Knowledge Management Strategies for Distance Education

A TOPICAL, START-UP GUIDE TO DISTANCE EDUCATION PRACTICE AND DELIVERY

If information and knowledge are to be of practical value, they must be effectively managed

INTRODUCTION

During the past century, rapid development of an information society and growth in the quantity of accessible information was given considerable momentum with the development of information and communication technologies (ICT), which allow people to interact with each other and to share digital information relatively easily. An example of this is the Internet.

For many people the information explosion has led to an overwhelming feeling of information overload. Internet searches for relevant information yield a growing number of results that are unrelated to the searched topic or are only marginally useful, while growing amounts of the information available are of poor quality.

If information and knowledge are to be of practical value they must be effectively managed. This is particularly important in education and distance education (DE) where information plays such an important role in teaching and learning. Knowledge Management (KM) is a response to these challenges, mostly seen in the business world and to some extent, in education.

WHAT IS KNOWLEDGE?

Many people use "information" and "knowledge" interchangeably. However, in KM these terms are distinct. Most experts also differentiate between data and information:

- **Data** is a collection of facts and quantitative measures which exist outside of any context from which people can draw conclusions. By itself data has relatively little value.

- **Information** is data that people interpret and place in a meaningful context, highlighting patterns, causes or relationships in data; for example, reports or strategic planning documents.

- **Knowledge** is the understanding people develop as they react to and use information, either individually or as an organisation.

  i) **Tacit knowledge** is subconsciously understood and applied, developed from direct experience and action, and usually communicated through informal conversation and shared experience.

  ii) **Explicit knowledge** is more precisely and formally articulated, and removed from the original context of its creation or use.

Tacit knowledge is a vital component of knowledge in any system. A key challenge in KM is to find ways to structure and record tacit knowledge so that it becomes explicit. If this is not done significant value is quickly lost when people move on from an organisation. In many traditional universities when academics leave a position, they take with them all of the tacit knowledge associated with running a particular course before it can be passed on to their successors.

Data, information and knowledge are separate but linked concepts represented in the diagram *[Figure 1]* adapted from the Manaaki Whenua Landcare Research website.

People are at the centre of processes that convert data into information, as well as of those that use information to create and share knowledge. People, not systems, manage knowledge. KM is the attempt to improve or maximise knowledge usage in an organisation or system.

KM AND DE

At an institutional level, KM is essential to creating organisations that "learn" more effectively.

In a business context, a "learning organisation" is well-positioned to meet customer needs with employees who are good "knowledge workers" that apply knowledge effectively and adapt quickly through learning.

KM should be a fundamental objective of any educational institution, as learning is its core function and should be reflected in how the organisation operates. In an educational context, educators are the knowledge workers because they typically have considerable personal discretion and responsibility for analysing, developing and implementing curricular goals. The primary "customers," the learners, also play a role in creating and sharing knowledge.

The practices of well-functioning DE systems already reflect attempts to manage knowledge. A key attribute of DE programmes is a systematic planning and implementation approach that compensates for separation in time and space between educators and learners. Well-functioning DE institutions invest significantly in developing structured curricula and materials; creating flexible learner support systems; maintaining carefully designed administrative systems to support distance learners; and implementing quality assurance strategies.

KM is, therefore, not a new concept beyond the reach of the average DE institution, nor a concept that should induce fear in distance educators. The main challenge in DE institutions is to create and build on existing good practices, to integrate KM more systematically into all aspects of the institution's operations.

IMPLEMENTING KM

A KM strategy that works well in one institutional context may fail in another. When designing KM strategies, systems and tools, consider the people involved; the organisation's operational context, history and ICT capacity; and what the institution wants to achieve. People, processes and technologies are the three core elements in preparing a KM strategy *[Figure 2]*, as noted by Lisa Patrides and Thad Nodine.

KM AND PEOPLE

The more people see the benefit of managing knowledge effectively, the easier it makes their jobs, the more supportive of the KM strategy they will be. The simplest way to achieve this is to design KM strategies and systems around the needs of its users, which are the educators, administrators and managers, and learners. Successful KM depends on engaged proactive participants and a broader institutional environment that facilitates collaboration, builds trust and shared understanding, and encourages creation of communities of practice.

