IT in the Information Studies Curriculum: How Much is Enough? How Much is Too Much?

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Abstract. The fast changing information technology (IT) environment and the Internet are having a tremendous impact on the information studies discipline. IT is such an integral part of information processing, management and dissemination that it is difficult to conceive of the information profession without IT. The growing interest in Internet, multimedia, digital libraries and knowledge management has forced many schools to re-think their education and marketing strategies, and adjust their programmes. In this paper, we discuss the issues involved in developing the information studies curriculum with respect to IT, and examine how the Division of Information Studies at the Nanyang Technological University (NTU) has addressed these issues. We also discuss the factors that have affected the development of the programme, and these include the university environment and the parent school, the background and expertise of faculty members, the local economy and job market, whether the school is able to recruit lecturers with the appropriate background and expertise, and student demands and expectations.

Introduction

With the increasing importance of information technology (IT) for handling, managing and transmitting information, it is important for librarians and information professionals to be comfortable with IT and be able to use it competently in their work. To prepare their graduates to work in an increasingly computerised and networked environment, information studies programmes worldwide now have a substantial IT component in their programmes. When developing information studies programmes, several questions relating to IT arise in the minds of educators: How much IT and what kind of IT should there be in the programme? In what way should the students be trained in the use of IT and what are required to provide this training? How much is enough, and how much is too much?

These issues and concerns are not new. Information technology has been an important element of information studies education since the early 80s. In the 80s, the focus was on library automation as more and more libraries embarked on computerisation projects, and library systems gradually provided more functionalities to handle more of the library operations. Library schools strove to make their courses relevant to library automation and equip librarians with the necessary IT skills to perform system librarian duties. Besides incorporating library automation into the traditional courses, library schools also introduced new computer-related courses into their curricula, particularly computer programming, database management and personal computer applications. With the rise of online search services such as DIALOG, OCLC, RLIN, BRS, STN, etc., courses on online searching of bibliographic databases were also introduced.

As library automation dominated the IT aspect of information studies education in the 80s, the Internet and the Web dominated information studies education in the 90s and most likely for many years to come. Surprisingly, library

automation and online searching courses which were "must take" courses, do not appear to be popular anymore and are not included in the present information studies curriculum at Nanyang Technological University (NTU). However, the issues and questions faced by library schools in the 80s regarding IT are still present today. Some of these are:

- How much and what kind of IT courses should be in the information studies curriculum?
- Information studies schools are trying to develop non-traditional information professions and help their graduates obtain non-traditional jobs. What are the skills needed by our graduates to obtain employment in non-traditional environments?
- How do we incorporate IT in the information studies curriculum in such a way that we do not become another computer science programme?
- How do we teach introductory IT courses in a way that justifies calling them graduate-level courses?
- Introductory IT courses can take up time needed for teaching core information processing and management skills. How can the curriculum be structured so that our graduates still have core information skills needed for work in libraries and information services? What are these core information skills?
- How do we find staff to teach these IT courses?

In this paper, we examine how the Division of Information Studies at the Nanyang Technological University (NTU) has addressed these issues, and the factors that have affected the development of the IT component of the programme. The following factors have been identified:

- The school (i.e. faculty) in which the Division is located. The Division is situated in the School of Computer Engineering (formerly called *School of Applied Science*) that includes the Division of Computing Systems and the Division of Software Systems.
- The emerging knowledge-based economy and the new information professions.
- The IT background of the faculty members.
- Student demands and expectations.

We also briefly survey the curricula of 20 information studies schools worldwide to find out the extent and kind of IT courses taught.

Some Issues Identified in the Literature

The need for incorporating IT into the curriculum is not a problem that is peculiar to information studies. As Rowley (1994) said, there is general agreement that students in most, if not all, programmes at the university have to develop a level of IT skills appropriate to their employment market place.

However, IT is certainly very important and intimately involved in the work that librarians and information professionals do. Rowland and Tseng (1991) pointed out that courses in information studies are concerned with the identification, evaluation, selection, acquisition, storage, retrieval, dissemination and presentation of information, and have to respond to the widespread use of computers in all of these activities. Morris (1993) highlighted the continuing need to expand and diversify IT teaching to meet the ever changing demands of the profession and to keep abreast of the developments in computer technology.

Rowley (1994) said that as more students in other fields develop good levels of information

and IT competence, there will be less that is unique about librarians and information professionals, except that they are specialists in the area. In an environment of increasing user expectations of information and information systems, "it will be essential that the information profession has good, current IT skills and much more" (p. 244).

