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A bounded or unbounded universe?: Knowledge Management in Postgraduate LIS Education

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Abstract:

[The School of Computer and Information Science at ECU has made a commitment to teaching Knowledge Management (KM) and is, at present, engaged in the process of determining its place within existing postgraduate LIS and IT courses. In turn, it is engaging in debate with other academics and industry practitioners about the unique contribution that the LIS disciplines could make to KM. This paper reports on the research and consultative processes that the School undertook and discusses the findings and conclusions. It will also offer some thoughts on where the authors believe LIS, in particular, can make a contribution to the core knowledge and practice of KM].

Background and Introduction

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 offer 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 an undeniable tendency among university educators to see KM as an unbounded universe and just too hard.

Framing Knowledge Management

Researchers and practitioners in the fields of computer and/or information science have tended to equate KM with the management of information, that is the management of objects that can be identified and handled in information systems. Those that have been educated in the disciplines of philosophy, psychology, sociology and/or business and management have traditionally equated KM with the management of people. 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 (Sveiby, 2000).

Recently, commentators have argued that KM deals with a range of approaches to communicating and using both knowledge and information. They maintain that KM is made up of both the hard technical problems 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 (Bukowitz & Williams, 2001). These commentators argue that the human aspects of knowledge creation are critical for sustaining knowledge management systems that facilitate inquiry based on divergence of meanings and perspectives. They also assert that the human nature of knowledge creation seems more pertinent now than it was twenty-five years ago, given the increasingly 'wicked' environment characterised 'by discontinuous change and a "*wide range of potential surprise*"' (Malholtra, 1997).

Peter Drucker, writing about KM in 1999, argued that:

> 'What we call the Information Revolution is actually a Knowledge Revolution. What has made it possible to routinize processes is not machinery; the computer is only the trigger. Software is the reorganization of traditional work, based on centuries of experience, through the application of knowledge and especially of systematic, logical analysis. The key is not electronics; it is cognitive science' (Drucker, 1999).

Ruth, Theobald and Frizzell (1999) believe that KM will someday be taught across the academy, and they recommend a University-based approach to the diffusion of KM concepts and practice. They argue that it is possible for courses as varied as finance, accounting, management, psychology, public policy, medicine, marketing, computing and information science to include a knowledge management component and, as more courses appear at universities, 'significant changes to the understood core of KM knowledge and practice will occur' (Ruth, Theobald and Frizzell, 1999). If they are correct, it follows that, during the process of dissemination and assimilation, each discipline area may make its own contribution to that 'understood core'.

As researchers and practitioners in the field of computer and information science, we have skills and expertise in the field of information management. The topics covered by this discipline area are now well defined and, in the more general debate, it is agreed that they make a substantial contribution to knowledge management theory and practice.

In the section that follows we have attempted to chart the history and the development of a new field, which we have chosen to define as 'knowledge computing', and show how it contributes to the overall theoretical base of KM. 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*.

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. The current interest in knowledge computing is sustained by factors such as globalisation, down-sizing (Al Dunlap may have bitten the dust, but the idea lingers) and of course, the Web, which has become a delivery vehicle for knowledge management solutions.

The Web began life as a hypermedia document delivery system, but has since become established as a computer-based knowledge-sharing tool. The runaway success of the Internet speaks eloquently for the power of a system that makes it easy for users located anywhere to contribute knowledge and to access knowledge contributed by others. This model has been adopted and adapted to create intranets, improving knowledge management for all kinds of enterprises.

The key part played by Web technology has made other computing technologies more relevant and brought about renewed interest in some old ideas. Among existing technologies that are being incorporated into computer-based knowledge management solutions are expert systems, intelligent agents, decision-support systems, natural language processing, information retrieval and electronic document management. In Figure 1 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.

