

Is Your Information Systems Curriculum Evolving?

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Abstract

This paper will examine current literature findings and reports on technological developments, trends, and predictions for the technology sector. Information Systems publications such as the January 1, 2007 edition of Computerworld have provided extensive information regarding the current status, future trends and employment opportunities in the technology sector. Most educators involved with technology-based programs will readily admit that the technology field is constantly evolving and changing. The author contends that significant technological changes create a need for different competencies and preparation requirements to qualify students as contenders in the entry level employment market. It therefore becomes critical for technology-related educators to monitor organizational developments, assess curricula, and make appropriate program modifications to ensure that our graduates are sufficiently prepared to compete. Educators also need to consider the extent that external factors and national trends such as offshore outsourcing are impacting entry level technology positions in the U.S. As educators, we need to assure ourselves and our students that our programs will provide the appropriate educational preparation that qualifies our students for the opportunities available upon graduation.

In addition to summarizing the issues mentioned above, this presentation will also include an interactive component during which the session attendees will be asked to share their program strengths and goals, speculate on future directions, and consider possible curriculum revisions to meet future needs.

Introduction

Never in our history has technology played such a vital role in organizational success. Expectations for cost reductions, productivity increases, and overall competitive advantage through technology abound in today's organizations. Also, in today's organizations, both technology managers and general managers must be aware of what the other is doing. The technology manager is expected to understand business processes and have in-depth knowledge of technology, whereas the general manager is expected to understand key management issues and relate them to appropriate aspects of technology (Pearlson, P.8). Managers are challenged to provide an infrastructure that efficiently and effectively serves the needs of both internal and external customers of the organization (Kibiloski, pp. 58-59).

Technology is described as a force and byproduct of change, and it is impossible to separate technology from overall business strategy. It is also difficult to manage organizational change, because change is basically unplanned. Organizations are constantly changing, and technology is

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an integral part of many changes. It is imperative that managers be capable of managing the change process. Because people generally resist change, this is not a simple task.

We are faced with similar problems in higher education. Frequently, the situation in higher education involves our willingness to change curricula and thus change the educational program that we provide for our students. Comfort zones are good, and the temporary discomfort that results from change is bad. The end result is an educational program that becomes “out of touch” and frequently “out of date” with the realistic needs of a group of stakeholders known as the employers of our students. Technology educators must overcome this resistance to change, assess the needs of the marketplace and modify curricula to meet the needs of the stakeholders.

The Business Environment – Current and Future

Many organizations are questioning how their technology departments are adding value rather than simply providing service. To add value, technology must play a significant role in business processes (Gibbs, p.46). Return on investment measures are frequently being applied in measuring the overall success and contributions of technology (Gibbs, p.46, Gruman, p.2).

Some desirable characteristics for successful technology departments of the future include flexibility and scalability. An agile work environment that is able to respond to organizational needs on a timely basis is essential. It is also imperative that organizational architecture be adaptable to future expansion and growth. It is anticipated that in the future, the focus of work competency will shift from simply providing services to being an integral part of processes. It is also predicted that the focus of internal staff of the future will be on providing user access and data resources on a network that will exist to connect to outsourced applications and services (Gibbs, p.46).

Another area of intense growth is information security. Worldwide, there are more than 500,000 people employed in information security roles. Expectations are that over two million people will occupy these roles by 2010, a growth rate of nearly eight percent per year (Hadfield, p. 48). The International Information Systems Security Certification Consortium (ISC) 2 certifies information security professionals and is actively engaged in recruiting people to become certified in information security (Hadfield, p.48). Unfortunately, identity theft is a growing problem, and it is anticipated that it will worsen.

A recent Department of Labor Report indicated that some of the fastest growing occupations in the next seven years will be in the areas of network systems and data communications analysts, with an expected growth rate of 55 percent. Computer software engineers are also classified in the high growth areas. Generally speaking, information technology jobs have rebounded, and salaries are increasing with opportunities (Whitaker, p. 3.25-26).

According to a Robert Half survey reported by Whitaker, technology skills in greatest demand included Windows administration, network administration, database management, web development, programmers, network security and project management. It was also reported that there is particularly high demand for service level project managers, experienced software quality assurance specialists and people who have experience with Microsoft's .Net technology (Whitaker).

The encouraging news reported by Katherine Spencer Lee, Executive Director of Robert Half Technology is summarized by the statement: “We’re seeing companies investing in technology to make them better, faster, and stronger” (Whitaker).

Another area that warrants consideration involves predictions for the current year and near term future. For instance, the January 1 issue of Computerworld identified the following as the top five “hot skills” where hiring will take place in 2007 (McAdams, p.29):

1. Programming/Application Development
2. Project Management
3. IT Business Analysis (critical thinking)
4. Security
5. Help Desk/Technical Support

McAdams (p. 30) also summarized the type of work environment that appeals to today’s entry level employees. Preferred is a “decentralized, independent, collaborative and innovative work environment...that values contributions, provides clear expectations and feedback, and above all provides supervisors who mentor and guide.”