Pors (1994) predicted that the development of IT and changes in labour market conditions will lead to more frequent changes in information studies education. With the globalisation of the information culture leading to increasing demand for current and fast access to information, he predicted that IT will remain the driving force in the processes of change. People will be exposed to new technological possibilities and opportunities, which will change the job markets drastically.

Information studies programmes in Asia are actively revising their curricula to incorporate more IT, though they are hampered by budget, staffing and other constraints (Sulistyo-Basuki, 1999; Mahmood, 1997; Sengupta & Umarani, 1996; Basu & Sarkhel, 1996).

Rowley (1994) identified the following issues and problems relating to the teaching of IT skills:

1. *Hardware & software resources*. Students need open access to IT facilities and laboratories, and this presents problems of security and technical support in the laboratories.
2. *Documentation*. Hardware/software manuals often disappear from the laboratories and students who borrow manuals may not return them. Considerable effort also has to be expended to produce hardware/software documentation and guides for students.
3. *Staffing resources*. Effective teaching of IT skills demand a lot of staff time, and classes exceeding 20 students are difficult to manage effectively.
4. *Problems with managing classroom and laboratory sessions* due to the following factors:
   - the subject is ever-changing and the instructor cannot be proficient in all aspects of the software
   - classroom control is difficult with students walking around and making noise, and students hiding behind computer monitors
   - different students have different learning and working speeds
   - different students will use a software package differently and make different kinds of mistakes.
5. *Integrating IT into the different subjects* to teach subject-specific IT skills
6. *The ever-changing technology* resulting in a continuing need to upgrade facilities and for staff to keep abreast of the technology.

Incorporating IT in an information studies programme has to be done gradually in stages. Morris outlined the following four stages in the development of IT-related teaching (as developed by the *Transbinary Group on Library and Information Studies*, UK):

1. Initial experiments in, for example, cataloguing and information retrieval courses, leading to permanent subjects in these courses; department provides separate courses in basic IT-related subjects
2. Units/subjects added to the information studies programme giving a broad introduction to IT; department provides permanent courses on many aspects of IT in library and information work
3. Permeation of IT into the whole pro-

gramme; use of IT is taken for granted throughout the curriculum so that IT subjects no longer appear as separate subjects

4. New IT-oriented courses being developed; department develops IT-based courses which are geared more towards information work in general rather than library work.

Most information studies programmes are now in Stage 3 or 4. In the present environment, Stage 3 seems to refer to the integration of IT into the traditional library science subjects, and Stage 4 includes developing new courses to prepare graduates to work in emerging information professions related to the World Wide Web, e-commerce, digital libraries and knowledge management. In this regard, Pors (1994) asked to what degree it is possible to embrace topics relating to traditional librarianship as well as to information retrieval and IT in the same curriculum. He said that developing a technology-based curriculum, which can be used both in the public and the private sectors, is a challenge for information studies schools.

IT in International Information Studies Programmes

A quick survey was carried out to identify the level of IT in international information studies programmes. The survey covered ten schools in the US, five schools in UK, and one each in Australia, New Zealand, Japan, Malaysia and Singapore. The information studies schools surveyed were:

1. University of Illinois at Urbana Champaign
2. University of North Carolina – Chappel Hill
3. Syracuse University
4. University of Michigan at Ann Arbor
5. University of Pittsburgh
6. Indiana University
7. Rutgers State University at New Brunswick
8. University of Wisconsin at Madison
9. University of California at Los Angeles
10. University of Toronto
11. University of Sheffield
12. Loughborough University
13. City University
14. University of Strathclyde
15. University of Wales at Aberystwythe
16. Monash University
17. Victoria University of Wellington
18. University of Malaya
19. Keio University, Tokyo, Japan
20. Nanyang Technological University, Singapore

We noticed that the names of the programmes and specialisations offered by these schools differed quite widely. Names of programmes found were:

- Archival studies
- Archives & records management
- Health information management
- Human-computer interaction
- Information and library studies
- Information economics, management & policy
- Information management
- Information management & systems
- Information science
- Information systems

- Librarianship
- Library and information management
- Library and information science
- Medical/dental informatics tracks
- Telecommunications

This suggests a lack of agreement about the nature of the discipline and the direction of the profession. Different schools seem to be carving out different niches for their programme.