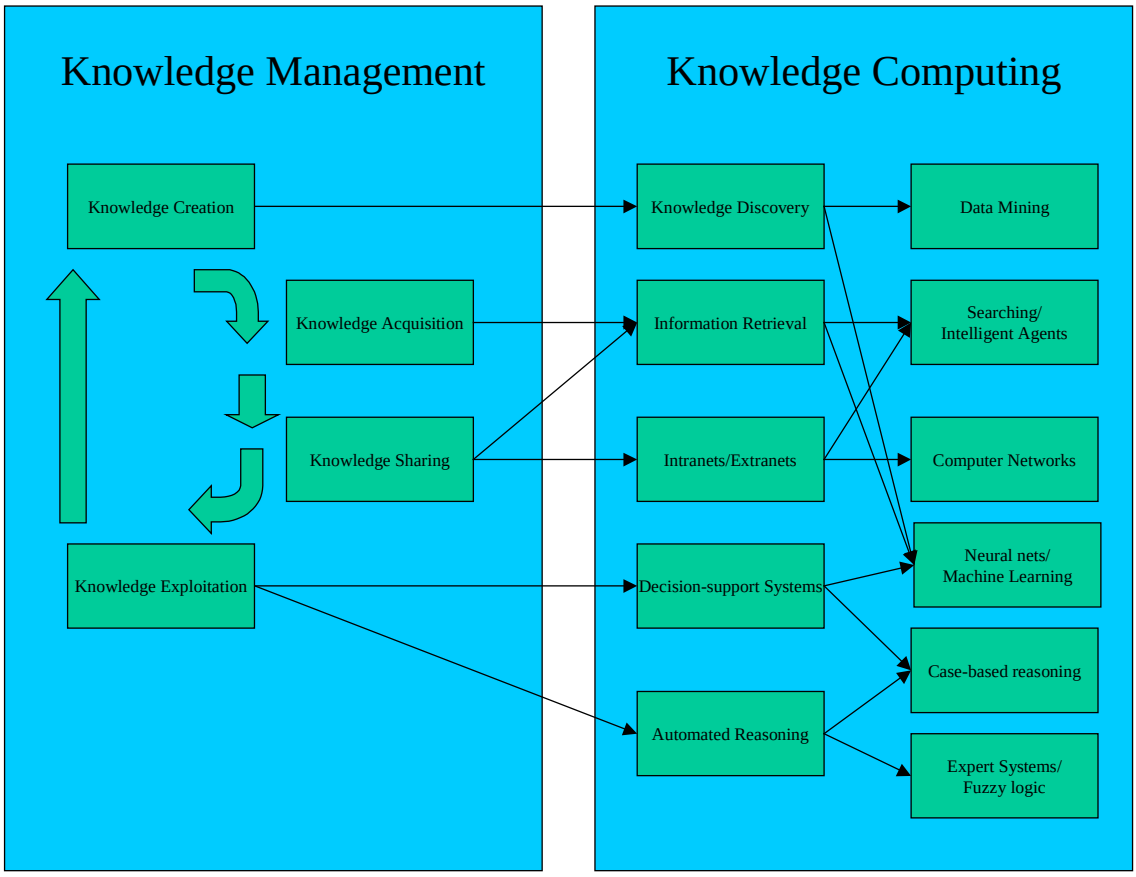


Figure 1 - Some computing technologies supporting knowledge management tasks

These revitalised technologies are in turn enabling the continued evolution of the next generation Internet – the Semantic Web, introduced by Tim Berners-Lee, one of the creators of the Web (Berners-Lee, 1998). 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 universal knowledge representation system, to provide a common language allowing knowledge from disparate sources to be understood, combined and manipulated. Knowledge representation has long been studied in the field of artificial intelligence, and at least the taxonomy aspect of it has been well studied in LIS. But the Semantic Web requires a decentralised knowledge representation scheme.

This is where knowledge representation systems from artificial intelligence, classification schemes from LIS and mark-up languages from electronic publishing converge to provide the solution. eXtensible Markup Language (XML) lets us include structured information in documents, and Resource Description Framework (RDF) provides the way to associate agreed meaning to this information, using Universal Resource Identifier (URIs) to refer to concepts defined in ontology pages on the Web. For complete and up to date details on these technologies and ongoing developments, visit the World Wide Web Consortium home pages at www.w3c.org.

Ontologies are long familiar to LIS practitioners, who are adopting RDF and RDF Schema as the implementation language 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 technology, particularly with regard to applications in e-commerce. 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 information retrieval (or should that be knowledge retrieval?) tasks or otherwise acting on behalf of their human or corporate masters.

As this discussion suggests, knowledge computing exercises a good deal of influence over the trajectory of knowledge management, something likely to persist into the future. This influence is currently so profound that the study of knowledge computing must be 'a given' in any valid knowledge management program of study. But what else do knowledge management practitioners need to know? Most commentators agree that the LIS and Computing disciplines have made contributions to the discipline of Knowledge Management, but they do not represent KM in its entirety. Given the fluidity of boundaries associated with KM, the wise course designer will flesh out the remainder of the curriculum via market research aimed at assessing demand and market preferences in course content.

