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Abstract

The phenomenal growth of e-commerce programs during the past few years was unprecedented in the pace and magnitude. The debate on whether e-commerce should be viewed as a new curricular area has not slowed down curricular innovation. The ability of universities to acquire faculty and technology resources and to continuously offer ever more innovative courses will affect the viability of these programs. Using five programs as examples, this paper examines the challenges these programs may face in the near future and explores solutions to address these challenges. This paper also proposes a research agenda for future development of e-commerce education.

Keywords: E-Commerce, curriculum development, faculty development, pedagogy, and infrastructure

Introduction

The recent phenomenal growth of e-commerce education programs in the United Stated paralleled the explosion of Internet commerce. To meet student and industry demands, many business schools, among others, established e-commerce programs. These programs take various forms, such as special courses, concentrations in existing master degree of business administration (MBA), certificate programs, and separate degree programs. The vast scope and swift pace of this curriculum development is unprecedented in business education and has generated many debates (Tabor, 1999; AACSB, 2000). Critics have questioned whether higher education was simply trying to cash in on the dot-com boom. Many business schools around the country continue to debate about how e-commerce should be integrated into existing MBA programs or be implemented as a separate degree program. Central to this debate is how e-commerce, as a new academic field, should be defined. Some wonder whether e-commerce is a transitional phenomenon and will eventually be merged under the rubrics of commerce in general. Furthermore, even though technology expectedly plays a prominent role in e-commerce programs, the varying degrees of emphasis has yielded e-commerce programs that are either business or technically oriented in order to achieve different learning outcomes.

As the dot-com explosion has resulted in some massive failures and has led to a slowdown of economy, it is time to take a critical look at the current state of e-commerce education and to assess its future development. This paper examines several current models of graduate e-commerce programs and identifies challenges these programs may face in the future. Five examples of recently launched e-commerce curricula are compared in terms of intended career paths for their graduates and curricular thrusts. The paper also identifies five emerging trends and assesses their impacts in terms of the e-business market evolvement and university resources, and proposes a research agenda to help advance e-commerce education.

The Changing E-Commerce Marketplace

The shakeout of dot-coms starting in the third quarter of 2000 has already resulted in the layoffs of thousands of Internet workers. This has given rise to questions about the future of e-commerce and the career prospects of students in e-commerce programs. However, forecasts for Internet commerce are still optimistic on the basis of demand driven by increased access and technology capacity, as well as investments made by companies and government initiatives, particularly in Asia and Europe, over the past

five years (Gantz, 2001). Projections from GartnerGroup and Forrester Research all show strong vital signs for e-commerce growth.

- According to the Gartner Group's forecast, business-to-business (B2B) e-commerce will reach $7.29 trillion worldwide in 2004, or 7 percent of the forecast of the total global economy of $105 trillion. E-market makers, the key catalysts in this transformation, will capture 37 percent of these transactions (Knight, 2000).
- Forrester Research has projected that worldwide e-commerce, both B2B and business-to-consumer (B2C) e-commerce, will amount to $6.8 trillion in 2004, while B2B online trade will grow to $6.3 trillion and B2C to $454.4 billion (Sanders, 2000).

These projections signal several new developments in the e-commerce market:

- Job opportunities will shift from the dot-com sector to Internet-related jobs in brick-and-mortar companies.
- There will be an increasing demand to integrate front-end e-commerce sites with back-end enterprise systems to leverage existing technology investments.
- Companies will shift their resources to strengthen relationships with trading partners and customers through supply chain management, customer relationship management, and enterprise integration.
- New pressures are mounting on enterprises, upon joining e-marketplaces, to reduce costs and improve competitiveness through e-procurement and other Internet-based opportunities for collaboration.
- Growth in access and the focus on the e-marketplace will increase the globalization of e-commerce implementation.

The Academic Landscape

Universities have responded to the market demand in different ways. Some universities have started master degree programs in e-commerce and others began offering MBA concentrations in e-commerce. Five programs are selected to illustrate different approaches.