Figure 1 shows the number of IT courses offered by the 20 schools surveyed. The proportion of IT courses compared to the total number of courses differed from school to school. On average, IT courses accounted for about 30% of the total number of courses in the 20 schools surveyed.

Another noteworthy phenomenon is the speed in which new specialisations and subjects are created in each school. More and more schools are separating library and information services from the other information disciplines. For example, Pittsburgh University has two different departments dealing with library science and information science. Sheffield and Victoria Universities are offering an information systems programme, separate from the library science programme. Universities like Monash have dropped the Library and Information Science name and replaced it with Information Management and Systems.

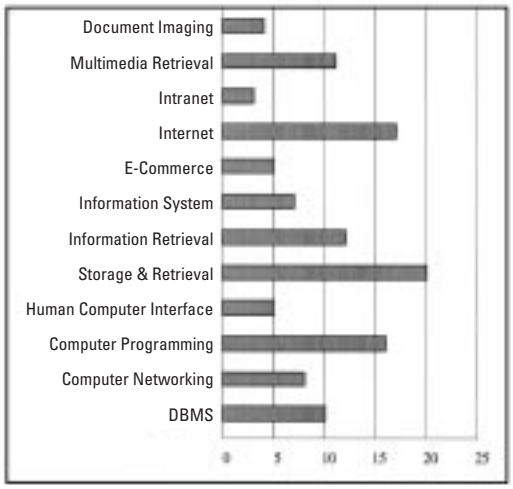

Figure 1. IT courses offered by the 20 schools surveyed

IT in the NTU Information Studies Curriculum

In the information studies programme at NTU, the courses offered are divided into 3 tiers (see Appendix 1):

1. Core courses (3 courses)
2. Group A electives (students select 2 out of 4 courses)
3. Group B electives (students select 4 courses)

The core courses are the foundation courses that define the skills and competencies that we believe to be common to all the information professions. *Group A electives* provide the foundation courses for the various specialisations/ concentrations. *Group B electives* are more in-depth courses that build on *Group A electives*. Out of the 30 courses listed, half can be characterised as IT courses. However, all the courses make substantial use of the Internet and various kinds of information technology.

Two areas of concentration are defined for the students:

- Library and information services
- Information management and systems.

Within each area, the student can choose from a number of specialisations or customise a specialisation to meet his or her needs. Under the *library and information services* area, the following specialisation are defined:

- Public libraries
- Academic libraries

- School libraries and media resources
- Corporate information services

Under the *information management and systems* area, the following specialisations are offered:

- Internet and multimedia-based information systems
- Information systems and products development
- Document and records management
- Knowledge management.

The courses prescribed for each specialisation are listed in Appendix 2.

The term specialisation in a short programme of this nature might be misleading, as the number of subjects offered under each specialisation might not be enough to qualify the student as an expert in that area.

What are the factors that have influenced the development of this curriculum with respect to IT? The factors can be divided into internal factors, external factors and student expectations.

Internal factors

The two main internal factors that have influenced the development of the information studies curriculum are:

1. The location of the Division in the School of Computer Engineering (formerly called *School of Applied Science*) that includes the Division of Computing Systems and the Division of Software Systems.
2. The IT background of faculty members and the conflicting views of faculty members with regard to the integration of the Library Science and IT areas.

The location of the information studies programme in the School that includes a computer engineering and software systems programme has, we believe, influenced the information studies programme in a number of ways. It has given the perception both to faculty members in the School as well to outsiders that the information studies programme is an IT-intensive course. Lecturers in the other Divisions in the School often refer to the Information Studies Division inadvertently as Information Systems. Many applicants to the MSc (Information Studies) programme also think that the programme is a "conversion programme" to train programmers and system developers. Since the Information Studies Division began in 1993, two of its three Heads of Division have been seconded from the Computing Systems/Software Systems Divisions in the School. All this has influenced the Division to be more IT-focused. In the United Kingdom, Rowland and Tseng (1991) has also found that IT courses taught in information studies programmes tended to be influenced by the faculty in which the department and school was located.

The development of the information studies curriculum is to a large extent influenced by the background, capabilities and perceptions of the lecturers teaching the programme. After all, there is no point having IT courses without any staff member to teach them. In the first few years of the programme, there were only one or two lecturers with the "technical" background to teach IT-related courses. Now, more than half of the faculty members can teach IT courses. This has made possible an increase in the IT component of the programme.