The ECU KM Survey

Over the past nine months, we have been investigating the optimum design for a course in knowledge management at Edith Cowan University. During this time we have held focus group sessions with academics and industry practitioners and conducted research into what should be included in a relevant and useful course. This research has included the development and administration of a survey instrument that 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. We have also examined a range of courses in KM offered by other universities both in Australia and internationally.

On the basis of this research, we have developed a provisional 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 discusses the process of researching and developing the course structure and also identifies where we believe the Computing and LIS disciplines have a contribution to make to this study and teaching.

Survey instrument

The survey instrument was designed to measure preferences in terms of course content, course options (professional development, program of study in an existing award or dedicated award), industry demand for KM qualified personnel and attitudes toward knowledge management. The survey population comprised information technology professionals, librarians, records managers and fellow educators. Whether respondents were positively or negatively disposed towards KM was measured using a Likert scale. Statements focussed on three key dimensions of attitude toward KM, denoting expectations, identification or belonging and perceived value. Dimensions were operationalised with statements that invited respondents to say whether they:-

- regarded KM as durable;
- saw themselves as Knowledge Managers;
- could see career benefits in learning more about KM.

Limitations

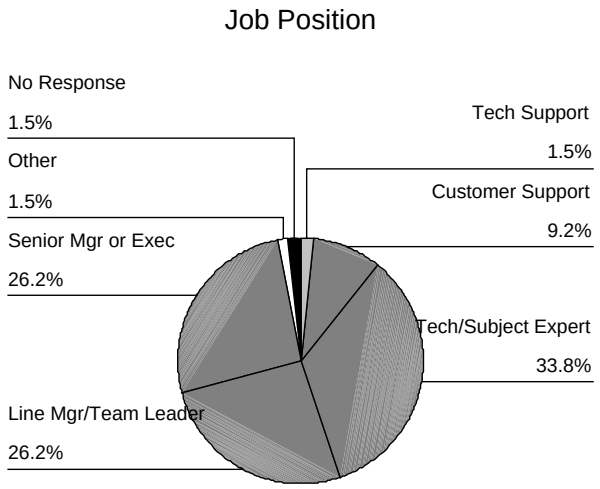
At the time of writing, data gathering has not been completed. Updates of analysis outcomes will be posted on the survey web site (http://www.scis.ecu.edu.au/research/KM/survey.htm) as they become available. Other limitations concern the reliability of the Internet for market research. Well known sources of unreliability include the adoption of alternate personae by users and multiple submission. A useful account of the advantages and limitations of Internet market research can be found in Tanya Cheyne and Frank Ritter's (2001) *Targeting Audiences on the Internet.*

Data analysis

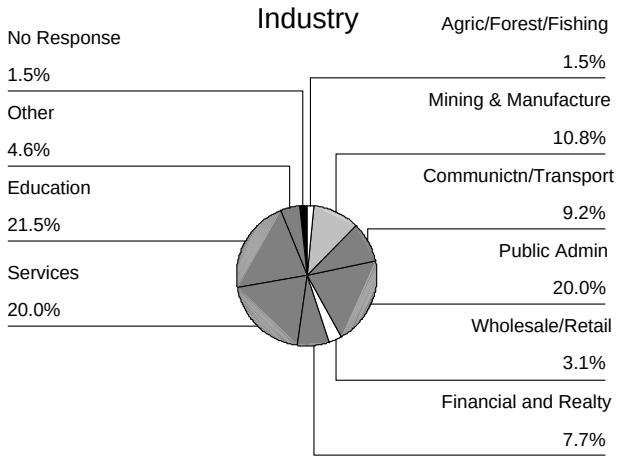
The following are provisional analysis outcomes based on analysis of survey data in SPSS.