Each program is profiled along two dimensions -- the career paths intended for its graduates and the curricular thrusts. Career orientation is broadly classified as either *specialist* or *generalist*. In the e-commerce context, specialists may fill the role of e-business accountants, or developers of online exchange systems. Generalists, on the other hand, may be planners or managers who have broad responsibilities in e-business organizations. Curricular thrust concerns how a curriculum balances technology and business strategy as well as integrates various disciplines: a) business strategies override technology; b) business and technology receive equal emphasis; and c) technology dominates the curriculum. The integration of business strategies and technology may be achieved within a course and class, or at the program level. The first approach achieves a higher degree of integrated learning and the second approach expects students to integrate business and technical knowledge from different courses in a curriculum. *Intentional* integration at the course level is more difficult to accomplish because it requires a greater faculty effort in curriculum design (Wheeler, 2000). Integration at the curriculum level may also be viewed in terms of cross-disciplinary collaboration within a single college, business school, or among several schools.

Bentley College: MBA Concentration in E-Business

Student Career Orientation: Specialist
- Target Career Path: E-business specialization in accounting, information systems, marketing or finance
- Student Learning Goals: Management of technology driven workplace in e-business context

Curricular Thrust: Business Oriented
- Business-Technology Balance: 12-course concentration for three career paths -- accounting, strategy, and information systems focus. E-business computer information systems focus has strong technology focus, but other focuses are mostly business oriented.
- Level of Integration: Program level, in the concentration
- Cross-disciplinary Integration: MBA curriculum
- Unique Features: Information-age MBA, concentration provides flexibility.
- Source: http://www.bentley.edu/graduate/acprog/ftmba.html

Carnegie Mellon University: Master of Science in Electronic Commerce Programs (MSEC)

Student Career Orientation: Generalists and Specialist
- Target Career Path: Managers, planners, analysts, and programmers
- Student Learning Goals: Appraise costs and benefits of e-commerce strategies; construct B2C and B2B e-commerce systems; appraise tools and technologies; contract services; and provide financial accounting infrastructure for e-commerce.

Curricular Thrust: Equal Emphasis on Business and Technology
- Business-Technology Balance: Even distribution of required business and technology courses (9 in each category), 5 electives, and a two-term practicum to build a prototype e-commerce system
- Level of Integration: Program level and in the practicum
- Cross-disciplinary Integration: Program is staffed by business and computer science faculty.
- Unique Features: Co-sponsorship by two colleges.
  Source: http://www.ecom.cmu.edu/program/curriculum.shtml

DePaul University, School of Computer Science, Telecommunication and Information Systems (CTI): Master of Science in E-Commerce Technology (MS/ECT)

Student Career Orientation: Specialist
- Target Career Path: E-commerce application developers, project managers and consultants
- Student Learning Goals: Integrate business strategies and technology to support evolving e-business models; develop Internet solutions using technologies and tools in a collaborative development environment.

Curricular Orientation: Equal Emphasis on Business and Technology
- Business-Technology Balance: 7 courses integrating business strategies, process, and technology; 2 technology courses; 4 electives from e-commerce and technical fields
- Level of integration: Course level and program level. All e-commerce courses are integrated courses.
- Cross-disciplinary Integration: Integration of business strategies, marketing, and operation management with computer science, information systems, human computer interaction, and telecommunications.
- Unique Features: Pioneering course design, technical depth, and multiple practicums. Courses also support e-business programs in DePaul's school of commerce.
  Source: http://www.cs.depaul.edu/programs/2002/gradeECT2002.asp

Georgia State University: Global E-Commerce Masters (GEM)

Student Career Orientation: Generalist
- Target Career Path: Managers, policy makers and intra /entrepreneurs
- Student Learning Goals: Strategize, plan, and deploy e-commerce

Curricular Thrust: Business Oriented
- Business-Technology Balance: 7 e-business courses; 3 technology courses; 2 policy and law course; 3 business electives; international seminar/project
- Level of integration: Program level, separate courses, integration by students and in the seminar
- Cross-disciplinary Integration: All business disciplines plus law and public policy
- Unique Features: A member of an international consortium, virtual courses, virtual team exercises, international seminars
  Source: http://www.eci.gsu.edu/gem/emba.thm

University of Maryland: MBA Concentration in Electronic Commerce

Student Career Orientation: Specialist
- Target Career Path: Systems analyst, e-business consultant, and customer relationship managers
- Student Learning Goals: Understand e-business models and opportunities

Curricular Thrust: Business Oriented
• Business-Technology Balance: 7-course concentration includes two technical courses.
• Level of integration: Program level, in the concentration
• Cross-disciplinary Integration: Traditional MBA curriculum
• Unique Features: Flexibility to customize concentration as elective.
Source: http://www.rhsmith.umd.edu/mbams/electives.htm

Several patterns are discernible in these curriculum models:

(1) Separate master degree programs seem to offer more opportunities for technical training. Among the five programs reviewed above, DePaul's e-commerce technology program offers the greatest technical depth, followed by CMU's program. Both programs attracted active participation of computer science faculty. Other programs are business oriented, providing only the foundation of e-commerce technology.