Adisorn Na Ubon and Chris Kimble identify some key elements of effective user-friendly KM design:

- **Communities of practice:** Small, informal, self-organising networks of practitioners. An excellent point of departure for dynamic, productive knowledge creation and sharing in education, as knowledge in an organisation is often built up and generated by communities of practice.
- **Staff collaboration:** Meetings, forums and discussions, and tools such as email and intranets, create knowledge through active social interaction and collaboration. Most organisations realise they will improve performance if their staff work together.
- **Organisational trust:** An essential condition for people to share knowledge and expertise. People are often reluctant to share knowledge because of the risk of loss of control and influence. Overcoming this reluctance is key to successful implementation of KM strategies.
- **Organisational understanding:** Shared understanding and common ground or purpose among people in an organisation or community is essential for collaboration and productive knowledge transfer.

Review the institution's existing policies and practices to assess whether they support organisation-wide communities of practice or promote departmental cliques. For example, review human resource policies to assess how much they reward information-sharing as opposed to encouraging employee territorialism and competition. If compensation and reward systems are based only on what people know there will be few incentives to share information; if they are based on what people teach others in the organisation, information-sharing is likely to increase dramatically.

Finally, make information gathering and storage systems accessible to any members of the organisation who may need that information to effectively produce and use knowledge. Information has historically been regarded as a source of power and the people responsible for managing information have often been selective in sharing it. Patrides and Nodine note that organisations benefit enormously when people who have been formerly excluded begin to gain access to information and join with others to actually change the system.

KM AND ORGANISATIONAL PROCESSES

KM is useful to all processes that identify, share and create knowledge. In DE formal and informal processes and procedures govern all aspects of institutional operations, including administration, course design and development, learner support, student assessment, and quality assurance. All institutional processes can be improved through effective KM.

KM AND ICT

ICT enables effective KM. Rapid growth and development of ICT functionality opens great possibilities for building and exploiting information and for converting it into knowledge. As PC Barnes notes, ICT can be harnessed to support many key KM processes:

- **Capturing knowledge:** Use electronic databases and software information management systems to digitally store any kind of information, whether text, graphic, audio or video.
- **Designing, storing, categorising, indexing and linking digital information:** Store more data, access it and manipulate it more quickly using today's computers that feature faster computer processing speed, storage capacity and a lower relative price.
- **Searching for, and subscribing to, digitally stored content:** Query the stored information and receive search results using a Web browser, via the Internet or a secure intranet. Send student course updates or receive student feedback using cheap, increasingly automated electronic communication, such as mobile phones or Internet-based email.
- **Presenting information and content in a way that it is meaningful and applicable for many contexts and uses:** Organise content as learning objects, in learning object repositories (see back page).

DE organisations must devise systematic ICT strategies to re-use information in different ways without generating significant additional cost, and to store information in ways that allow it to be easily used for future purposes and applications. This ensures that an institution builds on growing knowledge bases rather than repeating basic work already conducted, thus maximising the value of money spent on course design, development or educational research. The gathered information can also, where appropriate, be made available online for access by other distance educators around the world contributing to an effective, useful global DE resource and research base. If information security is important, user access can be restricted through passwords by the online website or system.
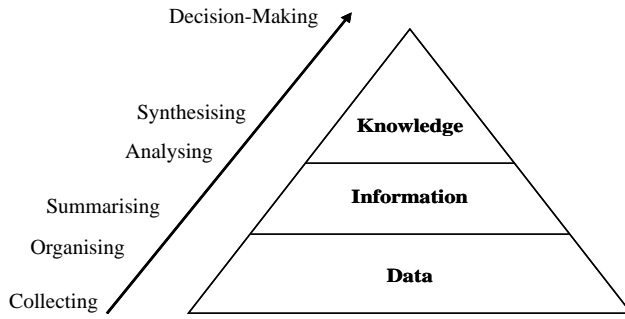
Decision-Making