Sample population characteristics

By position, the survey respondent population was weighted in favour of Technical or Subject Experts, Line Mgr/Team Leaders and Management:

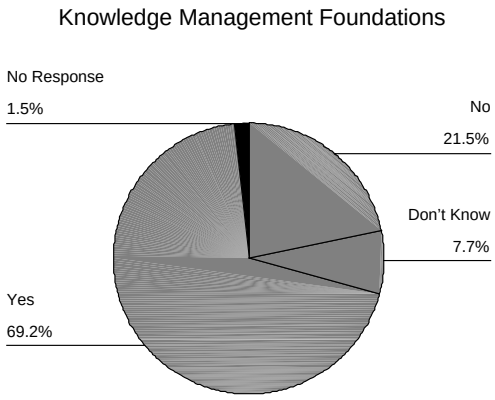


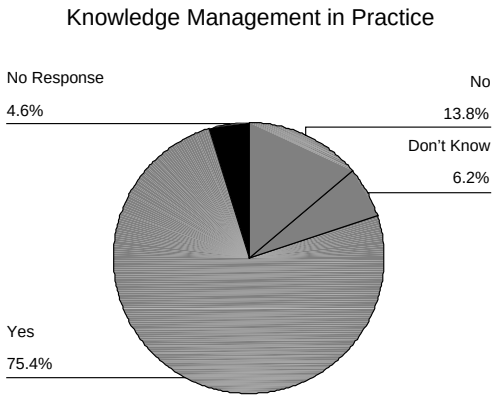
Distribution by industry/sector showed greater representation in education, services and public administration:



Knowledge management training needs (Course content)

Strong support was evident for knowledge management foundations (Knowledge Taxonomies, Knowledge Maps, Intellectual Capital and KM Roles)(69.2% 'Yes') and Knowledge Management in Practice (Organizational behaviour, Change management, Project Management, Teams) (75.4% 'Yes'). These results were anticipated.





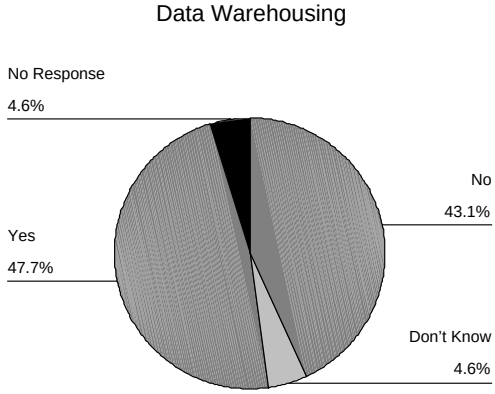
Trends in information technologies across the sample were more interesting. Distribution for and against Internet technology (49.2% 'Yes', 44.6% 'No') was approximately equal. Web application development (52.3% 'Yes', 41.5% 'No), Intranets/Extranets (52.3% 'Yes', 40.0% 'No') and Image Management (43.1% 'Yes', 35.4% 'No) all received strong support. Groupware and workflow was even more decisive (69.2% 'Yes', 18.5% 'No). A majority of respondents did not want Electronic Commerce (40.0% 'Yes', 44.6% 'No').

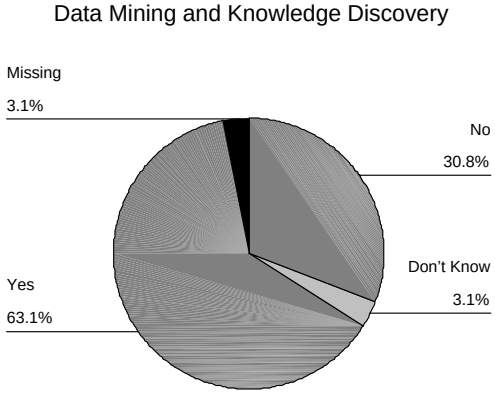
Knowledge-based systems

Decision support systems, Intelligent Systems and Agents and Artificial intelligence form recognized taxonomies of knowledge based systems. Measured support was highest for decision support systems (56.9% 'Yes', 26.2% 'No'), followed by intelligent systems and agents (47.7% 'Yes', 33.8% 'No) with artificial intelligence recording a somewhat ambivalent result (41.5% 'Yes', 38.5% 'No').

Database

Enthusiasm for data warehousing isn't evident in this sample with respondents for and against evenly divided (47.7%, 'Yes' 43.1% 'No'). Data mining and knowledge discovery were more popular with respondents (63.1% 'Yes', 30.8% 'No').

