** Students encouraged and supported in creating and using electronic information during course activities and assessments.

Table S6-1: Descriptions of process practices by capability dimension

Evaluation: *Processes surrounding the evaluation and quality control of e-learning through its entire lifecycle*

This process area is focused on quality assurance, feedback and evaluation processes throughout the entire lifecycle of e-learning design, development and deployment. The goal is encouraging reflective practice informed by evidence from previous successes and failures. The ability of staff and students to provide informal and formal feedback and to see the results of that reflected in improvements to the quality of e-learning is key to this process area. The individual processes are directed at ensuring the evidence collected is robust and able to provide a reliable base of knowledge for future strategy and sustainable development both of infrastructure and staff skills.

Evaluation: ***Processes surrounding the evaluation and quality control of e-learning through its entire lifecycle***	
E1.	Students are able to provide regular formal and informal feedback on the quality and effectiveness of their e-learning experience
E2.	Teaching staff are able to provide regular formal and informal feedback on quality and effectiveness of their e-learning experience
E3.	Regular formal independent reviews of e-learning aspects of courses are conducted

Table 5: eMM Version Two *Evaluation* Processes

Process E1.

Students are able to provide regular formal and informal feedback on the quality and effectiveness of their e-learning experience

Process Background

The need for institutions and teachers to solicit and analyse student feedback that is formative, summative, and based on multiple independent and standard evaluations is well acknowledged (Kirkpatrick, 1977; Forsyth *et al*., 1999; Arrelola, 2000; Sherry, 2003; Thompson and Irele, 2003; Brennan and Williams, 2004). Student feedback is a reliable and important measure of teaching and learning quality that can be used to inform action for improvements; it is also informative for prospective students (Brennan *et al*., 2003; Richardson, 2005a, 2005b). However, for feedback to be of use for improving teaching and learning it must be understood and acted upon (Kember *et al*., 2002).

Richardson (2005b) reports on research showing that students' perceptions of course quality influences their approaches to study (p. 24), thereby emphasising the importance of obtaining, analysing and acting upon student feedback. In a comprehensive review of the literature on student feedback instruments Richardson (2005a) identifies some obvious but key issues for obtaining reliable and useful information: 'Feedback should be sought at the level at which one is endeavouring to monitor quality…the focus should be on students' perceptions of key aspects of teaching or on key aspects of the quality of their programmes…feedback should be collected as soon as possible after the relevant educational activity' (pp. 409-10). Noting that e-learning presents new opportunities for obtaining feedback, he observes that more research is needed to study response rates and results patterns (p. 406). Richardson concludes that although teachers and students regard student feedback as useful and informative, its usefulness is often compromised by issues such as interpreting information, institutional incentives to teachers, publication of responses; and notions of teachers' and students' ownership of feedback (p. 410).

Norris and Conn (2005) investigated student response rates in online course feedback and they identify three simple strategies for achieving response rates equivalent to those of conventional classroom feedback: 1. announce the availability and location of the evaluation promptly after the completion of the course; 2. explain the value of the evaluations and feedback; 3. remind students to give feedback (pp. 26-7). In conclusion they add that, after overcoming concerns about response rates 'the real work of developing useful course evaluation instruments that will inform reliable and valid interpretations about instruction can begin' (p. 27).

Practices

Evidence of capability in this process is seen in the inclusion of a formal student evaluation plan in the design and development of projects and courses. This plan should include conducting multiple formal evaluations, both summative and formative, in a standard way that allows for comparison of results between projects and over time. Information on how the evaluation results are being used to improve the quality and effectiveness of their learning should be provided to students. Policy and guidelines should require that student evaluations to be independently conducted and provide standard forms that they should take. The results of the evaluations should be used to inform ongoing and new development, and to support resources and strategy. Teaching staff are provided with templates, examples, training and support in using the range of evaluation resources available to support student learning.

Table E1-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practice examples
5: Optimisation	**Results of student evaluations of the quality and effectiveness of e-learning are used to determine what pedagogical and technological changes are sustained.** **Results of student evaluations of the quality and effectiveness of e-learning are used to determine how current offerings and teaching staff are supported.** **All new e-learning technologies or pedagogies are accompanied with an evaluation programme when introduced.** Results of student evaluations and feedback used to inform risk analysis and mitigation procedures for e-learning projects and initiatives. Institutional risk assessments and mitigation strategies are regularly updated to reflect the outcomes of student evaluations and changing staff requirements arising from e-learning technologies and pedagogies being used.
4: Management	**Evaluation results are collected across all courses and reported regularly to management, staff and students in a manner that allows for comparison of the educational effectiveness of e-learning aspects of similar courses and initiatives.** Financial costs and benefits of collecting feedback and conducting formal and informal student evaluations are regularly assesssed and reported upon. E–learning design and (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Regular, formal, risk assessments undertaken of e-learning initiatives and projects so as to identify requirements for new or changed e-learning evaluations. Changes in e-learning delivery, projects and initiatives occuring as a result of feedback and evaluations are monitored and reported on regularly.
3: Definition	**Institutional standards for evaluations of educational effectiveness of e-learning are defined including the tempo and content of the evaluations.** **Institutional expectations for the quality and type of evaluation feedback to be provided to students are formally defined and communicated to staff.** **Teaching staff are provided with templates, examples, training and support in using the range of evaluation resources and results available to support student learning.** **Expert assistance available and used in designing the collection, analysis and interpretation of student feedback on the quality and effectiveness of e-learning.** Guidelines and support materials provided to students to assist their making effective use of staff feedback in their e-learning experiences. Institutional policy requires that student evaluations of the quality and effectiveness of e-learning are performed by independent assessors according to a standard timetable and defined procedures.
2: Planning	**Students are provided with information on how feedback and evaluation information has been and will be used to modify and improve their e-learning experience.** **E–learning design and (re)development procedures include explicit evaluation phases assessing quality and effectiveness of e-learning.** **E–learning design and (re)development procedures include opportunities for user testing and feedback from students.** Student requirements for e-learning are collected prior to initiating course design and (re)development to incorporate e-learning technologies and pedagogies. Consistent evaluation procedures used to enable comparisons between courses. A searchable repository of e-learning evaluation and feedback information is provided and maintained.
1: Delivery	**Summative feedback collected regularly from students regarding the quality and effectiveness of their e-learning experience.** **Formative feedback collected regularly from students regarding the quality and effectiveness of their e-learning experience.**

Table E1-1: Descriptions of process practices by capability dimension

Process E2.

Teaching staff are able to provide regular formal and informal feedback on quality and effectiveness of their e-learning experience

Process Background

The e-learning environment presents many new and/or different teaching and learning challenges that can benefit from valid, reliable, and informative feedback from teachers. Laurillard (2002) recommends the establishment of a forum for teachers to 'discuss their experience of learning technologies, and the academic issues surrounding the balance of learning methods' (p. 227). She suggests such a forum could discuss and debate evaluation of developments, approaches to supporting teaching and learning, integration of learning resources and teaching methods, and teachers' requirements for further technology developments (p. 227).

In a comprehensive report on improving teachers use of ICT, Scrimshaw (2004) refers to professional development approaches 'fall[ing] along a spectrum from informal mutual support to the use of formal training courses' (p. 21). He discusses several approaches and concludes that the question is 'less which specific approach is best, but which combination of methods are needed to suit the level of progress staff individually and as a whole have already reached' (p. 22).

According to Jamieson (2004) e-learning represents 'the emergence of a significant online pedagogy [which] raises host of issues…concerning the complex and idiosyncratic nature of online learning' (p. 22). A key issue is the erosion of 'traditional teacher-centred pedagogy…as online environments provide learners with greater flexibility over when, where, how, and with whom they learn' (p. 22). Jamieson discusses a flexible learning programme for academics, which includes a weekly discussion group and regular anonymous evaluation responses that demonstrate the variety and value of communities of learning practice.

Communities of practice are discussed by Gray (2004) who emphasises the benefits that the online environment offers for collegial information sharing. However she recommends that an accomplished moderator be employed to facilitate formal and informal discussion across e-learnings technical, social, organisational, and pedagogical functions (p. 33). Motteram (2006) also engages in discussion of communities of practice, which he contextualises in reporting various cross-over communities for participants in an online module of a teachers' Masters programme. Of interest to Motteram is the transformative potential that this rich contextual environment offers participants as they interact and exchange interpretations of experiences: 'These experiences appear to represent a deeper experience of learning, as well as maintaining a good balance of skills development' (p. 24).

The importance of sharing feedback information is emphasised by Ravitz and Hoadley (2005) who propose a systematic approach to reviewing e-learning as professional development: 'this model of systematic review…holds the potential to change feedback systems among stakeholder groups in online resource development' (p. 968).

Practices

Evidence of capability in this process is seen in the inclusion of a formal staff evaluation plan in the design and development of projects and courses. This plan should include conducting multiple formal evaluations, both summative and formative, in a standard way that allows for comparison of results between projects and over time. Information on how the evaluation results are being used to improve the quality and effectiveness of their work should be provided to teaching staff. Policy and guidelines should require that staff evaluations to be independently conducted and provide standard forms that they should take. The results of the evaluations should be used to inform ongoing and new development, and to support resources and strategy.