Synthesising

Analysing

Summarising

Organising

Collecting

Knowledge

Information

Data

FIGURE 1

People
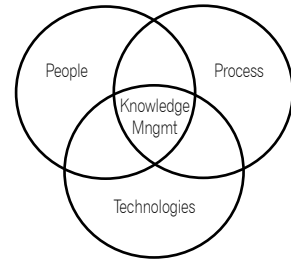
Process

Knowledge
Mngmt

Technologies

FIGURE 2

KM AND INFORMATION SYSTEMS

A DE institution's information management systems should allow information to be cheaply, easily and logically stored and retrieved, and provide the type of information that a DE institution actually needs at all levels, without adding unnecessary bureaucracy or administrative labour.

Understand what information or knowledge you want to extract from the databases you develop to ensure that the gathered data is capable of providing the answers to your questions. These resources may provide some guidance:

- An overview of the kinds of information that DE systems should contain, by J. Kidwell *et al* (www.educause.edu/ir/library/pdf/EQM0044.pdf)
- COL Knowledge Series guide *Managing Student Records in Distance Education* by Christine Randell (www.col.org/knowledge)
- An article by this author on *Student Management Information Systems for Distance Education Institutions* (www.africaodl. org/resources/0000001539/0000000763/0000001039/Student%20Management%20Information%20Systems%20for%20Distance%20Education%20Institutions.pdf).

Create user-friendly computer access to information so that users can easily access information independently. For example, implement a Web-based interface to access and search your institution's data systems. This enables educators and learners to select their own search criteria and extract relevant resources quickly, at no additional cost after initial design and set-up. These systems can be designed with security measures that allow decentralised data entry, so that the individuals responsible for maintaining certain information can independently enter data into the system; for example, academics entering student marks for their courses, and for database changes to be updated automatically to the Web interface.

INVESTING IN ICT AND KM

To implement an effective, broad, ICT-based KM strategy, DE institutions must invest financial and human resources to:

- Establish types and combinations of information that will support teaching and learning environments, target learners, and make the information accessible to all participants in the educational process.
- Develop a conceptual framework for computer-based management information systems. Many investments in ICT systems lead to disappointment and serious wastage of resources due to incomplete definition of the business requirements of ICT systems; insufficiently detailed technical specifications; and lack of user input during design and development. A key objective in designing effective ICT systems to support KM is to leverage existing processes by computerising and automating them.

- Design an electronic database that can be used to organise, store and allow for multiple uses of information, including some combination of:
    i) Databases, data warehousing systems and content repositories.
    ii) Computer networks that allow users to connect to the resources remotely. Increasingly, these should be high bandwidth networks that allow faster transfer of large amounts of data. A significant challenge in developing country contexts is that communication between the various centres of a DE institution may be hampered by poor quality or expensive telecommunications. Affordable high bandwidth connectivity must be established to allow all elements of the distance education system to stay in ongoing contact and to share information seamlessly and effectively.
    iii) Communication systems including email systems, discussion lists and collaborative tools designed to support knowledge sharing, such as online project management systems and collaborative content authoring tools.

KM DESIGN PRINCIPLES

Start with Strategy: Be clear what the objectives of your KM strategy are to ensure that KM does not come to be seen as an end in itself. Document these carefully so that they can be used to assess every aspect of designing evolving information systems and tools. The objectives must be, in broad terms, to advance and improve student learning. If KM investments cannot be linked to this overall objective it would seem difficult to justify them in an educational organisation.

Involve users in designing KM strategy and systems: People are central to KM. The most successful strategies and systems will harness the people who are expected to drive the system from the outset, who can build a KM strategy based on the organisation's existing context and from an understanding of the patterns of information usage already present.

Clearly distinguish KM strategies from ICT implementation and management: Although ICT can be harnessed to support KM, technology does not drive KM. Technology should be an enabler, facilitating how people establish solutions to real problems. Once technology becomes a problem that needs its own solutions, it stops being useful to its users.