Although at this time, we don’t know the actual result of 2007 predictions, it is interesting to read some of the predictions that were published by experienced writers who are considered to be experts in the technology field. Some very specific predictions for technology can be derived from an article by Dave McClure (p.26) writing in the CPA Technology Advisor. McClure’s predictions include the following:

1. Cable mergers will occur
2. Monitor and TV prices will continue to fall
3. PCs will continue to be in demand
4. Spam will get worse
5. CRM will dominate business software
6. Consumer electronics will get easier
7. Privacy will become increasingly important
8. Satellite broadband will provide rural access to the Internet
9. Vista will arrive and gain acceptance
10. Fiber will dominate discussions on broadband

Another consideration that was implied earlier in this paper involves the role of the information systems professional within the organization. Many contend that software delivered over the Internet is becoming much more acceptable, even in larger organizations. This practice was once a consideration only for smaller organizations. The Gartner group predicts that 25% of new business software will be delivered as a service by 2011, a dramatic increase from the five percent delivered in 2005 (Network World, p.15).

Finally, another emerging trend involves the renewed interest on the part of big business to provide IT services for small companies. According to IDC, a market research firm in Framingham, Massachusetts, small businesses make up the majority of U.S. companies, and it is established that only 3.5% of companies with five or fewer employees have a full-time IT staff and 4.2% of companies with fewer than 10 employees have a full-time IT staff (Flandez, p.R8).

Companies like Dell, CM IT Solutions, On Force Inc., and Best Buy's Geek Squad now provide a wide range of IT services for small companies. Of course, many smaller companies dispute the quality of service and personal attention provided by the large organization and claim that smaller organizations provide better personalized service than larger firms and outsourcing organizations (Flandez).

Of course, it is extremely important to know which jobs and therefore which skill sets are in demand in the job market. Familiarity with the Occupational Outlook Handbook is essential for help in making this determination. The Handbook projects, for ten years, the anticipated number of job openings in thousands along with median annual earnings. Technology-related titles such as computer software engineers, systems software, computer and information systems managers and computer system analysts reflect large numbers of openings in the 2004-14 time span. Anticipated median earnings are also reported as being quite high as in the range of 66-92 thousand dollars (Crosby, pp.47-49).

We therefore have some idea of market conditions, but the question that remains unanswered involves the subject matter content of our curricula. Are we delivering the material that will enable our students to qualify for opportunities in a very competitive job market? For example, a recently completed research study (Banerjee, et.al, p.284) identified seven critical entry level skills for systems analysts. The identified skills include the ability to do document analysis, observations, individual interviews, prototyping, group interviews, joint application design and questionnaires or surveys. We should make certain that we are developing these competencies in our systems course.

The Occupational Outlook Handbook is also a valuable resource for identification of qualifications. An excerpt on the position of computer and information systems managers, for instance, states "must possess strong interpersonal communication and leadership skills...They must also possess team skills..." (U.S. Department of Labor, computer and information systems managers). Computer support specialists or systems administrator candidates must "have strong problem-solving, analytical and communication skills..." (U.S. Department of Labor, computer support specialists and system administrators).

Although not all of the above points are relevant to curricula in higher education, we should have a sense of awareness and, where appropriate, we should incorporate relevant information that maintains the currency and relevancy of the courses we deliver. Each of the trends or practices mentioned will require competent faculty to effectively deliver the desired content.

Evolving Curricula

One will readily agree that the technical and managerial aspects of information systems constantly evolving and advancing. Tracking changes in the field and deciding what is relevant to our educational programs is difficult. Furthermore, change is difficult, and it is especially difficult with curriculum issues that must be agreed upon by a team of faculty. Deciding where to make major changes and where minor changes are adequate sometimes creates quite a controversy among colleagues. Of course, philosophical questions also arise. Some educators contend that the development of good critical thinking skills will suffice and produce successful graduates. Others contend that critical thinking must be coupled with the most relevant technical and mana-

gerial skills in order to produce truly successful graduates. Coming from a business school perspective, the quality of entry level employment opportunities for which graduates qualify is an important measure of success in the author's viewpoint. The author therefore advocates constant monitoring of regional employment opportunities and constant identification and inclusion of new entry level skill requirements.

A question that all educators in the IS field must answer is how can we maintain currency and relevance in our program? We want our graduates to be successful. We want our graduates to contend for the best jobs. Our reputation is built largely on this measure of our success. Studies have concluded that undergraduate information systems programs in the U.S. are quite diverse (Kung, et.al., p.295). Each of us must identify those program elements that make our program attractive.

