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A Rich Stonehouse for the Relief of Man's Estate? Developing a Teaching Curriculum in Knowledge Management

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ABSTRACT

[The School of Computer and Information Science at Edith Cowan University (ECU) has made a commitment to teaching Knowledge Management (KM) and has developed a Master's suite of courses in KM that will take their places with existing postgraduate LIS and IT courses offered by the School in February, 2002. As part of this process, the School engaged in debate with other academics and industry practitioners about the contribution that the IT and Library and Information Science (LIS) disciplines can make to KM. This paper reports on the research and consultative processes that the School undertook, discusses the findings and conclusions and presents the structure of the course that was designed on the basis of this research].

INTRODUCTION

'Knowledge is a rich storehouse, for the glory of the creator and the relief of man's estate' (Francis Bacon)

Thinkers and writers from Ancient Greece to the present day acknowledge the fundamental importance of knowledge to the furtherance of human society. Debates on the nature of knowledge have occupied philosophers from Aristotle to Hegel, but discussion about the best way to 'manage' knowledge is of fairly recent origin.

Education systems are under constant pressure to adapt to changes in society. Some believe that our societies are undergoing a transformation as important as the industrial revolution and that knowledge is the core element in the emerging mode of production with learning as the most important process. Our understanding of what knowledge is and of how knowledge is created, transferred, managed and used remains partial, superficial and partitioned in various scientific disciplines, with the result that 'the basic concepts of knowledge are defined and interpreted in different ways' (CERI, 2000).

Knowledge Management (KM) has been practiced and reported on for a number of years. As early as 1988, Peter Drucker called attention to the primacy of 'knowledge assets' in the future success of companies. By 1994, many articles addressed the importance of the individual employee's knowledge as opposed to the company's databases and reports (Ruth, Theobald and Frizzell, 1999). As the early enthusiasm for the concept subsides in the current management literature, KM is becoming part of the corporate culture of large complex organizations, especially those that operate in a multinational environment. Early insubstantial applications of KM theory and practice have given way to broadly focused initiatives that are transforming the way organizations work (Davenport, 2000). Despite this integration of KM theory and practice into the core operations of organizations worldwide, very few universities have taken up the challenge of offering full courses in this discipline area. One of the reasons for this is the difficulty of determining the intellectual territory to be covered by any viable and practical KM course (Ruth, Theobold, & Frizzell, 1999). Consequently, there is a tendency among university educators to offer units of instruction on KM as parts of other awards, but to see the development of a fully-fledged and integrated KM course as just too hard.

FRAMING KNOWLEDGE MANAGEMENT

Most researchers and practitioners in the fields of computer science and information systems have taken a restricted view of KM and have equated it with the management of information, that is the management of objects that can be identified and handled in information systems. The information-processing view of KM has been prevalent in practice and research for a number of decades. This view of KM makes simplistic assumptions about storing past knowledge of individuals in the forms of 'routinized' rules-of-thumb and 'best practices' for guiding future action. There has been an assumption that the adaptive functioning of the organisation could be based on 'explicit knowledge archived in corporate databases and technology-based knowledge repositories' (Malhotra, 2000, p.4).

Such views are based primarily on a static and syntactic notion of knowledge and have ignored the human dimension of organisational knowledge creation. Malhotra calls for a greater emphasis on the human aspects of knowledge creation and knowledge renewal that are difficult – if not impossible - to replace completely with knowledge management technologies. He calls these aspects the 'sense-making' model of KM and proposes a model for business model innovation that is based on equal weight being given to both the information processing and the sense-making models .

Malhotra is by no means the only commentator to recognise the importance of the human element in any KM system. For example, Collison and Parcell (2001,p18) conceptualise knowledge management as a 'hybrid' discipline in which the role of people is vital. The elements of a successful knowledge management program include:

- a common reliable *technology* infrastructure to facilitate sharing;
- connecting the *people* who know, and the behaviours to ask, listen and share; and
- some *processes* to simplify sharing, validation, distillation.

Those that have been educated in the disciplines of philosophy, psychology, sociology and/or business and management have long equated KM with the 'sense-making' model. They believe that knowledge managers are primarily involved with assessing, changing and improving individual human skills and behaviour and that knowledge is a series of processes, a complex set of dynamic skills and expertise that is constantly changing. Proponents of this school tend to discount the importance of the information-processing paradigm (Sveiby, 2000).