Table E2-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Results of evaluations on the quality and effectiveness of e-learning are used to determine what pedagogical and technological changes are sustained.** **Results of evaluations on the quality and effectiveness of e-learning are used to determine how current offerings and teaching staff are supported.** **All new e-learning technologies or pedagogies are accompanied with an evaluation programme when introduced.** Results of staff feedback used to inform risk analysis and mitigation procedures for e-learning projects and initiatives. Institutional risk assessments and mitigation strategies are regularly updated to reflect the outcomes of staff evaluations and changing staff requirements arising from e-learning technologies and pedagogies being used.
4: Management	**Evaluation results are collected across all courses and reported regularly to management, staff and students in a manner that allows for comparison of the educational effectiveness of e-learning aspects of similar courses and initiatives.** Financial costs and benefits of collecting feedback from staff are regularly assesssed and reported upon. E–learning design and (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Regular, formal, risk assessments undertaken of e-learning initiatives and projects so as to identify requirements for new or changed e-learning evaluations. Changes in e-learning delivery, projects and initiatives occuring as a result of feedback and evaluations are monitored and reported on regularly.
3: Definition	**Institutional standards for evaluations of educational effectiveness of e-learning are defined including the tempo and content of the evaluations.** **Support staff are provided with templates, examples, training and support in using the range of evaluation resources and results available to support teaching staff.** **Expert assistance available and used in designing the collection, analysis and interpretation of staff feedback.** Institutional policy requires that evaluations of the quality and effectiveness of e-learning are performed by independent assessors according to a standard timetable and defined procedures. Teaching staff supported in researching and reflecting on their own practice and experiences of e-learning.
2: Planning	**Staff are provided with information on how feedback and evaluation information has been and will be used to modify and improve their e-learning experience.** **E–learning design and (re)development procedures include explicit evaluation phases assessing the quality and effectiveness of e-learning.** **E–learning design and (re)development procedures include opportunities for user testing and feedback from staff.** Staff are provided with time, recognised, rewarded and supported in their engagement with innovative e-learning initiatives and experiments. Consistent evaluation procedures used to enable comparisons between courses. Staff requirements for e-learning are collected prior to initiating course design and (re)development to incorporate e-learning technologies and pedagogies. A searchable repository of staff e-learning evaluation and feedback information is provided and maintained.
1: Delivery	**Summative feedback collected regularly from teaching staff regarding the quality and effectiveness of their e-learning experience.** **Formative feedback collected regularly from teaching staff regarding the quality and effectiveness of their e-learning experience.**

Table E2-1: Descriptions of process practices by capability dimension

Process E3.

Regular formal independent reviews of e-learning aspects of courses are conducted

Process Background

The dependence of e-learning on the use of an appropriate pedagogy and well-designed technology means that when assessing the success of courses and projects it is very important to ensure that the effectiveness of the technology is also formally measured. Evidence of success or limitations in the local context is an important factor in ensuring the efficient design and development of existing and new courses and projects. To improve e-learning outcomes it is important to learn from past mistakes, according to Ehrmann (2002), who argues that tracking progress is not only necessary to stay on course but also to identify solvable problems that can attract fresh resources (p. 55).

In addition to the evaluations of projects and courses (processes E1 and E2), there is a range of other data available through the standard technologies in use, such as LMSs, that can be effectively used to assess the impact a given use of technology is having on students. This data, while limited in some respects, has the advantage of being comparatively easy to collect, empirical in nature and independent of may aspects of opinion and bias that can complicate other evaluations (Bates and Poole, 2003). Similarly, while it can be challenging to do so accurately, costings and comparisons with alternative delivery approaches are essential for effective management of e-learning (Inglis, 2003; Jung, 2003).

As part of the need for review and evaluation of the effectiveness of courses and projects it is important to ensure that they meet the needs of the institution and its programmes. Review of the materials regularly ensures that they continue to meet the objectives of the students, the course and the wider programme context as well as ensuring that the online materials referenced are still appropriate and available.

Validation of e-learning processes and resources is a significant stage in the full cycle of organisational learning that describes success in terms of 'student performance, student satisfaction, staff experience, and cost effectiveness, as judged in relation to the original intentions' (Salmon, 2000, p. 236). Salmon discusses validating as one of six activities in the iterative process of creating an effective learning organisation infrastructure that enables 'the system to learn about itself' (p. 237).

Ravitz and Hoadley (2005) discuss links between systematic review and professional development and they identify needs for stakeholders that include: Quality resources for teachers; reliable programmes for policymakers and evaluators; and, refined tools that are appropriately distributed, for developers. 'These issues map onto three ongoing and related challenges: (1) professional development or training for using online resources, (2) evaluation of resources for purposes of research and development, and (3) dissemination and reuse of knowledge and practices related to knowledge management and metadata' (p. 958). Ravitz and Hoadley's proposal for a systematic review approach aims for a more collaborative and cumulative understanding of e-learning facilities and resources. They argue that the complex e-learning environment calls for stakeholders to continually learn about and share experiences and understandings: 'analysis of resources must include not just consideration of basic qualities of web design, but also awareness of the structures and processes that provide opportunities for teacher and student learning, and consideration of artifacts of resource use such as examples of student work, project ideas, lesson plans or rubrics' (p. 959).

An integrated approach to evaluating e-learning is important for improving quality and effectiveness and verifying design assumptions (Bastiaens *et al*, 2004). Bastiaens *et al.*, (2004) discuss the need for a multi-level simultaneous evaluation approach that incorporates reactions to learning experiences, learning process results, learning performance changes, and organisational results. They comment that a four level evaluation is unnecessary for every event, but recommend that reactions are considered when implementing new learning events (p. 197).

Quality issues are of concern for Barbera (2004) who identifies six qualitative dimensions for evaluation: The educational scenario; participants' teaching and learning purposes; instructional agents roles; patterns of interaction; educational instruments; and, knowledge building factors (p. 18). Indicators are ascribed to subdimensions of each dimension that also enable quantitative results to be discerned from the observations.

Practices

Evidence of capability in this process is seen through the use of formal data collection processes that are incorporated into design and development and which allow for regular reporting and analysis of the effectiveness of the technologies used. These processes should be standards based and designed to support comparisons over time and between courses and projects. Policy should require the collection and reporting of this information and the results used to inform ongoing and new development and support resources and strategy. Formal content and materials review plans should be used during the design and development of projects and courses. Policy and guidelines should require these reviews be conducted formally and provide guidance on what aspects require checking

An important factor to be conscious of in this area is that the impact of technology on student satisfaction and student learning need to be separately evaluated as they are linked but distinct. Similarly, staff satisfaction may not be related to the effectiveness of the technologies or innovations deployed.

Table E3-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**E–learning evaluation and review information used to inform strategic planning relating to future e-learning initiatives.** **Reviews of success or failure of new e-learning technologies are used to determine ongoing support and resourcing for the use of the technologies.** **Reviews of success or failure of new e-learning technologies are used to determine resources for and content of staff development for the use of the technologies.** Results of course e–learning reviews are used to determine support and resourcing for existing courses and used to plan the design and (re)development of courses. Risk assessments of failed courses and e-learning initiatives are formally reviewed to identify factors for inclusion in the risk analysis and mitigation plans of existing and future e–learning projects and initiatives. Institutional risk assessments and mitigation strategies are regularly updated to reflect the outcomes of reviews and changing staff requirements arising from e-learning technologies and pedagogies being used.
4: Management	**Review information collected and reported upon to management, staff and students in a manner that allows for comparison of the e-learning aspects of similar courses.** Measures of the success of new technologies/innovations collected and reported on in a manner that allows for comparison of similar courses and analysis of the factors impacting on the successful adoption of the new technology/innovation. Financial costs and benefits of conducting formal reviews and assessments of courses are regularly measured and reported on. E–learning design and (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Regular, formal, risk assessments undertaken of e-learning initiatives and projects so as to identify requirements for new or changed e-learning review procedures. Changes in e-learning delivery, projects and initiatives occuring as a result of feedback and evaluations are monitored and reported on regularly.
3: Definition	**Institutional standards for the review of the e-learning aspects of courses defined and implemented.** **Staff are provided with training and support in the analysis and use of review and evaluation information in improving course delivery and student outcomes.** Institutional standards for assessing the success of new technologies/innovations defined and applied to all courses. Institutional standards for e-learning materials defined along with processes for regular review of e-leaning aspects of all courses.
2: Planning	**Students and staff are provided with information on how review and evaluation information has been and will be used to modify and improve their e-learning experiences.** **Reviews are conducted formally as part of the normal procedures for delivering courses using e-learning technologies and pedagogies.** **Formal plan for assessing the success of new technologies/innovations explicit within the delivery of individual courses.** A searchable repository of e-learning evaluation and feedback information is provided and maintained. Courses are subject to regular assessment of the risks arising from the use of e-learning technologies and pedagogies.
1: Delivery	**Courses have a regular assessment and review of the e-learning materials and resources used.** **Courses have a regular assessment and review of the effectiveness of the teaching provided using e-learning technologies and pedagogies.** Courses have a regular assessment and review of the student outcomes achieved. Courses have a regular assessment and review of the effectiveness of assessment and other learning activities.

Table E3-1: Descriptions of process practices by capability dimension

Organisation: *Processes associated with institutional planning and management*

This process area is concerned with the institutional planning and management of e-learning. The goal is ensuring that the use of e-learning technologies and pedagogies is well managed and planned to deliver the strategic and operational outcomes required by the institution. The individual processes are directed at ensuring the strategic, administrative and organisational aspects of e-learning are high quality, efficient and effective, particularly as institutions transition from face-to-face delivery and demands upon the e-learning infrastructure grow..

Organisation: *Processes associated with institutional planning and management*	
O1.	Formal criteria used to allocate resources for e-learning design, development and delivery
O2.	Institutional learning and teaching policy and strategy explicitly address e-learning
O3.	A documented specification and plan guides technology decisions when designing and developing courses
O4.	A documented specification and plan ensures the reliability, integrity and validity of information collection, storage and retrieval
O5.	The rationale for e-learning is placed within an explicit plan
O6.	E-learning procedures and which technologies are used are communicated to students prior to starting courses
O7.	Pedagogical rationale for e-learning approaches and technologies communicated to students prior to starting courses
O8.	Course administration information communicated to students prior to starting courses
O9.	The provision of e-learning is guided by formal business management and strategy

Table 6: eMM Version Two *Organisation* Processes

Process O1.