Ensure that the broader organisational environment supports and rewards knowledge creation and sharing: There is little point in layering a KM strategy on top of an organisation that is structurally unsupportive of knowledge creation and sharing. The process of organisational change toward implementing policies and practices that encourage a spirit of enquiry and curiosity, while rewarding information-sharing and collaboration, requires strong institutional leadership if it is to work successfully. Policies should also work actively to break down internal departmental boundaries within an organisation, making it easier for people to work in teams so that

they are able to develop their own knowledge through innovation and interaction with others.

Approach KM as an ongoing process: KM is not a one-time investment in which a system is created and then left to run by itself. Support for KM strategies must be long-term and must assume an ongoing need for change and improvement as the people and KM needs within an organisation change. Again, this requires strong institutional leadership if the KM strategies and systems are to become truly embedded into the organisation's operations.

Measure the impact of KM: As previously noted, managing knowledge is not an end in itself but should be informed by clear objectives. It is critical to integrate into KM strategies and systems some processes of measuring the impact of these investments. This may be difficult to do, as it may be difficult to quantify the benefits of KM; however, reflective review of the impact of KM helps ensure that its evolving design and implementation has the greatest impact.

LEARNING OBJECTS AND REPOSITORIES

Most curriculum design and development is not approached or implemented systematically and is often specific to a particular course or instructor, leading to potential problems:

- Lack of cost effective curriculum design and development which may result in investments in this area being halted
- A curriculum design and development process that is hard to understand and is often implemented inefficiently
- Large investments in curriculum design or development are often quickly lost when an individual leaves an institution.

Learning Objects (LO) are a way to store intellectual property that may help overcome these issues. Originally an eLearning concept, LOs have become increasingly relevant in a much wider array of educational settings. Sandy Mills' definition provides a useful starting point: "A learning object…is an object or set of resources that can be used for facilitating intended learning outcomes, and can be extracted and reused in other learning environments."

A LO that is well designed, appropriately stored and accurately catalogued in a database is likely to be useful for applications beyond its original audience and educational context. The development of LOs is considered very important to KM strategies for education as the reusability of knowledge resources is a central KM concept.

A Learning Object Repository (LOR) stores LOs digitally. Typically a LOR brings together a collection of LOs for a defined community or organisation, storing them in a single location. LORs make learning resources readily accessible to educators and learners, and are usually databases accessible to users via the Internet or some other form of computer networking. Some LORs are open access systems while others are intranet facilities available only to specific users. Still others are commercial repositories from which LOs can be purchased.

The need to share learning content across institutions and systems is becoming increasingly important, both to make use simpler and more streamlined for learners and educators, and to reduce duplication of effort. Movements on an international level are attempting to define common standards for describing educational content so that the content in various LORs can be more easily shared across different repositories (see *Web Resources* on back page of guide for examples).

A final development is a move towards making reusable information resources more freely accessible through establishing Open Educational Resources (OER). OER content development is based on the principles of the open source and free software movements.

A 2002 UNESCO-hosted online discussion (opencontent.org/blog/archives/247) defines OERs as technology-enabled educational resources for consultation, use and adaptation by a community of users for non-commercial purposes, typically freely available over the Web or the Internet. Their principal use is by teachers and educational institutions for course development but they can also be used directly by students. OERs include LOs such as lecture material, references and readings, simulations, experiments and demonstrations, as well as syllabuses, curricula and teachers' guides.

Most open educational content projects release their products using a Creative Commons licence, which allows authors to retain certain rights while granting other rights to users–particularly the right to make copies of content produced.