There seems to be agreement that, no matter what the enterprise, KM must deal with both paradigms. It follows that most organisations will require any 'knowledge managers' that they employ to have skills and expertise in both 'codification' and 'personalization'. KM education should therefore be made up of both the hard technical discussions of knowledge storage, retrieval and dissemination and a whole range of softer issues that involves fostering an environment in which knowledge and information are shared and new knowledge is created (CERI, 2000)

Further evidence as to the breadth of the curriculum required for a KM course can be garnered from a discussion of the present research

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agenda in the area. The Centre for Educational Research and Innovation (CERI) at the OECD has identified a broad range of research questions associated with knowledge management in the learning society:

a. How can organizations use knowledge more efficiently?
b. What are the differences in KM between the public and private sectors?
c. How do different professions manage knowledge?
d. What are the characteristics of a learning organization?
e. How can schools and other educational institutions develop a commitment to KM?
f. What are the costs and benefits of knowledge transfer in education?
g. Can educational institutions be given incentives to promote knowledge management and learning organizations?
h. Can indicators of tacit knowledge be established?
i. Can we get a better grasp of which kinds of learning are important for which kinds of innovation?
j. How can we measure the performance of learning organizations?
k. Can indicators be developed which show the role of social capital in the promotion of economic development including learning and innovation?

The cross-disciplinary nature of these research questions, taken together with input from the range of disciplines that make a contribution to Malhotra's KM model, dictate a cross-disciplinary approach to any KM course design. The research questions suggest that the 'territory' for KM study is far from decided; that any course will need to be agile and flexible and will need to provide for 'continuous construction and reconstruction…as a dynamic and ongoing process' (Malhotra, 2000, p.15).

THE KNOWLEDGE MANAGEMENT CURRICULUM

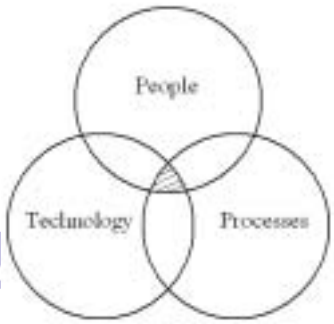
In summary, the KM curriculum must encompass two fundamental aspects, each of which is of equal importance to the development of 'knowledge managers' with the right mix of skills and abilities to perform useful work in the knowledge economy. On the one hand they must be skilled at understanding and exploiting a wide range of information-processing technologies. On the other, they must be skilled at understanding and exploiting the human aspects of knowledge creation and knowledge renewal. In addition to these two fundamental requirements, they may also require a broad understanding of wider social issues such as the nature of the overall knowledge economy and of the role of social capital in the promotion of economic development across industry sectors. Two questions emerge for the course designer:

1. How do you encompass all of these requirements in a single course without diluting the student's exposure to the concepts to the point of triviality?
2. Given the wide range of possible sectors in the knowledge economy in which the student may practice, how do you ensure that the skills and expertise developed in this future knowledge manager match the needs of their anticipated sector of operation?

Much of what has been said so far about the framing of KM emphasizes its essentially multi-disciplinary nature, or what Collison and Parcell (2001) refer to as its 'hybrid' character. Collison and Parcell (2001, p.18) diagrammatically conceptualize this hybrid notion of KM as an area of boolean intersection of the three core concerns of people, technology and process (Figure 1).

In the section that follows we have attempted to chart the history and the development of the technology dimension of KM - something which has grown out of the information-processing paradigm and that we choose to call 'knowledge computing'. Our goal is to show how it has contributed and will continue to contribute to the overall theoretical base of KM, subject to the qualifier that it does not encompass KM in totality. It is our view that a major issue all educators must face in course design, concerns *Knowledge Management's* relationship with what we call *Knowledge Computing*.

Figure 1: Boolean intersection



KNOWLEDGE COMPUTING FOR KNOWLEDGE MANAGEMENT

Knowledge Computing is about the construction of Knowledge Management *Systems* informed by a body of discipline knowledge inherited from information science and computer science and sustained by factors such as globalisation, down-sizing and of course, the Web.

The key part played by Web technology has made other computing technologies more relevant and brought about renewed interest in some old ideas such as expert systems, intelligent agents, decision-support systems, natural language processing, information retrieval and electronic document management. In Figure 2 the left hand side shows some knowledge management tasks making up a knowledge cycle, while the right hand side shows some information systems and computing technologies that can be used to support these tasks.

Knowledge computing is entering an era of excitement and innovation centred around the technologies of next generation Internet and the idea of a 'Semantic' Web, introduced by Tim Berners-Lee, one of the creators of the original Web. In a recent article in Scientific American, he describes it thus:

"The Semantic Web is not a separate Web, but an extension of the current one, in which information is given well-defined meaning, better enabling computers and people to work in cooperation."

(Berners-Lee et al., 2001)

The first requirement for the Semantic Web is a decentralised but universal knowledge representation system, to provide a common language allowing knowledge from disparate sources to be understood, combined and manipulated. This is where knowledge representation systems from artificial intelligence, classification schemes from Library and Information Science (LIS) and mark-up languages from electronic publishing converge to provide the solutions.

To make automated reasoning possible in this knowledge domain we require two things:

- Firstly, a knowledge representation framework describing entities in the domain and relations between them- in other words an *ontology.* An ontology is typically captured in RDF and commonly represented in an XML schema;
- Secondly, we need a way of identifying each instance of an entity in the database .