Formal criteria used to allocate resources for e-learning design, development and delivery

Process Background

Provision of expert technical and pedagogical assistance is vital if institutions are to move away from ad-hoc developments in e-learning. Like any other scarce resource, expertise in e-learning development within an institution must be managed in a way that ensures efficient and effective use. Formal criteria which align the use of these resources with defined outcomes for the institution are essential in this process (Hagner, 2000).

E-learning's increasingly significant role in educational operations and effects on overall policy is directing more attention to how e-learning criteria influence the promulgation and implementation of policy (de Freitas and Oliver, 2005). de Freitas and Oliver's recent study concluded that e-learning policy does drive organisational change in both human and technical resource areas. They advise care when considering strategic development to ensure that the extent and effects of change are appreciated and understood, 'so that the benefits and pitfalls of introducing e-learning across a higher education institution can be analysed and shared more effectively' (p. 94). Factors that de Freitas and Oliver raise include: Organisational structure and scale; previous e-learning experience; extent of investment required; organisational experiences of others; professional consultation; benefits of inter-/intra-institutional collaboration; and, critical evaluation strategies.

A systemic approach to developing a strategic plan that coherently integrates elements in a timely way is needed: 'it is not sufficient to select elements…in a fragmented or ad hoc manner' (Garrison and Anderson, 2003, p. 109). Bates and Poole (2003) discuss the value of project management when undertaking complex information technology and education projects. They argue that the process defines project management, and that includes: 'a defined set of resources…a timeline, and a clear "deliverable," in that it is clear what the project has to achieve and it is obvious when it is completed' (p. 143).

According to Davis (2004), the needs of students and the course learning outcomes underpin all teaching and learning systems; therefore planning 'flows from a full understanding of these two fundamentals' (p. 99). Although e-learning is new to many, Davis considers that it is sufficiently mature for coherent, pragmatic planning decisions to be made: 'plenty of research and information is available, and there are many successful examples of online learning systems to learn from' (p. 113).

Picciano (2006) highlights the wide range of factors and extensive information administrators must contend with in formulating policy, which he discusses in terms of pedagogical and operational issues. Observing that there is 'no single pedagogy of online learning' Picciano identifies three pedagogical aspects that he considers significant: Course management software, interaction, and reflective teaching (p. 78). Operational issues include the hardware and software infrastructure of course management systems and the supporting human resources that extend from technological implementation through teaching and learning technical assistance and instructional design support to administrative systems integration (p. 85).

Comparing policies to traffic laws or language syntax, Simonson and Bauck (2003) discuss how the growth of e-learning is increasing the need for guiding policy frameworks (p. 418). Citing previous online/distance learning policy research (Berge, 1998; Gellman-Danley and Fetzner, 1998; King *et al.*, 2000), Simonson and Bauck discuss an accepted model that categorises seven policy areas: Academic; fiscal, geographic, and governance; faculty; legal; student; technical; and, philosophical/[and cultural] (pp. 418-9). They argue that online/distance education policies need to be integrated with face-to-face policies, to make plain that 'distance education is a routine and regularly occurring component of the educational enterprise' (p. 424).

Also drawing on Berge (1998) and Gellman-Danley and Fetzner (1998), King *et al.*, (2000) propose a three tiered framework for e-learning policy analysis that points to faculty, students/participants, and management and organisation as the significant areas to identify the effectiveness of policy. Descriptions of issues in each area include: staff incentives, intellectual property; student support and access to records; and, organisational collaboration and resource management (n. p.).

Practices

Evidence of capability in this process is seen in the provision of formal funding and resourcing criteria and guidelines, mandated by policy, which provide consistency and clarity in the allocation of resources. Access to support is managed by these criteria to ensure efficient and equitable use of time and the achievement of strategic goals as well as short term requirements. Effective approaches in the local context are communicated through examples, case studies, standards and guidelines, customised for the institution, that demonstrates the benefits of the criteria used.

Table O1-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Allocation of support and resourcing across all courses and programmes using similar technology or pedagogies is handled consistently on the basis of outcomes from trial or pilot e-learning projects and initiatives.** **Successful e-learning projects and initiatives are documented as case studies that show the relationships between the criteria, the use of technology in particular ways and the educational outcomes for students.** **Consideration of the impact of the criteria for e-learning design, development and delivery on the achievement of the goals of the institutional e-learning strategies and technology plans is included in formal e-learning strategy and planning (re)development reviews.** All applications using the institutional criteria for allocating resources and funding for e-learning technologies and projects are analysed for potential reuse or improvement. Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of e-learning projects and initiatives and changing staff requirements arising from e-learning technologies and pedagogies being used. Criteria for e-learning design, development and delivery resource allocation are reviewed when the institutional e-learning strategies and technology plans are reviewed.
4: Management	**Measures are collected of the success or failure of e-learning projects and initiatives supported and this information reported on regularly.** **Feedback collected regularly from students regarding the effectiveness of e-learning projects and initiatives for their learning.** **Feedback collected regularly from staff regarding the effectiveness of e-learning projects and initiatives for enabling student learning and assisting staff teaching responsibilities.** **Contribution of the formal criteria used to allocate resources for e-learning design, development and delivery to addressing the goals of the institutional e-learning strategies and technology plans are regularly reviewed and reported on.** Financial costs and benefits of compliance with selection criteria used to allocate resources for e-learning design, development and delivery are regularly assessed and reported on. E–learning projects and initiatives are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Reports on what projects and initiatives and on what basis resources were allocated are provided regularly. Regular, formal, risk assessments undertaken of e-learning initiatives and projects so as to identify requirements for new or changed e-learning resource allocation criteria. Overlap and duplication of support and resources provided to staff engaged in e-learning design, (re)development and delivery is regularly reviewed and addressed by the criteria in line with institutional e-learning strategy and technology plans.
3: Definition	**Criteria used to allocate resources for e-learning design, (re)development and delivery are formally and explicitly linked to the institutional e-learning strategies and technology plans.** **Staff are provided with training and support in the development of e-learning proposals and plans that effectively address the criteria used to allocate resources for e-learning design, development and delivery.** Templates and examples are used to communicate how the criteria for resource allocation should be interpreted and applied. A researched evidence base of e-learning projects and initiatives undertaken within or relevant to the local context and consistent with the resource allocation criteria is maintained for use by staff engaged in e-learning design and (re)development. Resource allocation, associated policies and strategies are coordinated across the institution.

Dimension	Practices
2: Planning	**A formal procedure that references the criteria for allocating resources for e-learning design, development and delivery is followed at designated times during the budget cycle.** **Plans for e-learning projects and initiatives formally link decisions regarding e-learning technologies and pedagogies with the institutional criteria used to allocate resources.** Criteria used to allocate resources for e-learning design, development and delivery include consideration of the costs of maintaining e-learning initiatives and projects. Criteria used to allocate resources for e-learning design, development and delivery include an assessment of risks arising during or as a consequence of e-learning initiatives and projects.
1: Delivery	**Institutional criteria are defined for selecting and prioritising the allocation of resources and funding for e-learning technologies and projects.** **Resources and funding for all e-learning technologies and projects are allocated according to formally defined criteria.**

Table O1-1: Descriptions of process practices by capability dimension

Process O2.

Institutional learning and teaching policy and strategy explicitly address e-learning

Process Background

The emergence of e-learning as a 'significant…pedagogy [which] raises a host of issues…concerning the complex and idiosyncratic nature of online learning' (Jamieson, 2004, p. 22) that is 'forcing universities to rethink their foundations and shift their paradigms' (Howard *et al*., 2004, p. vii), highlights the importance of explicitly addressing its requirements. Posing questions about matters like adapting teaching practice, and interpreting online communications, Jamieson observes that e-learning brings pedagogical, technological, and operational challenges to teaching practice (p. 22). E-learning involves a 'major realignment of the institutions organizational identity' (p. 26) that calls for intensive, strategic professional development activity.

The increasingly ubiquitous e-learning environment is also giving institutions cause to question and redefine their understanding of learning experiences, and to reflect on the shift in focus from content to the context and processes of learning: 'Institutions face the challenge of developing a vision and strategic direction…to move forward while not reducing their agility to adapt to new developments' (Garrison and Anderson, 2003, p. 105). Garrison and Anderson identify ten topics that should be considered for strategic planning and policy: 1. Vision; 2. Needs and risk assessment; 3. Description of educational principles and outcomes; 4. Implementation initiatives and strategy; 5. Infrastructure; 6. Info-structure; 7. Support services; 8. Budget and resources; 9. Research and development; 10. Benchmarking (p. 108). They also comment that sustainable innovation emerges through middle-level leadership rather top down or bottom up management approaches: 'middle-level leaders…have the expertise and commitment, along with access to both senior management and the grass-roots…to formulate realistic strategic direction and influence institutional leadership' (p. 108).

Turoff *et al*. (2004) comment on the importance administrators attached to research funding compared with teaching, and remark that e-learning's more learning-centric focus is likely to require a reassessment of approaches to balancing academic teaching and research duties. Furthermore, they note that the e-learning environment 'will make the quality of teaching more visible to the public and prospective students' (p. 18), thus making learning and teaching policy and strategy more imperative.

Describing her thesis as Rethinking University Teaching, Laurillard (2002) reconceptualises teaching as mediating learning, or '[m]aking student learning possible' (p. 11). Such a view requires an institution to recognise itself as a learning organisation, that is, 'to be capable of adaptive learning….[which involves] an internal learning conversation that allows it to learn from experience, and adapt to its environment' (p. 215). Laurillard proposes an iterative strategy that draws on internal dialogues of practice involving academic, operational, and administrative groups, which contribute to a recursive Conversational Framework that is discursive, adaptive, interactive, and reflective (p. 86). The Conversational Framework enables a negotiation of understandings that brings all stakeholder interests into policy and strategy considerations.