Some starting points for further research:

- The Development Gateway website (topics.development-gateway.org/openeducation)
- The COL Knowledge Series guide, *Designing Learning Objects for Online Learning* (www.col.org/knowledge)
- The COL Knowledge Series guide, *Adapting Learning Materials for Distance Learning* (www.col.org/knowledge).
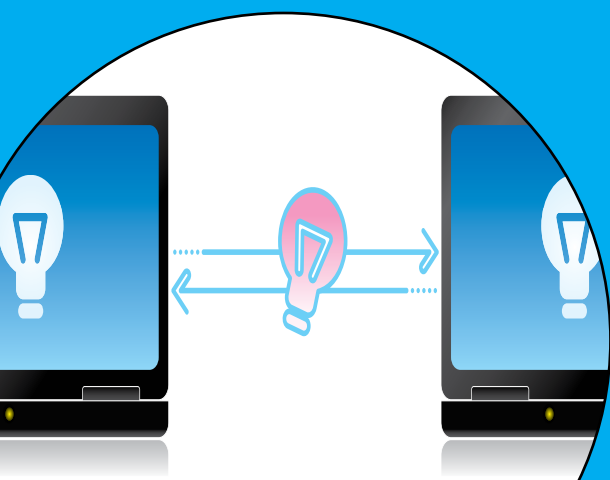
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Horn, Chrys. 2003. *Communicating science—Reflecting on practice.* *www.landcareresearch.co.nz/research/sustainablesoc/social/ communicationinfo.asp*

Patrides, L. and Nodine, T. 2003. *Knowledge Management in Education: Defining the Landscape.* California: Institute for the Study of Knowledge Management in Education. 11.

Barnes, P.C. 2001. *A primer on knowledge management.* Student Accountant, Paper 3.4. *www.accaglobal.com/students/publications/student_accountant/ archive/2001/18/57627*

Mills, S. 2002. *Learning about Learning Objects with Learning Objects.* League for Innovations CIT Conference 2002, Long Beach, California, United States. *www.alivetek.com/learningobjects/site_paper.htm*

WEB RESOURCES

STANDARDS

Advanced Distributed Learning (ADL)—SCORM. *www.adlnet.gov/scorm*

Aviation Industry Computer-Based Training Committee (AICC). *www.aicc.org*

The Centre for Educational Technology Interoperability Standards (CETIS). *www.cetis.ac.uk*

Dublin Core Metadata Initiative (DCMI). *http://dublincore.org*

Educational Modelling Language (EML), Learning Networks of Educational Technology Expertise Centre, Open University of the Netherlands (OUNL). *http://eml.ou.nl/eml-ou-nl.htm*

IMS Global Learning Consortium. *www.imsproject.org*

Institute of Electrical and Electronics Engineers (IEEE), Learning Technology Standards Committee (LTSC). *http://ieeeltsc.org*

COLLABORATIVE RESOURCES

Community Dimensions of Learning Object Repositories (CD-LOR). *www.ic-learning.dundee.ac.uk/projects/CD-LOR*

Creative Commons (CC). *http://creativecommons.org*

OpenCourse. *http://opencourse.org*

EduResources Weblog—Higher Education Resources Online. *http://radio.weblogs.com/0114870*

The Open Learner. *www.bloglines.com/blog/JosephHart*

LEARNING OBJECT SHARING

Apple Learning Interchange—Digital Learning Events. *http://newali.apple.com/ali_sites/ali/nav5.shtml*

Ariadne—Foundation for the European Knowledge Pool. *www.ariadne-eu.org*

Campus Alberta Repository of Educational Objects (CAREO). *www.careo.org*

Co-operative Learning Object Exchange (CLOE). *http://cloe.on.ca*

Curriculum Online. *www.curriculumonline.gov.uk*

Education Network Australia Online (EdNA Online). *www.edna.edu.au*

Education Resources Information Center (ERIC). *www.eric.ed.gov*

Gateway to 21st Century Skills (GEM). *www.thegateway.org*

The Inclusive Learning Exchange. *http://inclusivelearning.ca*

Maricopa Learning eXchange (MLX). *www.mcli.dist.maricopa.edu/mlx*

Massachusetts Institute of Technology OpenCourseWare (MIT OCW). *http://ocw.mit.edu/index.html*

Multimedia Educational Resource for Learning and Online Teaching (MERLOT). *www.merlot.org*

Teaching and Learning Centre, University of Calgary. *http://commons.ucalgary.ca*

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