(2) E-commerce concentrations tend to build on MBA core courses. These programs are constrained in their ability to integrate technology into existing programs. To preserve flexibility, these programs allow students to customize their course work in the concentration to create a niche in their career path.

(3) Only DePaul's program has integrated business strategies and technology at the course level. Other programs may have re-designed business courses with an Internet orientation, but the integration is mostly achieved at the program level with capstone courses or seminars.

(4) B2C e-commerce has received greater emphasis in MBA concentrations in terms of marketing and B2C Web development. The emphasis on back-end technology integration is only observed in the DePaul program.

(5) Only Georgia State's new GEM program has a clear orientation of international issues.

(6) Programs offered by business schools, as expected, support career paths as e-business planners or consultants for e-business strategies. Even specialist roles are defined within the traditional boundaries of accounting, finance, marketing, or strategy. Programs that emphasize both business and technology tend to have less structured career paths in keeping with the rapid evolvement of technology job markets.

Challenges for E-commerce Education

Five major trends have emerged from market changes and the experience of early implementations: new market dynamics, faculty resources, new pedagogies, continuous curriculum innovation, and technology infrastructure.

New Market Dynamics

The shift in the marketplace presents new pressures on the academy. The move from the B2C to B2B and e-marketplace motivated universities to place a greater emphasis on global logistics, supply chain management, customer relationship management, and system integration. These new directions are closely linked with technology strategies.

In response, academic programs need to shift from a marketing focus on front-end web development towards the process and deployment of new strategies which involve large scale, complex enterprise application integration (EAI), data mining, XML, and message-based collaboration technology. New skills in demand in the next few years will include: e-business analysis, QA testers, e-business technology architecture, EAI-legacy integration, component development, systems administration, and developers in Java Server Pages (JSP), XML, Java, and Active Server Pages (ASP) (Driver and Faltau-Reynoso, 2000; Goff, 2000). As organizations go through significant transformation, students of e-commerce should be prepared to support rapid and technology-driven change management.

Students with a limited technical foundation in Web development, networking, and Internet technology will find it difficult to approach advanced technology. Celsi and Wolfinbarger (2000) have challenged business schools to step out of the traditional model of relegating technology to a supporting role in business strategies. E-commerce and the Internet have accelerated the convergence between technology and functional areas. As a result, disciplinary boundaries are blurred and career pathways are not as clearly defined as they once were. But Celsi and Wolfinbarger felt that the "course work requirements and academic

programs tend to adjust to this reality slowly." This is not easy for business schools to tackle, because there are implications for faculty resources and curriculum design.

Faculty Resources

Faculty resources and readiness are the thorniest constraints of e-commerce education. As suggested by the statistics of the AMCIS placement and salary survey posted on ISWORLD Web site in recent years, the bidding war for e-commerce faculty will intensify, as the pool of e-commerce faculty candidates remains small over the next few years. The high salary costs will make e-commerce programs especially expensive to maintain (AACSB, 2000). Therefore current faculty development will become an attractive alternative.

Because of the fast pace of technology advancement in e-commerce, the business faculty as well as the IS faculty need to update their technical skills. Even technically oriented faculty need to understand the changing e-business models in order to put technology topics in a proper context. DePaul's experience has shown that computer science faculty could bring tremendous technical skills to e-commerce courses but were generally not accustomed to working with business application problems, nor were they familiar with the more collaborative, team-oriented atmosphere in IS classes (Chan and Knight, 2000).

Faculty willingness to learn changing business models and technologies is essential for successful retooling. They will have to spend additional time developing instructional materials and learning new software continuously because of the nature of e-commerce. Rewards are necessary to sustain their commitment.