Awareness of the importance of integrated e-learning is accompanied by managerial questions, challenges, and uncertainties (van der Klink and Jochems, 2004, p. 151). van der Klink and Jochems argue that e-learning is integral to, not an adjunct of, teaching and learning, and that planning for, and implementing, e-learning requires an holistic integrated approach (p. 155). They discuss the integrated approach having four perspectives: technological, strategic, pedagogical, and organisational, and caution against 'technologically driven motives to adopt new types of technological infrastructure' (p. 162). Readily available e-learning infrastructural products may enhance teaching delivery at the expense of learning content, whereas 'real innovation…requires an approach that ensures different aspects are taken into account' (p. 162). Garrison and Anderson (2003) also call for institutional focus on integration, but caution that resistance is likely. They advise institutional leaders to 'understand the dynamics of change and be prepared to start small but successfully. [Leaders] have to recognize and incubate e-learning as a disruptive technology, while demonstrating how it can meet the challenges and demands of the knowledge era' (p. 114).

New roles, structures and alliances are emerging as learning technologies become embedded in higher educational institutions, but more coherent institutional support is needed (Joint Information Systems Committee, 2003a). This Joint Information Systems Committee study identified new and changing roles for learning technology specialists, academics and other professionals, and learning support professionals. The study recommends the articulation of an institutional statement on the role of e-learning; recognition and reward for personnel; an organisational framework for multidisciplinary /cross boundary collaboration; and, auditing of these actions (p. 2).

Practices

Evidence of capability in this process is seen in the provision of a complete and redeveloped set of institutional strategies and policies incorporating a thoughtful and strategic assesment of the contribution e-learning can make to the institution, disciplines, staff and students. Staff involved in e-learning design and (re)development projects and initiatives need support and guidance in effectively applying the revised policies and strategies and ideally they, along with students, should be involved in the (re)development of the policies and strategies.

Table O2-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**The outcomes of successful and unsuccessful e-learning initiatives are used to inform a programme of learning and teaching strategy and policy (re)development.** Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of e-learning projects and initiatives and changing staff requirements arising from e-learning technologies and pedagogies being used. The institutional learning and teaching strategies and policies are re-evaluated using a formal process when any significant e-learning technology failure occurs to ensure any risks arising from or identified by the failure are explicitly addressed in current and future risk assessments.
4: Management	**Regular, formal reviews of institutional learning and teaching strategies and policies examine whether e-learning implications are appropriately covered.** **Feedback collected regularly from students regarding the effectiveness of the e-learning policies and strategies.** **Feedback collected regularly from staff regarding the effectiveness of the e-learning policies and strategies.** Financial costs and benefits of teaching and learning policy and strategy regularly assessed and reported on. E–learning design and (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Regular, formal, risk assessments undertaken of e-learning initiatives and projects so as to identify requirements for new or changed e-learning strategy and policy. Course materials are regularly reviewed to ensure compliance with institutional learning and teaching strategies and policies.
3: Definition	**Policy templates and guidelines include a requirement to consider implications of e-learning when (re)developing new and existing policy.** **Staff are provided with guidelines and training in effectively applying policies and strategies when designing and (re)developing e-learning projects and initiatives.** Staff are provided with training and support in the development of institutional and disciplinary strategies and policies that address the implications of e-learning effectively. A researched evidence base of e-learning projects and initiatives undertaken within or relevant to the local context and disciplines is maintained for use by staff engaged in e-learning strategy and policy (re)development. Unit and discipline e-learning policies and strategies are coordinated across the institution.
2: Planning	**E–learning design and (re)development activities formally link decisions regarding e-learning technologies and pedagogies with the institutional e-learning strategies and policies.** **Staff with experience in the design, (re)development and delivery of e-learning are formally involved in the (re)development of institutional learning and teaching strategies and policies.** **Students are formally involved in the (re)development of institutional learning and teaching strategies and policies.** **Inclusion of e-learning aspects in relevant institutional policies and strategies is formally endorsed by the institutional leadership.** Formal review programme for institutional learning and teaching strategies and policies includes requirement to consider implications of e-learning. Procedures for implementing e-learning initiatives include examination of policy and strategy implications at both the institutional and disciplinary levels.
1: Delivery	**E–learning technologies and pedagogies explicitly addressed in relevant institutional learning and teaching strategies, policies, and associated documents.** Contribution of e-learning technologies and pedagogies to the achieving of the goals of the institutional learning and teaching strategies and technology plans are formally communicated to all staff.

Table O2-1: Descriptions of process practices by capability dimension

Process O3.

A documented specification and plan guides technology decisions when designing and developing courses

Process Background

A risk of using technology to support learning is that poor quality technology can seriously compromise the learning outcomes (process D2) and the diversity of available technologies can encourage a range of ad-hoc and disconnected approaches that fail to build on institutional experience and success (process D1). A technology plan combines a strategic focus on the selection of technology with practical experience based on previous work in the institution to ensure that technological resources are chosen in ways that build capability rather than dilute it.

E-learning operates in a complex, dynamic, continually evolving environment, which includes 'mechanisms to facilitate the development of and access to a variety of learning services; an underpinning technological platform; means to help potential learners select and enrol in learning experiences; and supporting administrative processes' (Elloumi, 2004, p.61). Elloumi argues that because technology change is constant and accelerating technology planning must be embedded in a wider institutional strategy that generatively encompasses all teaching and learning, and servicing aspects (pp. 61-2).

To this end Gunawardena and McIsaac (2004) discuss the need to understand the various types of technology and their defining characteristics when dealing with e-learning technology decisions. They identify six factors that are helpful in this regard: 1. Delivery and access; 2. human-machine interface; 3. social presence; 4. symbolic characteristics; 5. interaction; 6. control (p. 374). However, they note that these factors are interdependent: 'They are not entities in and of themselves but interact with each other to make up the total environment in which a specific [technological] medium operates' (p. 374).

The implications and challenges of rapid change affecting planning also concern Bates and Poole (2003). They propose the SECTIONS model for selecting and applying technology, which identifies the following criteria: Students, Ease of use, Costs, Teaching and learning, Interactivity, Organizational issues, Novelty, Speed (pp. 79-80). In concluding their discussion of the model, Bates and Poole remark on its heuristic nature and comment that it 'is not mechanical or "scientific." There are many different factors to be taken into account, and the decisions will need to be context specific' (p. 105). They also emphasise the complexity of the decision making process and, in addition to proposing the use of a framework to identify factors for consideration, they recommend the following strategies: Formulating questions that enable a systematic analysis of the factors; reviewing responses to the question; assessing available skill resources; and, making an intuitive or subjective decision based on all the information obtained (p. 105).

Picciano (2006) discusses the multitude of e-learning operational issues confronting administrators and emphasises the importance of addressing the technological infrastructure. He notes that in addition to implementing and maintaining complex data networks that must be continuously available, increasingly, decisions are required on establishment, integration, and maintenance of course management systems (pp. 84).

A systemic approach to developing a coherent and timely technology implementation plan is advocated by Garrison and Anderson (2003). They refer to an info-structure, which includes the design of institutional connectivity, creation of a knowledge management system, provision of digital content, and creation of standards (p. 108).

Finally, observing that there are often strong pressures to adopt new technology infrastructures, van der Klink and Jochems (2004) caution against teaching and learning resource 'substitution, in other words replacement of written materials by electronic delivery without substantial improvements or benefits' (p. 162).

Practices

Evidence of capability in this process is seen in the use of a formally documented technology plan that is used to guide the selection of technologies appropriate to the local context. Formal institutional standards are used where available to inform and guide the plan. This should include existing technologies that are defined as standard by the institution and for which there is clear evidence of effectiveness and ability to be supported. The plan, along with the associated standards and guidelines, is communicated widely to encourage wider adoption and compliance throughout the institution. Policy should mandate compliance with the technology plan and explicit reference to it should be made in processes for the resourcing and development of e-learning resources.

Table O3-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Information on compliance with institutional e-learning technology plans is used to determine support and resourcing for existing and future e-learning initiatives and projects.** **Institutional e-learning technology plans are re-evaluated using a formal process when any significant e-learning technology failure occurs to ensure any risks arising from or identified by the failure are explicitly addressed in current and future risk assessments.** Institutional technology plans are re-evaluated using a formal process when new technologies/ innovations are considered. Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of e-learning projects and initiatives and changing staff requirements arising from e-learning technologies and pedagogies being used.
4: Management	**Compliance with institutional e-learning technology plans are measured and reported on regularly along with information on how the plans have assisted or hindered the development of e-learning projects and initiatives.** **Feedback collected regularly from staff regarding the effectiveness of institutional e-learning technology plans as tools for informing the design and (re)development of courses and programmes.** Financial costs and benefits of institutional e-learning technology plans are regularly reviewed and reported on. E–learning design and (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Regular, formal, risk assessments undertaken of e-learning initiatives and projects so as to identify requirements for new or changed institutional e-learning technology plans. Overlap and duplication of support and resources provided to staff engaged in e-learning design, (re)development and delivery is regularly reviewed and addressed in line with institutional e-learning technology plans.
3: Definition	**Compliance with institutional e-learning technology plans is required of all courses and programmes being designed and (re)developed to use e-learning technologies and pedagogies.** **Staff are provided with templates, examples and professional development to assist with using institutional e-learning technology plans to guide e-learning decisions.** **Resources for staff e-learning development and support are allocated with reference to institutional e-learning technology plans.** A researched evidence base of e-learning projects and initiatives undertaken within or relevant to institutional e-learning technology plans is maintained for use by staff engaged in e-learning design and (re)development. Institutional e-learning technology plans include formal risk assessment and mitigation strategies. Technology plans, associated policies and strategies are coordinated across the institution.
2: Planning	**E–learning design and (re)development procedures explicitly reference institutional e-learning technology plans.** **Institutional e-learning technology plans have clearly defined and empirically measureable objectives and milestones.** **E–learning design and (re)development activities formally link decisions regarding e-learning technologies and pedagogies with the institutional e-learning technology plans.** **Institutional e-learning technology plans are formally endorsed and explicitly supported by the institutional leadership.** **Course design and development plans include risk assessment and mitigation plans linked to the institutional e-learning technology plans and associated risk assessments.** Teaching staff are formally involved in the development and review of institutional e-learning technology plans. Students are formally involved in the development and review of institutional e-learning technology plans. E–learning design and development plans include explicit planning and resources for maintenance of e-learning technologies.