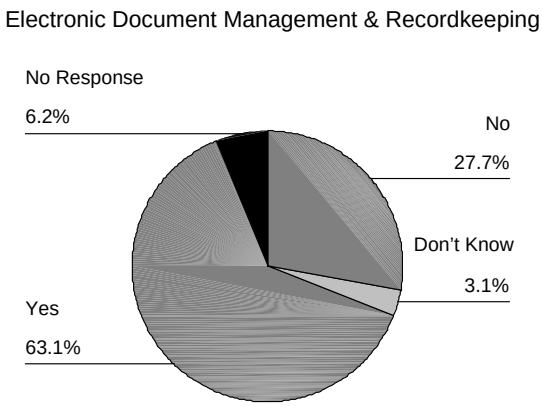


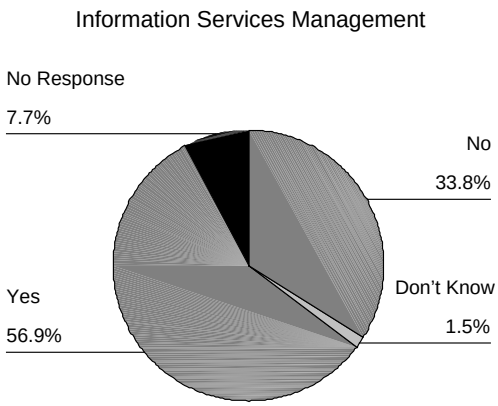


Information Science

Preferences for Information Organization, Information Retrieval, Electronic Document Management (grouped with Electronic Recordkeeping) and Information Services Management were tested. Ambivalence was observed with Information Organization (47.7% 'Yes', 41.5% 'No') and Information Retrieval (43.1% 'Yes',

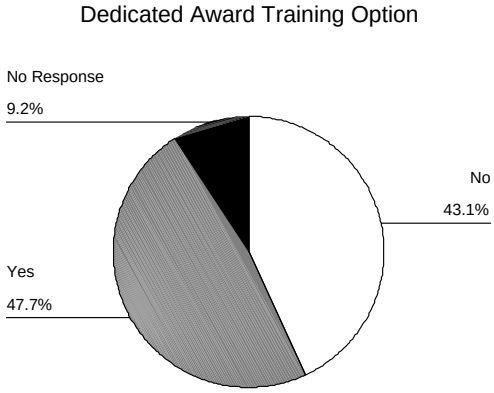
44.6% 'No'). Strong preference was shown for Electronic Document Management & Recordkeeping and also for Information Services Management:





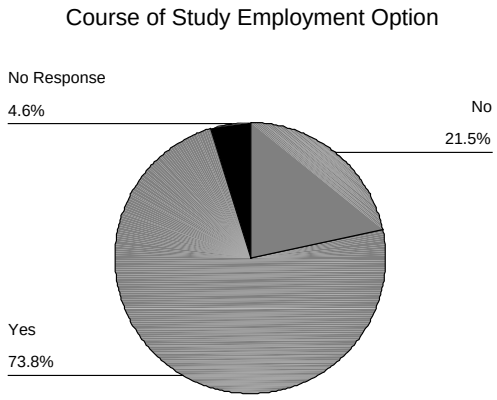
Course options

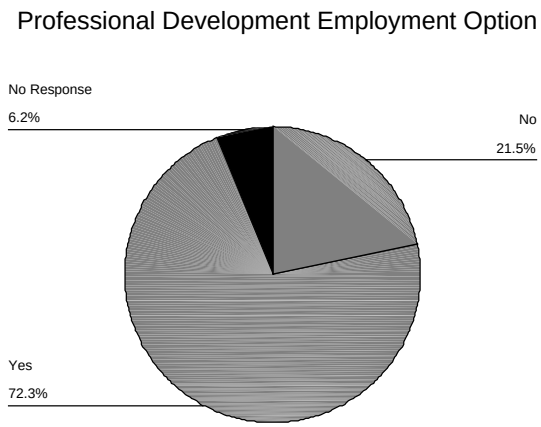
Far and away the most popular KM course option was the intensive short course (90.8% 'Yes', 6.2% 'No'). The majority of respondents voted against the idea of KM as a minor in another award program (43.3% 'Yes', 56.7% 'No). More support was evident for KM as an award program of study in its own right:



Employability

The data displayed a strong preference for employing KM trained personnel. A total of 75.4% of respondents said that they would consider employing a KM award graduate. Similar levels of support were measured across course of study and professional development (short course) trained personnel:





Attitudes toward KM

A panel of judges was used to weight statements on the Likert scale. A data subject sympathetic to knowledge management recorded a cumulative score across the scale greater than 0. Taken as a group, respondents were on the whole positively disposed toward KM (Mean= 0.91 Std Deviation= 0.62). A total of 87.7% of respondents regard the meaning of KM as unclear, a survey outcome containing an important message for the proponents of KM and how KM is being communicated to the industry. Echoing the positive sentiment across the sample, 65% of respondents thought that their careers would benefit from KM studies. More than half (55%) of respondents see themselves as a knowledge manager and 80% consider KM will be important in the future.