New Pedagogies

There is extensive experimentation in studying and teaching e-commerce. Web technology and tools are widely available and basic Web development is easy to learn. Recent dot-com failures have not dampened student interest in e-commerce degrees. Students continue to demand new and more sophisticated skills (Dash, 2000). The use of case study method in MBA programs is called into question because the long process of developing a case study may reduce the timely usefulness of the case (Harris, 2000). Some schools, including Carnegie Mellon and DePaul, now emphasize hands-on Web development and practicums for building prototype e-commerce systems. Other innovative approaches include the DePaul's use of a collaborative team learning approach to bring two e-commerce classes together in learning user-centered design for B2C Web site engineering (Chan and Wolfe, 2000). Students from one class served as usability consultants for groups of e-commerce application developers in another class. This innovative approach enabled students to learn about the fast-paced collaborative team process typical in an e-commerce environment.

The Internet has become the means for team-based learning and the source of instructional content. A greater use of the Internet to facilitate learning, such as virtual teams and virtual seminars designed by Georgia State's GEM program, holds promise to change the process of teaching and learning. Distance learning technology can offer new models of collaborative learning. It is challenging to find instructors who can blend business strategies and technology in advanced e-commerce courses. Team teaching may be a practical option, but this approach has rarely been supported by the administration. Practicums that involve systems development are difficult to implement. Therefore, partnerships and sponsorships with the industry are worth exploring.

Continuous Curricular Innovation

Rapid market changes demand continuous innovation in e-commerce initiatives. As Wheeler (2000) advocated, an *evergreen* approach to e-commerce curricular evolution should emphasize on-going changes to the topics, courses, and requirements for an e-business major. Creation of new courses, dropping of old ones, and rearranging topics among courses are essential for adaptation. This requires a culture for creativity, openness and agility in program renewal. Review and revision may occur as often as twice a year to stay proactive. A change in tools and topics may trigger realignment in course structure, student advising, and program marketing.

Technically oriented faculty members are more inclined to embrace change as part of the academic discipline. It is more challenging to introduce fast changes in the core business programs. Several schools, such as Penn State, Bentley College, and University of Maryland, created a course portfolio or specialty to address the latest development. Creating fluid majors by removing disciplinary boundaries would overcome the present business school structure, which "impairs cross-disciplinary creativity and stifles the flow of knowledge information because of disciplinary separation" (Celsi and Wolfinbargar, 2000). The

three master degree programs reviewed earlier were the result of cross-disciplinary collaboration. The Association of Computing Machinery (ACM) has voiced similar concerns encouraging computer science faculty to cross boundaries of academic disciplines into a broader, collaborative environment of applied information technology to advance the field (Denning, 2001). For small colleges and schools with limited technology resources, collaboration with computer science and similar technology programs is the only feasible option. Consortiums among schools and with industries within the U.S., and at the international level, may also offer new opportunities.

Several emerging developments have not been adequately addressed in the curriculum. System integration and mobile commerce are two examples. System integration should build on curriculum and infrastructure for enterprise resource planning (ERP) systems. New courses in CRM technology, data mining, data warehousing, and e-marketplace complement this curriculum focus. Mobile commerce will require coursework in data communication, wireless technology, mobile Internet, wireless application development, and usability to form a coherent new curricular focus. These initiatives will require realigning existing curricula.

Technology Infrastructure

Effective e-commerce programs demand a major investment in technology infrastructure and support services. Academic computing service at the university level seldom provides both types of support. This is a critical concern for programs with a greater emphasis in technology. The market shift towards more complex technology solutions increases the need for greater technical support. Technical strategies should go beyond lab support and Internet accesses. Course servers that support server-side programming and database connection constitute the basic support. More complicated software packages for data mining, CRM, message queuing, and EAI require different server configuration and services.

A competent technical staff is essential for providing reliable services. This staff is responsible for account management, server performance, labs, and software installation and testing, as well as application support. The support staff, similar to students and faculty in the e-commerce program, also has to learn the new technology in order to help their "users" to speed up their learning. The support operation has evolved from the role of traditional academic support to Internet Service Provider (ISP) and Application Service Provider (ASP). In the ISP role, they manage access and ensure 24-hour service. In the ASP role, they are literally running hundreds of online stores and B2B applications. The complexity of database connections and software integration requires them to create their own technical framework in order to support several hundreds of applications accessing databases and conducting transactions at the same time.