Dimension	Practices
1: Delivery	**Institutional e-learning technology plans are followed for adoption of technology within individual courses and programmes.** Institutional e-learning technology plans clearly describe the procedures for acquiring, deploying, supporting, maintaining and upgrading hardware and software for e-learning.

Table O3-1: Descriptions of process practices by capability dimension

Process O4.

A documented specification and plan ensures the reliability, integrity and validity of information collection, storage and retrieval

Process Background

In addition to being reliable and failsafe, the technology infrastructure used to support e-learning should also ensure that, as much as possible, the information within systems is protected from corruption and loss. A technology plan considering aspects of information integrity can combine a strategic view of institutional e-learning directions with practical consideration of risks and the integration with other systems within the institution.

A knowledge- or learning-management system focused on communities of practice is best-suited to an e-learning culture: 'Knowledge or learning management is the needed "middleware" that links repositories and the educational process' (Garrison and Anderson, 2003, p. 109). Garrison and Anderson discuss the evolving field of knowledge management as a way of overcoming the difficulties of navigating and managing the increasingly 'chaotic sea of data, information, and knowledge' (p. 109). They argue that knowledge management, comprising three core activities: content management, course management, and pedagogical management, 'can provide the interoperability for all components to synergistically work together for the enhancement of e-learning' (p. 109). To date, there has been strong development in content and course management areas but considerably less in the pedagogical management area. Because knowledge repositories are mostly unrecognised in pedagogical communities of practice, valuable information is underutilized: 'Moreover, such communities can contextualize and provide meaning to tacit intuitive knowledge through the sharing of experiences that cannot be objectively codified' (p. 111).

In a comprehensive review of the security of technology systems, Kvavik and Voloudakis (2003) discuss the complex issues involved in 'preserving confidentiality; protecting information from unauthorized use or disclosure; assuring information's integrity, including accuracy and completeness of the data, through protecting from unauthorized unanticipated, and unintentional modification; and, making data available to authorized users on a timely basis' (p. 9). Their key findings identify two dimensions: security technologies and a security culture, which both involve institutional values and rules. Kvavik and Voloudakis elaborate on an institution's position as originating in the following matters: 'Perceptions about the risks…internal, external or both; the institution's propensity to take on or accept risks; the resources an institution has to deploy, both financial and human; and, the institution's priorities and culture reflecting where it feels it can effectively make changes' (p. 10). They emphasise that without attending to the human aspects of security, technological solutions are ineffective. In concluding they consider that although loss-of-service damage and identity theft pose serious threats, the unintended mistakes of authorised users are often the most hazardous (p. 17).

In the United Kingdom the Universities and Colleges Information Systems Association (UCISA) and the Joint Information Systems Committee (JISC) provide extensive support for information systems management in education. The UCISA (2004) presents comprehensive information on responsible, reliable, ethical, legal, and secure use of information systems. The wide-ranging reference material is also regularly revised. JISC's valuable support material takes the form of key issues briefing papers and includes topics such as: Developing an institutional records management programme (Joint Information Systems Committee, 2004b); Open access (Joint Information Systems Committee, 2005b); The data deluge: Preparing for the explosion in data (Joint Information Systems Committee, 2004a); and, Digital repositories (Joint Information Systems Committee, 2005a). This resource is also regularly revised and updated.

Practices

Evidence of capability in this process is seen in the use of a formally documented technology plan considering information integrity and reliability. This should include assessments of the security of information from intentional and unintentional loss, protection of privacy and student information, versioning and consistency with other systems such as student records or enrolments. Information provided by the institution, teaching staff and students should be included, as well as explicit consideration of copyright implications, including the rights of students, and the reporting required by licences. There should be policy and procedures in place to deal with potential failures or compromises. Standards and guidelines should be used to communicate which technologies have been proven reliable, and regular monitoring and reporting used to prove reliability and identify potential problems. Teaching staff are provided with templates, examples, training and support in maintaining course information to ensure its validity and reliability.

Table O4-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Institutional plans for ensuring the integrity and validity of information delivered, collected and stored are re-evaluated using a formal process when any significant e-learning technology failure occurs to ensure any risks arising from or identified by the failure are explicitly addressed in current and future risk assessments.** **Institutional plans for ensuring the integrity and validity of information are re-evaluated using a formal process when new e-learning technologies/innovations are considered.** **Reports on student and staff effectiveness in using electronic information in the context of e-learning are used to inform the process of reviewing and refining institutional information integrity plans.** Information integrity performance is used to determine support and resourcing for existing e-learning technology and used to support the (re)development of courses. Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of e-learning design and development support and changing staff requirements arising from e-learning technologies and pedagogies being used.
4: Management	**Compliance with institutional plans for ensuring the integrity and validity of e-learning information is measured and reported on regularly.** **Feedback collected regularly from staff regarding the effectiveness of the institutional information integrity plan as a tool for informing the design and (re)development of e-learning initiatives and projects.** The extent to which resources are being accessed and under what licensing terms is measured and reported on regularly. Use of technical assistance relating to integrity and validity of e-learning information by teaching staff is measured and reported on regularly. Financial costs and benefits of the institutional information plan are regularly assessed and reported on. E–learning design and (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Regular, formal, risk assessments undertaken of e-learning initiatives and projects so as to identify requirements for changes to the institutional plan for ensuring the integrity and validity of information.
3: Definition	**Institutional plans for ensuring the integrity and validity of information delivered, collected and stored are in place and operational.** **Institutional support standards for the use of electronically accessed information and associated resources are defined and complied with when (re)developing courses.** **Clear guidelines and policy provided specifying what information is to be retained in institutional repositories, how it is to be stored, licenses used to control and authorise usage, and how it is accessed.** Teaching staff are provided with templates, examples, and support in the use of electronically accessed, created and stored information. Teaching staff are provided with templates, examples, and support in the legal use of intellectual property. Formal processes for course (re)development explicitly include consideration of the use of electronically accessed and stored information by staff and students. Metadata formats and schemas defined for information storage and retrieval purposes. Procedures for archiving and removing old or incorrect information are defined and operational. A researched evidence base of e-learning projects and initiatives undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development. Information plans, associated policies and strategies are coordinated across the institution.
2: Planning	**E–learning design and (re)development activities formally link decisions regarding e-learning technologies and pedagogies with institutional plans for ensuring the integrity and validity of information.** **Plans in place for each course to ensure that all information created, supplied or collected electronically is stored in a validated backup system.** **Plans in place for each course to ensure that access to all course information is authenticated and authorised.** Institutional repositories provided for the storing of information created, delivered and collected. Support in the student and staff use of electronically accessed information and associated resources is allocated as part of planning for (re)development of individual courses. E–learning design and (re)development procedures explicitly consider the integrity and validity of information delivered, collected and stored. Risk management plan for the institution formally considers the reliability, integrity and validity of information collection, storage and retrieval in the context of e-learning projects and initiatives.

Dimension	Practices
1: Delivery	**Integrity and validity of information delivered, collected and stored is assessed and maintained formally within courses.**

Table O4-1: Descriptions of process practices by capability dimension

Process O5.

The rationale for e-learning is placed within an explicit plan

Process Background

E-learning is a new reality that expands understandings of teaching and learning practice, because 'e-learning represents a very different category and mode of communication' (Garrison and Anderson, 2003, pp. 1-2). Such extraordinary change presents both opportunities and risks that call for complete and coherent articulation of institutional rationales and plans for e-learning's complex role. A consistent rationale is presented in the literature, which positions learning first when considering educational technology and many studies and synopses of e-learning principles commence with a review of pedagogical concepts. Bates and Poole (2003), for example, state that 'choice and use of technology are absolutely dependent on beliefs and assumptions about the nature of knowledge, how our subject discipline should be taught, and how students learn' (p. 25). They add, however, that in reality few higher education teachers have learned how to teach.

Laurillard (2002), in proposing the rethinking of university teaching, argues for reconceptualising teaching as 'mediating learning' (p. 11). This view introduces the concept of situating learning technologies within a conversational framework that enables an iterative teaching and learning dialogue to identify the activities needed to complete the learning process (p. 87).

Salmon (2000) also reconceptualises the teaching role and advances the notion of e-moderating as the key to teaching online. E-moderating repositions the teacher as a facilitator of access to and communicating about learning, rather than being the deliverer. Salmon's proposal includes a model for implementing e-learning that integrates pedagogical principles and technological capabilities in a series of stages that build conceptual understanding and technical confidence (p. 25).

An integrated approach to e-learning is comprehensively explicated by Jochems *et al.*, (2004) who argue that e-learning should be 'positioned at the intersection of complex, flexible, dual learning and [take] an educational systems approach to combining pedagogical, technological, and organizational demands' (p. 8). Within this concept of integrated e-learning, Westera (2004) identifies several significant strategic points for planning, including: Develop and communicate a change strategy; clarify changes to roles and responsibilities; establish a coherent implementation plan that addresses all relevant issues; set explicit targets; ensure adequate support; involve all stakeholders; institute pilot projects; promote early successes; implement evaluation procedures and be responsive to user feedback; address ongoing maintenance and upgrading (p. 183).