Lecturers also naturally bring to the courses their own background, experiences and perspectives. Different lecturers will teach the same course differently. Lecturers will teach a course in a way that allows them to draw on their personal expertise and experience. In the past, some students complained that lecturers used too

many library-related examples in the courses. Since most of the lecturers have library backgrounds, naturally they are most comfortable with library-related examples.

External factors

The following external factors have also affected the IT component of the information studies programme:

- The limited number of library-related jobs makes it necessary to train graduates for non-traditional information positions. These new-age (or "new economy") information professions are not only information-intensive, they are also IT intensive – requiring more IT skills.
- The poor perception of librarians by the general public has made it necessary to focus on the new-age information professions to attract more and better-quality students.
- Our perception that many of the new-economy professions are really information professions has spurred the Division to "stake our claim" to the new professions, by devising a curriculum to equip our students to claim the new professions. In this, we are competing with computer science and the management programmes, which are also trying to stake a claim to the new professions.
- The curricula of information studies schools overseas are, of course, studied closely when devising our own curriculum.
- The emphasis in Singapore on IT and the drive to make Singapore an information and IT hub may have influenced the Division to incorporate more IT into the programme.

We have found that the terms "Internet", information technology and knowledge management in our publicity material attracts many applicants. In fact, some applicants to the information studies programme think that it is an IT course. So, admission interviews have to be carried out partly to ensure that students do not enter the programme with erroneous expectations that it will give them advanced IT skills and make them computer programmers.

Student expectations

When the information studies programme first started at NTU, students were required to take six compulsory courses and two elective courses. The six core courses had to be taught in a way that catered to the needs of students who intended to be librarians as well as students who did not want to be librarians. As a result, one group of students would complain that the programme did not have enough library science content to prepare them to work in libraries, while another group of students complained that the programme had too much library science. It thus became necessary to have two groups of elective courses, 1 group of courses for the library science students and the other group for non-library science students. The non-library science students clamoured for courses in Internet and Java programming, and so these courses were offered first as special topics and eventually as regular courses.

Thus, student feedback and expectations have significantly influenced the development of the programme. Another kind of student feedback is through enrolment in courses. Elective courses are run only if at least five students registered for the course. Currently, the most popular courses appear to be E-commerce, Internet, business information and knowledge management.

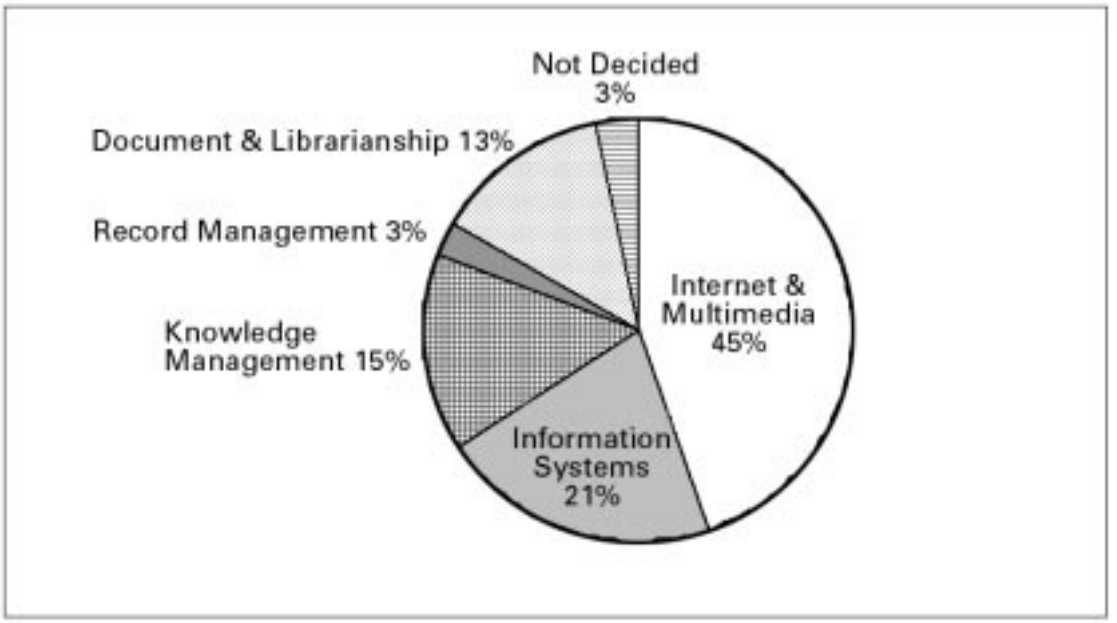

Figure 2. Proportion of applicants (N=302) selecting the various specialisations in the information studies programme at NTU