Once we have a knowledge representation scheme, we can enable its re-use by others through a Universal Resource Identifier, an idea already familiar to us from the most common form of URI, the Uniform Resource Locator or URL.

Ontologies are long familiar to LIS practitioners, who are adopting RDF and RDF Schema as implementation languages for defining metadata. Ontologies can contain inference rules as well as data, allowing sufficiently capable tools to carry out intelligent searches, reason about answers to user queries etc.

Agent technology, another established field of study in artificial intelligence, has also received a boost from the rise of Web technol-

ogy. Agents and the Semantic Web are made for each other. The Semantic Web provides an ideal nourishing environment for "softbots", software agents that can roam the Web, accessing knowledge from Web pages, exchanging knowledge with other agents, carrying out retrieval tasks or otherwise acting on behalf of their human or corporate masters.

WHAT ELSE MAY BE NEEDED?

While it is important to examine the literature and to take note of the opinions of experts and researchers as to the nature and structure of a KM course, it is also important to undertake some market research as to the viability of such a course and to survey the opinions of those who are likely to undertake it - or potentially employ - the graduates. To that end we developed a short questionnaire that was intended to elicit information on the course content, the likely market for the course and the employment opportunities for graduates.

Prior to finalising our questionnaire design, we held focus group sessions with academics and industry practitioners and conducted research into what should be included in a relevant and useful course. In addition, we examined the range of units and courses in KM offered by other universities both in Australia and internationally. The resulting questionnaire was distributed to practitioners in the library, information management, records management and computing industry sectors. The survey questionnaire was also published as a HTML/CGI form on the World Wide Web.

On the basis of the results of the survey and from our other research, we developed a model for a course that we believe will meet an identified need in the marketplace for study and teaching in this area. The remainder of this paper presents a synopsis of the results of the survey and discusses how we developed the course structure, as well as other related developments within the School relating to information and knowledge management. For a more detailed discussion of the survey and its results, we refer the reader to a paper that we presented at the International Federation of Library Associations Conference in Boston in 2001 (Brogan, Hingston, & Wilson, 2001)

THE KM COURSE MODEL

The literature review, discussion groups and survey provided us with the basic parameters for course construction. To that end, our post-graduate studies model:

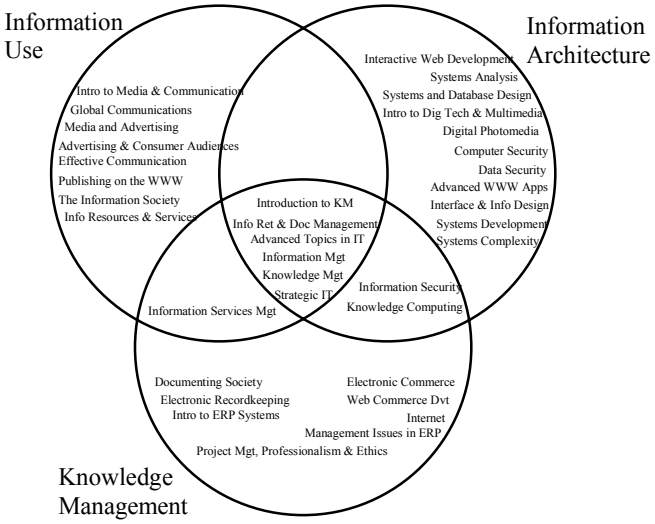
- operationalizes the critically important content areas revealed in the literature review and survey data in the program core and creates a wide range of choices in a stream/elective structure, allowing students flexibility in constructing their academic program;
- reflects the cross-disciplinary nature of the KM 'universe' and its rapidly changing nature by prescribing the minimum number of 'core' units and offering electives selected (at present) from 4 different schools at ECU, arranged in three streams of study (see Figure 2).
- reflects the strong content preferences expressed in the survey for Knowledge Computing, Knowledge Management Foundations and Knowledge Management Practice;
- takes into account the aversion shown by respondents towards classic information retrieval but recognises the importance of current developments in information retrieval theory and its relationship to document management by combining both topics in one of the six core units in the full Master's structure.
- allows for multiple exit points corresponding to award type and full time equivalent studies from one to three semesters in duration.

In Figure 3, the six core units are shown in the centre and the focus stream units are shown in the three intersecting circles. The first two core units are required for students undertaking certificate or diploma level awards.

CONCLUSION

The process that we have undertaken to develop this course in the School of Computer and Information Science at ECU has been arduous but rewarding. We now have a flexible and responsive framework in which to continue to develop the KM suite of courses as our understanding and experience of the field grows and matures. In addition, as a consequence of our activities in this area, we have formed an Information and Knowledge Management Research Group within the School that will lead and inform both staff and students involved in teaching and learning in this subject area.

Figure 3: Units composing the master of information and knowledge management



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