Professional development, operational support, and evaluation processes are major factors in much of the strategic planning literature (Howard *et al.*, 2004; Khan, 2005). Howard *et al.,* for example, emphasise the importance of administrative, academic, and operational staff needing to develop new understandings and capabilities, to be supported in using them, and to participate in evaluating and providing feedback on e-learning strategies and processes (pp. 6-7).

Practices

Evidence of capability in this process is seen in definition and use of an explicit course or programme e-learning development plan. This plan should be formally developed and endorsed by the institutional leadership. Alignment with institutional strategies and plans is essential as is the consideration of business issues such as risk assessments and quality assurance. Teaching staff should be supported in both the development of plans and their application in specific contexts.

Table O5-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**E–learning project and initiative development plans are regularly analysed for potential reuse or improvement in the light of experience with successful and unsuccessful e-learning initiatives.** **E–learning project and initiative development plans reviewed across all courses and programmes using similar technology or pedagogies to ensure consistency and effectiveness.** Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of e-learning design and development initiatives. E–learning project and initiative development plans used to determine support and resourcing for the design and (re)development of courses and programmes. E–learning project and initiative development plans are re-evaluated using a formal process when any significant e-learning technology failure occurs to ensure any risks arising from or identified by the failure are explicitly addressed in current and future risk assessments.
4: Management	**Measures are collected of the success or failure of e-learning project and initiative development plans.** **Feedback collected regularly from students regarding the effectiveness of the use of e-learning in the context of e-learning project and initiative development plans.** **Feedback collected regularly from staff regarding the effectiveness of the use of e-learning in the context of e-learning project and initiative development plans.** Financial costs and benefits of e-learning project and initiative development plans are regularly assessed and reported on. E–learning design and (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Regular, formal, risk assessments undertaken of e-learning project and initiative development plans. Overlap and duplication of support and resources provided to staff engaged in e-learning design, (re)development and delivery is regularly reviewed and addressed in line with institutional e-learning strategy and technology plans.
3: Definition	**Institutional policy requires that all courses and programmes have e-learning project and initiative development plans linked to an overarching institutional plan.** **Templates and examples are used to communicate how to link e-learning project and initiative development plans with institutional strategic planning and decision making for the use of e-learning technologies and associated pedagogies.** Staff are provided with training and support in the development of e-learning project and initiative proposals and plans that reference institutional e-learning strategy and technology plans effectively. A researched evidence base of e-learning projects and initiatives undertaken within or relevant to the local context is maintained for use by staff engaged in e-learning design and (re)development. E–learning project and initiative plans, associated policies and strategies are coordinated across the institution.
2: Planning	**Procedures for allocating resources and funding for all e-learning technologies and projects require alignment with course and programme e-learning development plans.** **Teaching staff are formally involved in the development and review of course and programme e-learning development plans.** **Students are formally involved in the development and review of course and programme e-learning development plans.** **Course and programme e-learning development plans formally link decisions regarding e-learning technologies and pedagogies with the institutional e-learning strategies and associated operational plans.** Course and programme e-learning development plans are subject to formal approval and endorsed by institutional leadership. The allocation of resources for e-learning initiatives and projects includes a formal assessment of risks and strategies for mitigaton or removal of risk.
1: Delivery	**The selection of e-learning technologies and pedagogies for given courses is related to a course and programme e-learning development plan.**

Table O5-1: Descriptions of process practices by capability dimension

Process O6.

E-learning procedures and which technologies are used are communicated to students prior to starting courses

Process Background

The use of e-learning is sufficiently unfamiliar to many students, and the range of possibilities so diverse, that it is important to warn students and provide them with opportunities to familiarise themselves with what to expect (Hillesheim, 1998). Many students will need to make particular arrangements so they get the most benefit from e-learning and supplying them with the information in advance ensures that they will not be forced to withdraw at a later date, or struggle to raise their technology skills while trying to learn the course content (Fredericksen *et al*., 1999; Waterhouse and Rogers, 2004, Ragan, 1999).

Continuing improvement in student computer literacy skills and technical capability, and the inherent usability of new technology systems does not lessen the need for ongoing training and detailed information about e-learning procedures and technologies (Concannon *et al*., 2005; Kvavik and Caruso, 2005). Kvavik and Caruso's recent study identified the importance of clarifying and communicating 'which information technologies we want to use…at what level of sophistication, and for what purposes' (p. 19). They add that it cannot be assumed that students will adopt new technologies without the availability of comprehensive training based on systematic planning that recognises required skill levels: 'Students need to learn how to learn with the new technologies [and] Institutions should…articulate concrete IT learner competencies and literacy for students' (p. 19).

According to Vonderwell and Turner (2005) e-learners 'need to be self-regulated, disciplined, and know how to learn and explore different sources and strategies for learning' (p. 67). These requirements, and understanding how to meet them, is a pre-requisite for e-learning, which calls for students to be 'prepared for technology, learning management, pedagogical practice, and the social roles required for online learning' (Vonderwell and Zacharia, 2005, p. 225). Bouhnik and Marcus (2006) refer to students' need for guidance to avoid functional and psychological barriers, and to ensure that the 'technology itself will remain transparent' (p. 303).

Concern about students lack of preparedness for e-learning is discussed by Hrabe *et al*., (2005) who also refer to students identifying online skills as 'requiring a "steep learning curve"' (p. 14). Hrabe *et al*. comment that e-learning preparedness is not an just issue for students with few capabilities and skills. Other students 'who consider themselves to be technically proficient may have developed bad habits… that create barriers for them in the online context' (p. 13). A technology resource, SPARK (Student Preparation and Resource Kit), is proposed to help with these issues. SPARK is an interactive CD-ROM programme that is designed to appeal to, and be instructive for, novice and competent users. It features an initial proficiency self-evaluation section that assists the user to navigate through to further sections that address their particular online learning knowledge and skill development needs. An evaluation of the SPARK programme's effectiveness reports positive experiences for both user groups. Other institutions also make learning technology resources available to students such as, for example, the Deakin Learning Toolkit (Deakin University, 2006) comprising two CD ROMs, one containing comprehensive information on e-learning methods and procedures and the other containing a range of software applications.

Kirkwood and Price (2005) note that educational purposes and pedagogy are as important as technologies, 'with students understanding not only how to work with ICTs, but why it is of benefit for them to do so' (p. 257). This view emphasises the need for teachers to be involved in explaining their role in e-learning procedures.

Practices

Evidence of capability in this process is seen with the publishing of clear statements describing the use of various media and technologies and the requirements this will impose on students. This description should also provide access to any support information or documentation. All of this information should be provided for students in public course listings or catalogues prior to enrolment and also in enrolment packs. Policy should require that this information be provided and maintained. Institutional guidelines should set in place how teaching and administrative staff communicate standard technologies and media used in courses. Instructions for use, minimum requirements, and support of standard technologies should be provided and maintained through a central repository linked to the course requirements statement.

Table O6-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Measures of student compliance with and effectiveness of institutional standards for providing students with instructions and requirements regarding electronic media are used to maintain and update the standards and the requirements for courses generally.** **Information on student preparedness for e-learning used to allocate support and staff development resourcing prior to new technology introduction.** Student and staff communication plans incorporated into any new e-learning technology rollout. Compliance information on the abilities of the student population to meet required e-learning technology skill levels used to determine the support and resourcing for e-learning initiatives and projects. Compliance information on the abilities of the student population to meet required technology skill levels used to determine the support and resourcing for services, such as the Library, that support the students independently of the courses and programmes. Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of e-learning support and changing student and staff requirements arising from e-learning technologies and pedagogies being used.
4: Management	**Measurements of student ability to comply with the technology and media expectations are collected and reported on regularly.** **Feedback collected regularly from students regarding their understanding of the supplied information.** **Feedback collected regularly from students regarding problems with technology and media that are not addressed in the provided course descriptions.** **Feedback collected regularly from staff regarding student understanding of the supplied information.** **Feedback collected regularly from staff regarding problems with student use of technology and media that are not addressed in the provided course descriptions.** Compliance with institutional standards for providing students with preparation and practice opportunities for e-learning pedagogies and technology use is measured and reported on regularly. Compliance with standards for advising students of technological requirements collected and reported on regularly. Financial costs and benefits for students of e-learning technology use are regularly assessed and reported on. Communication procedures are subject to formal quality assurance reviews. Regular, formal, risk assessments undertaken of e-learning communication procedures so as to identify requirements for new or changed communication procedures.
3: Definition	**Standards for collecting and displaying the instructions and requirements regarding electronic media and technologies are defined for use in all courses and the associated publicity and enrolment information.** **Templates and examples explaining to students how to make effective use of technologies and media are provided for teaching staff to use in course materials.** All course-related information regarding electronic media and technologies is subject to regular review to ensure consistency, accuracy and completeness. Institutional standards for providing students with preparation and practice opportunities for all standard technologies and media are defined. Teaching staff provided with training and materials to assist in supporting student's acquisition of skills in the use of particular technologies and media. Formal plans for informing students of the technologies and media in use, associated policies and strategies are coordinated across the institution.
2: Planning	**Course outlines contain a section covering the technologies and media which will be used, along with the procedures for their use that will be adopted in the particular course.** **E–learning technology practice sessions or tutorials organised and provided to all students as part of the course.** Formal plan for informing students of the technologies and media in use is in place within individual courses. E–learning design and (re)development activities formally link decisions regarding e-learning technologies and pedagogies with the institutional e-learning strategies and associated operational plans. E–learning design and (re)development activities reference the course learning objectives when selecting and implementing e-learning technologies and pedagogies. Formal plans and strategies cover mechanisms for ensuring students have access to and/or ownership of necessary technologies for e-learning. The institutional risk management plan covers risks arising from the communication of e-learning technologies and pedagogies to students.