We have also carried out both formal and informal surveys of student perceptions of the programme. New applicants to the programme are asked to fill out a questionnaire to find out why they are applying to the programme and what aspects of the programme interest them. Figure 2 shows the proportion of applicants for the year 2000 admission who selected the various specialisations. Only 13% selected librarianship. Straw polls taken of new students indicate that fewer than 30% of students in the past few years intended to work in libraries after graduation. A survey of current and past students carried out in 1998 found that 31% of the 89 respondents felt that the IT content of the information studies programme should be increased.

Issues Relating to IT in Information Studies Education

In developing the information studies curriculum, we have been grappling with several issues relating to IT. We briefly describe our perspective on these issues.

How much IT and what kind of IT to teach depends on:

1. *What the students can handle*. Since most of the information studies students do not have a computer science bachelor's degree, the IT courses have to start at an introductory level. Mathematical treatments have to be avoided since many students do not have a technical background. A pragmatic, how-to-do-it, hands-on approach have to be taken, rather than a rigorous, theoretical approach.
2. *What the faculty can teach*. One might think that since the courses are taught at an introductory level, there is no difficulty teaching them. The truth is that teaching technical things in a way understandable to non-technical people requires much skill and an in-depth understanding of the subject. It is thus

necessary to have lecturers with some kind of technical background who is comfortable with technical topics.

3. *Which information professions the School wants to focus on.* There are many new-age information professions. An information studies programme cannot do justice to all, so it is necessary to identify a small number of these professions to focus on, and then identify the core IT competencies for these professions.

There is a concern that we might end up teaching undergraduate-level IT courses as graduate-level courses. This concern can be addressed by:

1. Focusing on information-related applications so that the course can be packaged as professional courses rather than introductory computer science courses. More focus can be placed on understanding how to use hardware and software to solve information-related problems, rather than to understand the mathematical foundations of the technology.
2. Focusing on the managerial, social and higher-level aspects of using the technology.
3. Keeping in mind that our students are mature students with much work experiences and can therefore appreciate real life applications better than undergraduates.

Increasing the amount of IT in the curriculum can be done only at the expense of non-IT content. There is less time for our students to learn the traditional information-handling skills. What are the core information skills that we must ensure that our students acquire? This is a contentious issue. Some information studies schools have devised separate Master's programmes for library and information services and for information systems/management. The advantage of this approach is that the core information skills can be defined differently for the two areas.

The advantage of having a common Master's programme (as at NTU) is that we foster the perception that information professionals can switch easily between new-age and traditional professions. A disadvantage is that some students who do not intend to be librarians complain that they don't want to learn about encyclopaedias and dictionaries, and the Library of Congress. We also have to expend some effort to explain to applicants the relevance of library science to the new-age information professions.

Finally, who is going to teach all these new courses? One solution is to hire new lecturers with the background and skills to teach the courses. It is, however, a mistake to rely exclusively on this method. We have found it difficult to persuade overseas information studies educators to move to Singapore. The other alternative is for current faculty to acquire the knowledge in these areas to teach the new courses. This is possible only if there is low staff turnover and lecturers stay on in the school long enough to learn the subject and teach it for a few years.

To transfer the new information and IT skills to students, it is also desirable to develop relations with organisations and professionals working in these areas to advise on the curriculum and the skills needed, and to give guest lectures. These organisations can eventually employ our graduates.

Conclusion

We have discussed what we believe are the factors that have influenced the development of the IT aspect of the information studies programme at the Nanyang Technological Univer-

sity. We have also outlined several issues related to IT in information studies education, and provided our perspective on the issues. Different schools have taken different approaches to the problem and it seems to us that there is no single solution appropriate for all information studies schools. Each school has to grapple with the issues, perform its own "soul-searching" and work out solutions that are appropriate to its own circumstances. These circumstances include:

- the university environment and the parent school
- the background and expertise of its faculty members
- the local economy and job market
- whether the school is able to recruit lecturers with the appropriate background and expertise to teach the desired courses
- student demands and expectations.