Several recommendations for the maintenance of program currency and relevancy warrant mention. Unfortunately, there is not a single recipe for success. Following are several suggestions:

1. Maintain an agenda of research and reading that helps develop a keen sense of awareness of current trends, practices, and skill sets.
2. Develop contacts with the regional employers who will hire your students. Formation of an advisory board that will work with your program by providing advice on curriculum, internship and placement opportunities is invaluable.
3. Become involved with a professional organization related to your discipline. Consider forming a student chapter of the organization, and arrange for students to attend some of the regular meetings of the organization.
4. Solicit feedback on the overall preparation of your students from internship sponsors. They will likely be able to identify strengths and weaknesses that reflect on current content and practices within our educational programs.
5. Survey or talk with recent graduates. Solicit constructive feedback and recommendations for program enhancement.
6. Monitor research findings and articles in both research and trade journals.
7. Closely monitor changes that are suggested within model curricula.

Another point of relevance that warrants our consideration involves possible program modifications to deal with offshore outsourcing. We must exercise extreme caution that we are not placing excessive emphasis on the development of skills for positions that are being outsourced offshore. An effort to compete on technical skills alone, when it is actually cheaper to train in India can put a program at a disadvantage. Instead, an emphasis on both business and technical skills with the capability to manage outsourcing contracts is desirable. This will encompass interpersonal skills, project management skills, relationship management skills and sourcing skills. The general consensus is that technical skills alone constitute a short-term skill set (Goodwin, p.39).

The final section of this paper will focus on what we as educators might be able to gain from thorough analysis of model curricula. Model curricula that originate with professional societies can be helpful to universities by providing a number of inputs including the following (Gorgone, et.al, p.5):

1. A general common body of knowledge expected of graduates regardless of geographic region
2. A program structure with suggested courses and sequence

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3. Program rationale and resources required
4. Rationale for investment in faculty development to keep pace with changing technology and management practices

For forty years, four organizations have developed computing curriculum guidelines for collegiate level programs. The organizations and their areas of specialization are (Cross, p.5):

1. Association for Computing Machinery (ACM) – founding in 1947; developed computer science model in 1968 and information systems model in 1972.
2. Association for Information Systems (AIS) – founded in 1994 and began curriculum efforts with ACM and AITP in 1997.
3. Association for Information Technology Professional (AITP) – founded in 1951 as the National Machine Accountants Association, became the Data Processing Management Association (DPMA – in 1962 and became AITP in 1996. Focuses on professional computing; provided first IS curriculum in 1985.
4. Computer Society of the Institute for Electrical and Electronic Engineers (IEEE-CS) – merger created IEEE in 1964 and became the Computer Society. Began providing curriculum recommendations from an engineering perspective in 1977.

Today instead of separate curricula from each society, the societies cooperate in creating curriculum standards and thus send a single message to the academic computing community (Cross). The Overview Report that resulted from the collaborative efforts of the above mentioned organizations recommended coursework in five major computing disciplines. Included are Computer Engineering, Computer Science, Information Systems, Information Technology and Software Engineering (Cross, pp.13-15). Depending on the focus of a given program one can gain valuable insights from the work of this collaborative group. The work represents the contributions and thinking of many professionals from the world of computing.

A final consideration with regard to model curricula is a snapshot of the recently released MSIS 2006: Model Curriculum and Guidelines for Graduate Degree Programs in Information Systems (Gorgone, et.al.). The curriculum is a result of a joint effort on the part of professionals from ACM and AIS. Although designed as a graduate program, there is much transferability of ideas to undergraduate programs. Not only are specific courses recommended, but suggested content for each course is also suggested. A very wide range of career tracks including computer forensics, consulting, data management, warehousing and mining, database systems, enterprise resource planning, knowledge management, project management, security, systems analysis and design and telecommunications are addressed (Gorgone, p.26).

It is understood that an institution will emphasize tracks based largely on local industry needs and capabilities for program delivery (Gorgone). The model curriculum accommodates programs with requirements for 30-60 credits (Gorgone, p.27). Speaking in general terms, graduates will acquire the following from adherence to the model curriculum (Gorgone, p.13):

1. A core of IS management and technology knowledge
2. Integration of IS and business foundations
3. Broad business and real world perspective
4. Communication, interpersonal and team skills
5. Analytical and critical thinking skills

6. Specific skills leading to a career.

Conclusion

Maintaining a sense of awareness of developments in the information systems field is an important dimension for a faculty member teaching in the discipline. The field is constantly evolving and changing, and it is our responsibility to provide current knowledge as we prepare our students for the opportunities that await them in their profession.

It is important to develop a strategy for monitoring the changing needs of employer stakeholders. It is more important to decide how to integrate or modify our curricula to incorporate the current desirable skill set preparation. U.S. Department of Labor publications such as the Occupational Outlook Handbook can be a valuable source of information that can impact the content of our curricula.

In addition to soliciting feedback from regional employers, model curricula can be a valuable source of information in reinforcing the need for ongoing curriculum development, change and enhancement. Model curricula originate with professional societies and reflect expectations that extend far beyond regional boundaries. Model curricula can be a source of valuable ideas and provide a rationale for investment in resources and faculty development.

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