An infrastructure plan is a necessary part of implementation strategies for large and growing e-commerce programs. As the cost of technology investment can be prohibitive, only large programs can afford these strategies. Collaboration with industry and ASP vendors may provide useful solutions. Inter-college collaboration is another viable option.

Research Agenda

This paper has illustrated several approaches to e-commerce education, whose further improvement calls for a systematic examination of curricular issues. The challenges and implications discussed in this paper provide a basis for a research agenda to answer the following questions:

Market Impacts

How do market changes reshape e-commerce curriculum? What do industries expect from higher education concerning e-business education? How to define "fluid" majors in response to market changes? What competitive educational models are emerging in the industry?

Faculty Development

How do different schools train and retool faculty to support e-commerce programs? What are best practices? What are incentives for faculty participation in retooling? What collaborative models should be explored to form team learning and continuous faculty renewal? Which faculty characteristics affect their participation in faculty development initiatives? Which topical areas are more productive for faculty retooling?

Pedagogies

What types of pedagogies are transferable to other schools? How can Internet be used for learning about and teaching of e-commerce? What are critical success factors for facilitating virtual teamwork in e-commerce?

Curricular Innovation

What are the critical success factors for curricular innovation? To what extent can a theoretical framework of organizational change be applied to the study of curriculum renewal? What are models for collaboration -- cross disciplines, cross institutions, consortium? Can we use the disruptive technological change framework (Christensen, 1997) to examine how the spin off and merger of separate degrees?

Infrastructure

What are models for technology collaboration? How do small colleges and large programs address infrastructure issues?

Researchers from different universities and industries should collaborate in studying best practices and solutions to address the challenges facing the future of e-commerce education.

References

AACSB. "Hurr-E Up: B-Schools Striving to Get e-Business Courses and Resources Up to Speed," *AACSB Newsline*, Winter 2000.

Celsi, R., and Wolfinbarger, M. "The Evolving IT -- Marketing Strategy Relationship: Will Business Schools Meet the Need?" *Proceedings of the Sixth Americas Conference on Information Systems*, 2000, pp. 1823-1825.

Chan, S., and Knight, L.V., "Implementation strategies for a Graduate e-Commerce Curriculum*," Proceedings of the Sixth Americas Conference on Information Systems,* 2000, pp. 1826-1831, 2000.

Chan, S. and Wolfe, R. "User-Centered Design and Web Site Engineering: An Innovative Teaching Approach," *Journal of Informatics Education and Research*, (2:2), 2000, pp. 77-87.

Christensen, C. *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail.* Boston, Massachusetts: Harvard Business School Press, 1997.

Dash, J., "MBA Programs Expand E-Commerce Course Offerings," *Computerworld*, August 7, 2000

Denning, P. "Who Are We?" *Communications of the ACM*, (44:2), 2001, pp. 15-18.

Driver, M., and Flatau-Reynoso, R. "E-Business AD: Which Skills Are Needed Now?" GartnerGroup Research Note, 26 September 2000.

Gantz, J. "Despite Crash, E-Commerce Will Still Flourish," *Computerworld*, January 8, 2001, p. 31.

Harris, M. "Great Expectations for B-School E-Commerce Curriculum," *GarterGroup Research Note*, 6 June 2000. Strategic Planning, SPA-11-2631.

Knight, L., "Triggering the B2B Electronic Commerce Explosion," *Dataquest Perspective*, GartnerGroup, February 28, 2000.

Knight, L.V., Chan, S., Kellen, V. and Epp, H. "Internet Commerce in the Information Systems Curriculum," *Proceedings of the Sixth Americas Conference on Information Systems*, 2000, pp. 201-203.

Malone, B. "Taking e-commerce to a higher degree," *E-Commerce World Magazine*, December 2000.

Sanders, M. "Global eCommerce Approaches Hypergrowth," *Forrester Research*, April 18, 2000.

Tabor, M. "Latest Hit on Campus: Crescendo in E-Major," *New York Times*, September 22, 1999.

Wheeler, B. "Three Design Principles for e-Commerce Curricular Initiatives," *Proceedings of the Sixth Americas Conference on Information Systems*, 2000, pp. 1802-1804.