Interpretation

Data gathering and analysis has not yet been completed for the ECU KM survey. The number of respondents is currently too small and cross tabulation is required to provide a picture of market segmentation. The sample is disproportionately weighted towards information and computing professionals and therefore furnishes no guide to wider market preferences. Subject to these limitations what can be asserted about the market for KM courses?

Course Content preferences

In terms of course content preferences:

- Knowledge Computing is strong in the sample with Internet technologies, Knowledge based systems and database all recording strong levels of support. Groupware and workflow were strongly supported, with Intranets/Extranets and Web development receiving endorsement from a majority of respondents. Strong support was also shown for Electronic Document Management and Recordkeeping;
- There is strong support for the inclusion of Knowledge Management Foundations (Knowledge Taxonomies, Knowledge Maps, Intellectual Capital and KM Roles) and Knowledge Management Practice (Organizational behaviour, Change management, Project Management, Teams) in knowledge management training;
- Electronic commerce is not thought suitable for inclusion by a majority of respondents;
- In Information Science, respondents were ambivalent toward Information Organization (cataloguing, classification, indexing) and Information Retrieval.

Course delivery
Intensive short courses are strongly supported, with a small majority of respondents favouring a dedicated award. (A basic signal to would be course designers that flexibility is required in terms of exit points and course duration).

Employment
Strong support exists in the sample in terms of the employability of KM trained personnel across all three course of study options (professional development, minor studies and dedicated award).

Attitudes toward KM
This sample of information professionals (librarians, information technology professionals, records managers) is positively disposed toward KM- a result expected given the social desirability factor presumed to be at work in a population of information and computing professionals. Responses to data items concerning the durability of KM, perceptions of the significance of KM studies to career advancement and personal identification with KM are all very positive suggesting good market potential for KM studies. Around two thirds of respondents consider that their career would benefit from KM study and more than half see themselves as knowledge managers. Generalisability of this sentiment to the industry cannot yet be confirmed, but such indicators do suggest that the industry is embracing KM.

Towards a KM course model

Subject to the gathering of further data for a larger sample, data analysis suggests some basic parameters for course construction. In particular, our provisional post graduate studies model:-

- operationalises strong content preferences revealed in survey data in the program core and dispatches ambivalent outcomes to a stream/elective structure, allowing students flexibility in constructing their academic program;

- reflects the strong content preferences expressed in the survey for Knowledge Computing, Knowledge Management Foundations and Knowledge Management Practice; and

- allows for multiple exit points corresponding to award type and full time equivalent studies from one to three semesters in duration.

In our provisional model, the multi disciplinary character of KM is supported by a three stream elective structure based on the concepts of information use, information architecture and knowledge management with subjects drawn from ECU's School of Computer and Information Science, Communications and Multimedia and School of Management Information Systems.

Conclusion

The metaphor of KM as an 'unbounded universe' and too hard is not sustained by this study. A picture emerges of KM as multi disciplinary, but with some subject areas enjoying clear leadership in terms of market acceptance. In terms of this leadership, provisional conclusions point to the importance of Knowledge Computing, Knowledge Management Foundations and Knowledge Management Practice. Some familiar faces such as Groupware and Electronic Document Management are proving surprisingly durable. More recent arrivals to the KM technology stable such as data warehousing may not be fairing so well. Course designers hoping to leverage from linkages to Electronic Commerce, may wish to re-think this strategy, at least as far as this segment of the market is concerned. Similarly, course designers hoping to re-package mainstream LIS offerings into the more attractive KM brand should take note- Information Science subjects such as Information Organization and Information Retrieval may not appeal in this market place.

What can we say of the future of LIS in a KM centred world? Attitudes to KM in our research were positive suggesting that many information professionals regard KM as durable, see themselves involved in KM activities and can see career benefits in learning more about KM. Attitudinally, many information professionals have made the transition to a KM world. The market place dynamic in favour of knowledge computing, may get in the way for some, but LIS folk have adapted in the past to workplace transformation based on information technology. No crystal ball is required to see the role of libraries, both public and within organizations, evolving to become "knowledge centres", utilising many of the computer-based solutions mentioned above. Rather, it is an evolutionary trend in which appropriately qualified LIS and information technology professionals can play a central role.

Acknowledgment:
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