Furthermore, each school has to define its own vision of the information profession and select a small number of areas to focus on and develop. At the Nanyang Technological University, we have revised the curriculum twice since the inception of the programme in 1993. In 2000, we are embarking on our latest MSc (Information Studies) curriculum, as outlined in Appendix 1 and 2. We have been successful in attracting applicants to the programme. For the 2000 academic year, there were about 420 applicants vying for 90 places – 30 places in the full-time programme, and 60 in the part-time programme. We have selected eight areas of specialisation to focus on – four in the information services area and four in the information systems and information management areas. We are seeking to develop relations with organisations in these eight areas in order to keep abreast of developments in these areas, and also to help our students obtain employment. We are also planning to carry out a survey to find out the extent to which our programme has helped graduates obtain jobs and perform effectively in the "traditional" as well as new-age information professions.

References

Basu, A., & Sarkhel, J.K. (1996). Curriculum development in library and information science: Analysis of UGC report. *Herald of Library Science*, 35(1/2), 78-85.

Mahmood, K. (1997). Information technology education in Pakistani library schools. *Journal of Education for Library and Information Science*, 38(3), 200-210.

Morris, A. (1993). The teaching of IT in departments of information and library studies in the UK. *Journal of Information Science*, 19, 211-224.

Pors, N.O. (1994). The changing labour market of the information professional: Challenges for library school education. *Librarian Career Development*, 2(3), 14-21.

Rowland, F., & Tseng, G.M. (1991). Computer methods in the teaching of library and information studies students. *Education for Information*, 9, 47-54.

Rowley, J.E. (1994). Teaching IT skills to library and information studies students: Some reflections. *Education for Information*, 12, 235-245.

Sengupta, S., & Umarani, A. (1996). "What" and "why" of information technology in LIS education. *Herald of Library Science*, 35(1/2), 73-77.

Sulistyo-Basuki, L. (1999). Information technology and library education in Indonesia: Recent developments in the curriculum. *Education for Information*, 17, 353-361.

Appendix 1. Courses Offered in the MSc (Information Studies) Programme at NTU

Core Courses (Compulsory)

H6501 Information Users and Society
H6502 Information Sources and Searching
H6503 Information Storage and Retrieval

Group A Electives
(2 to be selected)

H6511 Human Computer Interaction
H6512 Information Management
H6513 Information Organisation
H6514 Internet and Web Technologies

Group B Electives
(4 to be selected)

H6521	Academic and Research Libraries
H6522	Archives and Records Management
H6523	Cataloguing and Classification
H6524	Library Services for Children and Young Adults
H6525	Collection Development and Management
H6526	Digital Libraries
H6527	Public Libraries
H6528	School Media Resource Centres
H6529	Business Information Systems, Services and Sources
H6530	Electronic Commerce
H6531	Imaging and Document Management
H6532	Information Mining and Analysis
H6533	Knowledge-Based Organisations
H6534	Knowledge Management
H6535	Computer Programming for Information Professionals
H6536	Data Communication and Networking
H6537	Database Management Systems
H6538	Web-Based Information Systems
H6539	Information Retrieval Systems
H6540	Intelligent Information Systems
H6541	Multimedia Information Systems
H6542	Systems Analysis and Design
H6543	Investigative Methods for Information Studies
H6544	Special Topic 1
H6545	Special Topic 2

Appendix 2. Areas of Specialisation

Specialisations	Elective Courses	
Library and Information Services Concentration		
Public Libraries	Group A:	H6513 Information Organisation
	Group B:	H6525 Collection Development and Management
		H6527 Public Libraries
Academic Libraries	Group A:	H6513 Information Organisation
	Group B:	H6521 Academic and Research Libraries
		H6525 Collection Development and Management
School Libraries and Media Resources	Group A:	H6513 Information Organisation
	Group B:	H6524 Library Services for Children and Young Adults
		H6528 School Media Resource Centres
Corporate Information Services	Group A:	H6513 Information Organisation
	Group B:	H6529 Business Information Systems, Services and Sources
		H6531 Imaging and Document Management
Information Management and Systems Concentration		
Internet and Multimedia-Based Information Systems	Group A:	H6514 Internet and Web Technologies
	Group B:	H6538 Web-Based Information Systems
		H6541 Multimedia Information Systems
Information Systems and Products Development	Group A:	H6511 Human Computer Interaction
	Group B:	H6539 Information Retrieval Systems
		H6542 Systems Analysis and Design
Document and Records Management	Group A:	H6512 Information Management
	Group B:	H6522 Archives and Records Management
		H6531 Imaging and Document Management
Knowledge Management	Group A:	H6512 Information Management
	Group B:	H6533 Knowledge-Based Organisations
		H6534 Knowledge Management

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