Dimension	Practices
1: Delivery	**Instructions and requirements describing e-learning technologies and pedagogies are listed in a formal and complete statement in the course and promotional materials available prior to enrolment.** **Opportunities for students to practice and prepare for technology use are explicitly identified in the course materials available prior to commencement of the course.**

Table O6-1: Descriptions of process practices by capability dimension

Process O7.

Pedagogical rationale for e-learning approaches and technologies communicated to students prior to starting courses

Process Background

The term 'e-learning' encompasses a wide range of applications and activities, making confusion on the part of learners a real possibility (Clarke, 2004). Because e-learning includes many different, and often new, technical and conceptual approaches, students need to be fully informed about why and how e-learning is being implemented and applied to their study programme, and the consequential benefits to their learning (Hillesheim, 1998). Such information should be made available at the earliest opportunity to ensure students are able to understand the competency and technical requirements of a programme before enrolling. Many students will need to make particular arrangements to ensure that they get the most benefit from e-learning, and supplying them with the information in advance ensures that they are not forced to withdraw at a later date or to struggle to raise their skills (Waterhouse and Rogers, 2004).

E-learning involves learner-centred pedagogies and anticipates that students engage with more critical and self-directed approaches to learning (Garrison and Anderson, 2003). Clarke (2004) emphasises the importance of making appropriate choices because 'e-learning is a mix of different features and services, so many combinations are likely to be effective' (p. 21), and presents a checklist of topics to enable students to systematically enquire about a programme.

Also concerned for learner-centred teaching, Bates and Poole (2003) argue that the choices and uses of technology in e-learning programmes depend on epistemological beliefs and assumptions and pedagogical principles that underpin them (p. 25). Adding that perhaps 'the term should be learning-centred teaching, [thus] focusing on the process rather than the person' (p. 43), they point to the importance of explicating and initiating collaborative and cooperative teacher-learner relationships from the outset. Quoting Bates (1995) they conclude that '[c]lear objectives, good structuring of learning materials, relevance to learners' needs, etc., apply to the use of any technology for teaching, and if these principles are ignored…teaching will fail, even if the unique characteristics of the medium are stylishly exploited' (in Bates and Poole, 2003, p. 45).

Students' approaches to learning and their perception of learning contexts are interconnected (Ramsden, 1998); it is therefore crucial to provide access to all relevant information about learning approaches and technologies to '[e]nsure that the logistics of the academic context allow students to study effectively and efficiently' (Laurillard, 2002, p. 208).

Garrison and Anderson (2003) characterise e-learning as a 'disruptive technology' with the potential to 'fundamentally alter how students approach learning and outcome expectations' (p. 20). In explaining this notion, they emphasise the shift in teaching and learning principles from a presentational to a transactional approach, and they comment that this calls for a 'refocusing and rededication to traditional higher education ideals' (p. 20). In concluding, Garrison and Anderson refer to the importance of recognising 'new learning communities' emerging through a critical community of learners engaging with a transactional perspective of teaching and learning (p. 21).

Practices

Evidence of capability in this process is seen in the incorporation of clear statements describing the use of various media and technologies and the requirements that this will impose on students. This description should also provide access to any support information or documentation. All of this should be provided publicly for students prior to enrolment and preferably also in enrolment packs. Policy should require that this information be provided and maintained along with guidelines that demonstrate how to communicate information on the standard technologies and media used in courses. Instructions for the use and support of standard technologies should be provided and maintained through a central repository.

Table O7-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Compliance information on the abilities of the student population to use technology effectively for their learning is used to determine the support and resourcing for e-learning initiatives and projects.** **Information on student preparedness for e-learning used to allocate support and staff development resourcing prior to new technology introduction.** Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of pedagogical support and changing staff requirements arising from e-learning technologies and pedagogies being used. Student and staff communication plans incorporated into any new e-learning technology rollout.
4: Management	**Compliance with standards for advising students of the pedagogical rationale for e-learning technology requirements of courses and programmes collected and reported on regularly.** **Compliance with institutional standards for providing students with preparation and practice opportunities for e-learning pedagogies and technology use is measured and reported on regularly.** **Measurements of student ability to comply with the pedagogical expectations arising from e-learning are collected and reported on regularly.** **Feedback collected regularly from students regarding the clarity and utility of the information provided.** **Feedback collected regularly from staff regarding the clarity and utility of the information provided.** Abilities of the student population to meet requirements imposed by e-learning pedagogies and technologies regularly assessed and reported on. Financial costs and benefits for students of e-learning pedagogies and technologies are regularly assessed and reported on. Communication procedures are subject to formal quality assurance reviews. Regular, formal, risk assessments undertaken of e-learning initiatives and projects so as to identify requirements for new or changed communication procedures.
3: Definition	**Standards for collecting and displaying the pedagogical rationale for e-learning technology requirements of courses and programmes are defined for use in all courses.** **All course-related information regarding the pedagogical rationale for e-learning technology requirements is subject to regular review to ensure consistency, accuracy and completeness.** **Templates and examples explaining to students how to make effective use of e-learning technologies are provided for teaching staff to use in course materials.** **Teaching staff provided with training and materials to assist in supporting student's acquisition of skills in the use of e-learning technologies.** Institutional standards for providing students with preparation and practice opportunities for all standard e-learning technologies are defined. E–learning design and (re)development plans, associated policies and strategies are coordinated across the institution.
2: Planning	**Course outlines describe the technologies and media which will be used, along with the procedures for their use in the particular course.** **E–learning design and (re)development activities reference the course learning objectives when selecting and implementing e-learning technologies and pedagogies.** **E–learning skills practice sessions or tutorials organised and provided to all students as part of the course.** E–learning design and (re)development activities formally link decisions regarding e-learning technologies and pedagogies with the institutional e-learning strategies and associated operational plans. Plan for informing students of the pedagogical rationale for e-learning technology requirements in place within individual courses. The institutional risk management plan covers risks arising from the communication of the pedagogical rationale for e-learning approaches and technologies to students.

Dimension	Practices
1: Delivery	Pedagogical rationale for e-learning approaches and technologies listed in a formal and complete statement in the course and promotional materials available prior to enrolment. Activities requiring the use of particular media and technologies clearly link the requirements with the stated learning outcomes of the course and activity. Opportunities for students to practice and prepare for e-learning pedagogies and activities are explicitly identified in the course materials available prior to commencement of the course.

Table O7-1: Descriptions of process practices by capability dimension

Process O8.

Course administration information communicated to students prior to starting courses

Process Background

The expanding integration of previously discrete components of institutional systems is increasing the pedagogical and operational complexity of e-learning. But it is also enabling the provision of accurate, consistent, complete, and timely administrative information for students. Levy and Ramim (2004) discuss the importance of institutional support for students that extends beyond online learning to include: 'registration, financial aid, the library, the bookstore, advisors, student organizations and virtual communities' (p. 285). Furthermore, as Khan (2005) observes, '[s]ince more and more institutions offer e-learning programs, learners have more options to compare quality, services, price, and convenience of education providers' (p. 23).

Relating the importance of coherent policy to effective e-learning, Waterhouse and Rogers (2004) promote not only the benefits that provision of comprehensive information brings to student familiarisation, but also the potential time savings available from simplifying administrative procedures. Consistent, clear information on the administrative aspects of courses ensures that staff are able to focus on teaching aspects rather than details of enrolment and also ensures that students are clear on the focus and can ensure that they are properly prepared for study (Waterhouse and Rogers, 2004).

Pacey and Keough (2003) discuss the challenges institutions face from external pressures to implement online education services. They argue the importance of a responsive institutional plan that 'to be acceptable…must be understandable, reflect the values of the institution, speak to the learner as the core of the enterprise, and communicate the "wins" to the institutional community' (p. 408). Caplan (2004) takes the view that stakeholder groups, including students, must be assured that the institution's e-learning 'is a viable means of delivering courses and programs, and accommodating student needs' (p. 176). He recommends personalising introductory materials for students, and, in addition to general, technical, and academic information, addressing: 'administrative regulations, including guidelines on plagiarism, privacy, academic appeal procedures, library facilities, and access to counseling and advisory services' (pp. 178-9).

Agre (2002) expresses concern for students personal and professional development and comments on the importance of students having access to information that enables them to establish for themselves what they want from a particular course: 'The…university should be able to facilitate this kind of self-discovery, and should not undermine it by fragmenting itself in a hundred incompatible directions' (p. 163). In addressing such administrative issues, Schauer *et al*., (2005) discuss the need for a collaborative approach because '[w]hile categories of issues can be defined, the way in which the issues are addressed becomes an interactive and responsive process as distance delivery grows and matures' (Summary ¶ 1), and students must not only be able to recognise that issues are being addressed appropriately, but also be able to participate in the responsive process. As Smith (2005) has observed, the 'virtual' nature of the online environment presents institutions with greater challenges than the physical environment does, to ensure that students are fully supported (p. 28).

Practices

Evidence of capability in the process is seen in clear documentation, complying with a consistent institutional template, setting out the course and institution administrative information. Policy should require that this information be accurate, regularly reviewed and provided to students in advance of enrolment. Templates should be provided to ensure a consistent organisation and content. Elements that are standard to all courses should use wording prescribed by policy.

