curriculum in a way that ensures that the high-level outcome expectations are met. Fundamentally, there are two ways to accomplish this: either, the degree programs are offered in an environment (for example, a business school or a school of public policy) in which general curriculum requirements for the school as a whole ensure that these educational objectives are met or the school specifically designs and implements courses that are intended to develop capabilities in these two areas. Without sufficient coverage related to foundational skills and knowledge and to domain-specific skills and knowledge a curriculum is not compatible with this curriculum recommendation, even if we do not specifically articulate how these requirements should be met.

For example, in a typical business school context, the foundational knowledge and skills would be covered in both general education and business core courses, whereas the business core would be used to develop the domain-specific skills and knowledge.

12. RESOURCES FOR IS DEGREE PROGRAMS

The resources for the IS degree programs have changed substantially since the last curriculum revision. Similar to past curriculum revisions a capable faculty is the first required resource (Firth et al. 2008). In addition to faculty the resources needed for an IS degree program are Internet access, laboratories and library resources. In a rapidly changing technical environment, students should be exposed to a variety of up-to-date hardware and software systems that adequately represent the professional setting in which they will be employed.

Faculty Requirements

Faculty members are vital to the strength of an Information Systems program. Its faculty needs both academic training and practical experience (Looney et al. 2007). There must be enough faculty to provide course offerings that allow the students to complete a degree in a timely manner. The interests and qualifications of the faculty must be sufficient not only to teach the courses but also to plan and modify the courses and curriculum.

Faculty members must remain current in the discipline. Professional development and scholarly activities are a joint obligation of the institution and the individual faculty members. The school should support continuing faculty development. Given the rapidly changing technology, it is particularly critical that faculty members have sufficient time for professional development and scholarly activities. Resources should be provided for faculty to regularly attend conferences, workshops, and seminars, and to participate in academic and professional organizations. The program is enhanced significantly when faculty acquire practical experience in the profession through activities such as consulting, sabbatical leaves, and industry exchange programs. Faculty must also be equipped to develop teaching materials for their students. Faculty must have available technology at least equivalent to and compatible with that available to students so that they may prepare educational materials for use by students. In addition, faculty must be connected to the Internet in order to have access to students and to the larger academic and professional community.

The number of full-time faculty needed by the program is influenced by such factors as the number of students in the program, the number of required courses, the number of service and elective courses offered, and the teaching load of the faculty. A program should have a minimum number of full-time faculty with primary commitment to the Information Systems program in order to meet the teaching and advising needs of the program and to provide depth and breadth of

faculty expertise. Courses must be offered with sufficient frequency for students to complete the program in a timely manner. The professional competence of the faculty should span a range of interests in information systems including computer systems concepts, information systems concepts, data management, telecommunications and networks, systems design and development, systems integration, and information systems management and policy. Additional faculty will be needed to teach the service courses that provide foundation-level knowledge across the campus.

Computing Infrastructure Requirements

Computing infrastructure consists of hardware, software, and technical support. Adequate computing facilities are essential for effective delivery of the IS program though the form in which this infrastructure is allocated has changed significantly. These formerly involved a blend of computer facilities of varying capabilities and complexity. Now with most freshmen entering college with computer resources, access plays a much more significant role (Lee 2009). Therefore, network access should be available for faculty and students to use with their own computers. Students at different levels in the curriculum have different needs. Substantial resources must be provided to support the courses targeted to all students. More sophisticated resources are necessary for Information Systems minors and majors who are developing skills in computing and IS fundamentals. Specialized laboratories or access to specialized simulation software is needed for advanced students where group and individual projects are developed. Contemporary and emerging software development tools should be available to create the most current enterprise solutions.

In addition to software and hardware, it is paramount to the success of the program that adequate technical support be provided. Modern computing infrastructure is highly complex requiring technically trained support staff to maintain the equipment. This is beyond the scope of faculty duties, a waste of precious faculty resources, and often outside their individual expertise.

Laboratory Requirements

Systems require hardware and software for structured, open/public, and specialized laboratories. Students must have an opportunity to use learning materials in both structured and unstructured laboratories.

Hardware and software are rapidly changing and improving. It is critical that faculty and students have access to facilities reflecting an environment that graduates will be expected to use professionally. All computing systems should be kept current. A plan should exist to continuously upgrade and/or replace software and equipment in a timely manner. The rate of change in technology suggests a rapid replacement cycle, with some technologies reaching obsolescence in less than 12 months.

Having said this, simulation software is becoming more prevalent for teaching advanced IS topics. This can include simulations for utilizations of applications to managing the single workstation to complex enterprise-level networks. Many companies including Microsoft, Cisco, and even the textbook companies have developed sophisticated simulation software that does not require the latest equipment.

Students should be provided opportunities to work together on team-oriented projects. The group skills developed in this mode are critical to a successful information systems professional. Technological support, such as groupware, is expected for group and team activities.

All laboratories must have adequate technical support in terms of professional staff to provide for installation and maintenance of the equipment. The staff should be proficient in both the hardware and software applications. Complete documentation must also be available.

Laboratories should be able to support the following types of functions:

1. Structured Laboratories

   A structured laboratory is a closed, scheduled, supervised experience in which students complete specified exercises. An instructor who is qualified to provide necessary support and feedback to the students provides supervision. Exercises are designed to reinforce and complement the lecture material.

2. Open/Public Laboratories

   Student ownership of computers has continued to increase. However, laboratories remain essential for those students who do not own a computer and for providing additional resources not available on personal machines.

3. Specialized Laboratories

   Laboratory facilities are necessary to support team projects and special computing environments. Special facilities may be needed for systems development, network infrastructure, and other advanced technologies.

Classrooms

Suitable classroom facilities, equipped with information technology teaching resources, should be provided. A computing system with multimedia facilities is necessary for demonstrating the development, implementation, and application of information technology as well as conducting walkthroughs and making presentations. Classrooms should have access to the Internet and extranet networks, either with port per seat or wireless networking capabilities.

Library

Library support is an important part of an academic program. It is especially important for disciplines with rapid development of knowledge such as the Information Systems field. Libraries should provide both traditional and digital access wherever possible to journals, proceedings, monographs, and reference books. The holdings should include access to digital journals and proceedings of the computing professional societies.

13. SHARED COURSES WITH OTHER COMPUTING DISCIPLINES

As explained earlier in the report, there is a close relationship between the academic fields of Information Systems and other computing disciplines, and there are also very significant differences. The context for Information Systems is an organization and its systems. In contrast, the context for Computer Science is algorithmic processes for information processing and