Table O8-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Feedback information used to inform allocation of resources for administrative services that support the students independently of the courses and programmes.** **Student and staff communication plans incorporated into any new administration processes.** Institutional risk assessments and mitigation strategies are regularly updated to reflect the effectiveness of administration information provision and changing staff requirements arising from e-learning technologies and pedagogies being used.
4: Management	**Measurements of student ability to comply with the administrative requirements of the course and institution are collected and reported on regularly.** **Feedback collected from students on the clarity and utility of the supplied administrative information.** **Feedback collected from staff on the clarity and utility of the supplied administrative information.** **Compliance with institutional standards for providing students with information on the administrative requirements of the course and institution is measured and reported on regularly.** Communication procedures are subject to formal quality assurance reviews. Regular, formal, risk assessments undertaken of e-learning initiatives and projects so as to identify requirements for new or changed communication procedures.
3: Definition	**Standards for displaying the administrative requirements of the course and institution are defined for use in all courses and the associated publicity and enrolment information.** **Staff are provided with training and materials to assist in supporting student's compliance with the administrative requirements of the course and institution.** All course-related administrative information is subject to regular review to ensure consistency, accuracy and completeness. Templates of administrative requirements of the course and institution are provided for teaching staff to use in course materials. Formal plans for informing students of the administrative requirements, associated policies and strategies are coordinated across the institution.
2: Planning	**Course outlines contain a section covering the administrative requirements of the course and institution.** Formal plan for informing students of the administrative requirements of the course and institution is in place within individual courses. E–learning design and (re)development activities formally link decisions regarding e-learning administration with the institutional e-learning strategies and associated operational plans. The institutional risk management plan covers risks arising from the communication of administrative information to students.
1: Delivery	**Administrative information and requirements are listed in a formal and complete statement in the course and promotional materials available to students prior to enrolment.**

Table O8-1: Descriptions of process practices by capability dimension

Process O9.

The provision of e-learning is guided by formal business management and strategy

Process Background

E-learning is an educational evolution, rather than an add-on, that requires a complementary approach to the integration of its manifold, complex, and dynamic elements and processes into institutional strategies and plans. The influence of information and communication technology (ICT) on the reconceptualisation of higher education organisation, administration, and teaching and learning, has been apparent for some time (Anderson and Elloumi, 2004; Bates, 1988, 1997; Duderstadt *et al*., 2003; Dutton and Loader, 2002; Laurillard, 2002; Ramsden, 2003). Dutton and Loader (2002), refer to not only 'the administration and services of higher educational institutions…being transformed [but also] the whole environment…not just the classroom, but teaching, learning, managing and obtaining services…being increasingly embedded in electronic resources' (p. 7).

As Davis (2004) explains, successful implementation of e-learning is 'based upon a good understanding of an institution or company's core business and values, of the nature of the intended student market, and of the needs of the curriculum' (p. 101). He also considers the importance of managing change, noting that the usual dynamics of educational change are further complicated by online activities: 'Because online learning technologies evolve as quickly, and often as unexpectedly, as do the curriculum, students' expectations and connectivity, etc., the ability to manage change effectively is important' (p. 110). Davis summarises the qualities needed for an effective infrastructure as: 'a healthy working environment, with committed staff, where implementation can proceed, and where constant change is understood to be the norm' (p. 113).

Arguing the importance of competitive advantage to e-learning strategy development, Elloumi (2004) proposes a value chain analysis approach to assess external and internal competitive opportunities and effects: 'value chain analysis facilitates the strategic management of an organization' (p. 84). Benefits of using this approach include the ability to show that it is 'serving specific public needs identified in its mission statement…. and to demonstrate its ability to manage its operating systems successfully by delivering a quality service to the public served' (p. 89).

Reporting on a case study into organisational change relating to e-learning, de Freitas and Oliver (2005) conclude that e-learning policy significantly affects institutional change beginning with 'organizational redevelopment (whether formally through staffing structures or informally through locally negotiated changes in staff roles)' (p. 94). They add, however, that this process is dynamic and complex and needs to be subject to negotiation between all parties.

Duderstadt *et al*., (2003), reviewing the institutional issues and concerns of e-learning, refer to the investment trade-off between 'bricks (conventional physical infrastructure) and clicks (information technology)' (p. 49). They note that, to be sustainable, these issues need to involve collaborative partnerships; within the institution, and beyond, to include commercial, government, and global relationships. Duderstadt *et al*. present several recommendations that emphasise the unique challenges and opportunities confronting institutions in the process of strategic transformation through e-learning. In concluding they observe that 'transforming…the university is neither linear nor predictable [but] is an iterative process, since… experience leads to learning that can modify the transformation process', and they refer to the importance of considering wide-ranging initiatives including: 'institutional culture, mission, finance, organization and governance, academic programs, and external relations, all of which interact with each other' (p. 58).

Also concerned about the forces of competition, Graves (2005) emphasises the need to rethink the '"technology bolt-on" process…to redesign a service process–that is, to change the service process in substantive ways to improve its quality, flexibility, and unit cost structure' (p. 96). Describing a path to improved performance, Graves identifies technology, information, analytics, and innovation as infrastructural steps towards 'collaborative, blended, adaptive planning and cultural models focused on improving institutional performance' (p. 86).

Focusing on institution-wide reorganisation, Harloe and Perry (2005) comment on the challenges of implementing new roles and reform to make the university 'fit for purpose' whilst preserving its distinctive knowledge production functions. They argue that 'the university has to be organised in ways that retain the active commitment of their academic staff. It also has to recognise the reality of a much more complex division of roles and responsibilities between academic and administrative staff' (p. 40).

Using the metaphor of a compass, Kowch (2005) discusses the complexity of exploring, mapping and navigating the e-learning environment with a view to discovering its social capital opportunities. Observing that administrators with a very limited understanding of technology are directing huge investments, Kowch calls for more research and input from educational technologists. He argues that a 'technology-integrated educational institution is an important (potential) social capital generator; so, education leaders must know both how to design it and how to lead it' (pp. 1068-9). Kowch believes that because educational technologists readily contextualise instruction and learning as a social (relational) process that is well suited to technology-mediated environments, they have potential for e-learning environment project design and organisational (change) leadership.

Practices

Evidence of capability in the process is seen through the alignment of e-learning investments with institutionally developed and endorsed e-learning strategies and technology plans. Important elements include a formal business development plan along with a detailed risk assessment and mitigation strategy. All staff involved in the design, (re)development and delivery of e-learning projects and initiatives need to be involved in the development of these plans and strategies and fully aware of the implications for their own work. The plans and strategies need to be dynamic documents building on a growing evidence base of locally relevant initiatives and projects linked with formal reviews, evaluations and quality assurance outcomes.

Table O9-1 sets out examples of the characteristic practices which are observed in organisations operating effectively for each dimension of the process capability.

Dimension	Practices
5: Optimisation	**Strategy and business management approaches and goals are regularly analysed for potential reuse or improvement in the light of experience with successful and unsuccessful e-learning initiatives.** **Reports summarising the outcomes of e-learning projects and initiatives are used when assessing the effectiveness of governance and management mechanisms.** Institutional risk assessments and mitigation strategies are regularly updated to reflect the strategy and business management approaches and goals and changing staff requirements arising from e-learning technologies and pedagogies being used.
4: Management	**Measures are collected of the success or failure of e-learning initiatives in supporting the achievement of strategy and business goals at programme and institution levels.** **Feedback collected regularly from students regarding the effectiveness of the use of e-learning in the context of the formal strategy and business management at programme and institution levels.** **Feedback collected regularly from staff regarding the effectiveness of the use of e-learning in the context of the formal strategy and business management at programme and institution levels.** **Financial costs and benefits of e-learning projects and initiatives regularly assessed and reported on.** E–learning design and (re)development activities are subject to formal quality assurance reviews and re-prioritisation of resources and objectives at key milestones. Regular, formal, risk assessments undertaken of e-learning initiatives and projects so as to identify requirements for new or changed governance and management mechanisms. Overlap and duplication of support and resources provided to staff engaged in e-learning design, (re)development and delivery is regularly reviewed and addressed in line with institutional e-learning strategy and technology plans.
3: Definition	**Institutional policy requires that all courses and programmes link e-learning development to an overarching institutional strategy and business management approach.** **Staff are provided with training and support in the development of e-learning proposals and initiatives that effectively reference formal institutional strategy and business management.** Templates and examples are used to communicate how to incorporate formal strategy and business management when planning for the use of e-learning technologies and associated pedagogies. Institutional strategy activities and documents formally consider the impact of e-learning on the institution. A researched evidence base of e-learning projects and initiatives undertaken within or relevant to the local context is maintained for use by staff engaged in strategy (re)development and business management. Business plans, associated policies, strategies and service level agreements are coordinated across the institution.
2: Planning	**Staff are formally involved in the development and review of institutional e-learning strategies and associated operational plans.** **Staff are recognised, rewarded and supported in their engagement with innovative e-learning initiatives and experiments that support or enhance institutional and programme strategies and operational plans.** **Students are formally involved in the development and review of institutional e-learning strategies and associated operational plans.** **Support for e-learning projects and initiatives formally linked to strategic and governance outcomes.** **Service level agreements formally linked to strategic and governance outcomes.** Risk assessments undertaken as part of governance and strategic planning include consideration of the impact of e-learning internally and externally. Institutional e-learning strategies contain clear and empirically measureable objectives and milestones. Course design and (re)development activities formally link decisions regarding e-learning technologies and pedagogies with the institutional e-learning strategies and associated operational plans.

Dimension	Practices
1: Delivery	**The allocation of resources and funding for e-learning technologies and projects is aligned with, informed by and supportive of the institutional e-learning strategies and technology plans.** **Strategic impact and contribution of e-learning technologies and projects is evident in institutional governance activities.** Institutional e-learning strategies, vision address academic, staffing, student and financial implications of e-learning adoption and development. E–learning strategies, vision and business plans are formally endorsed by the institutional leadership.

Table O9-1: Descriptions of process practices by capability dimension

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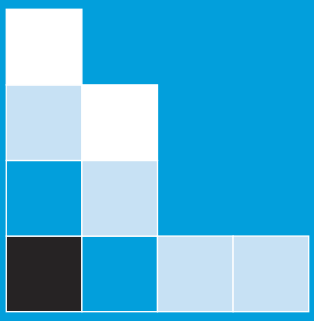

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