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DESIGNING INFORMATION SYSTEMS DOCTORAL PROGRAMS: ISSUES AND CHALLENGES

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ABSTRACT

Doctoral programs aim at preparing students for stewardship in their discipline with particular emphasis on training for research. While doctoral programs have been conventionally offered by research institutions, market demands, changing needs, and other factors are driving traditionally teaching institutions to explore opportunities for implementing information systems (IS) doctoral programs.

In this paper we present some of the issues and challenges involved in designing and implementing IS doctoral programs. The emphasis is on traditionally teaching institutions. The paper concludes with a set of recommendations and directions for future research on doctoral programs in information systems.

Keywords: Information Systems Doctorates, Doctoral Programs, Higher Education

INTRODUCTION

Doctoral education in the United Stated has developed over the century and currently encompasses a wide variety of academic programs. The underlying assumption about the purpose and process of most doctoral programs is that a doctoral degree is a research degree aimed at preparing future scholars to conduct sound and rigorous research. ApprenticeshipS where students work closely with faculty as their supervisors and mentors is the norm [1].

The field of information systems, while in its fourth decade, is no exception. Accordingly, IS research in general, and IS doctoral programs in particular, have been the domain of research institutions, e.g., the Carnegie classification of Intensive and Extensive doctoral institutions. Such institutions are characterized by established research traditions, availability of resources, variety of doctoral programs' offerings, links to the industry, and in many instances, name recognition.

Nevertheless, as we enter the 21st century, changing market conditions, changing needs, and other factors are driving traditionally teaching institutions to explore opportunities for implementing information systems (IS) doctoral programs. Specific drivers include the following:

- Imbalances in the IS job market [2] and the need for IS scholars to educate the next generation IS professionals.
- A growing need among non-traditional/part-time doctoral students for doctoral degrees in their quest for career advancement. Such students do not necessarily attract traditionally research oriented schools.
- Advancement in distance delivery and the new possibilities for capturing traditional/part-time students [3].
- A desire by universities to play a more active role in the economic development of their region by engaging in high quality research.
- The opportunity to attract research grants by establishing a research culture and infrastructure.
- The synergetic relationship between teaching quality and research involvement of faculty.

In this paper we present a framework outlining some of the issues and challenges involved in designing and implementing IS doctoral programs. The emphasis is on traditionally teaching institutions. Specifically, in this paper we present issues pertaining to the development of IS doctoral programs—including the motivation (rational) for a program, the courses, the facilities, the delivery methods, the faculty, and the students—emphasize the role of the program in the economic development, and discuss the challenges in establishing and sustaining a doctoral program in IS. The paper concludes with a set of recommendations and directions for future research on doctoral programs in information systems.

LITERATURE REVIEW

Research on doctoral education has received wide attention at the national and international levels. Examples of efforts at the national levels include Re-envisioning the Ph.D. project [4], the Carnegie initiative on the doctorate [5], and the National Research Council Study on research-doctorate programs in the United States (US) [6]. Additional

resources are provided by the Re-envisioning the Ph.D. web site [7].

At the international level, the European Union is undergoing a considerable change in higher education in Europe initiated by the Bologna declaration on European space for higher education, signed in 1999. The initiative is expected to affect doctoral education in various ways, most notable, establishing a 'quality culture.' There is also the aim of building a European Research Area which will affect how students approach their training [8]. With regard to quality, in doctoral education, the Stockholm School of Economic presented a framework for quality assurance to the European Doctoral Programmes Association in Management and Business Administration. Other efforts include the European Network for Quality Assurance in Higher Education (ENQA) [9].

Nevertheless, research pertaining to doctoral programs in IS is relatively limited. While many studies have research focused on specifics about the nature of IS research, methodologies, ranking of journals, and ranking of faculty and programs, very few have focused on doctoral programs and students.

Most notable is Larsen and Neely's study [10] profiling management information systems (MIS) students. This study examined the qualities being sought by institutions focusing on research, teaching, or both. Implications of the results for students include the importance of deciding on the type of institution he or she would like to be hired by (early in their program) and focusing on those factors that are important for these schools. Another implication highlights the importance of 'personality' in recruitment decisions.

In another study [2], Freeman et al. investigated the supply and demand for IS doctorates. This study reported on a large and growing deficiency in meeting current and future demands. Based on the findings, the study provided recommendations for faculty, administrators, students, and universities. The most notable recommendation for universities was that "Topped out IS programs will lead to a motivation by universities to create new non-business 'information' and information technology-related courses and degree programs (e.g., Informatics)."

THE FRAMEWORK

Figure 1 presents a framework for designing, implementing, and evaluating doctoral programs in IS. The following subsections describe the various components of the proposed framework with particular emphasis on issues and challenges pertaining to teaching institutions.

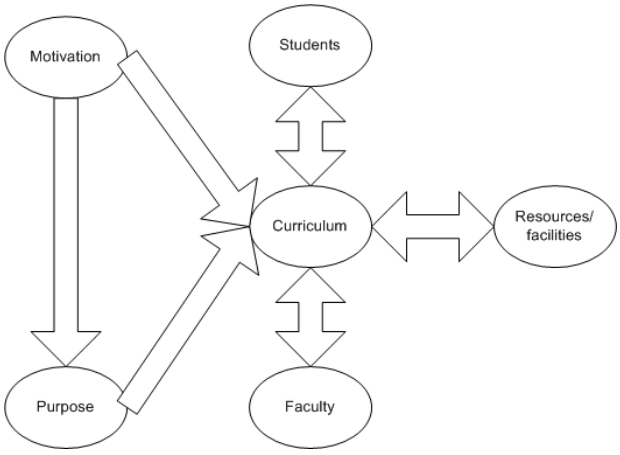

Figure 1. A Framework for Designing and Implementing IS Doctoral Programs

Motivation

A doctoral program has to fill a perceived need. Examples of needs include meeting market demand, improving the research infrastructure, and contributing to economic development in the regions.

Purpose

The purpose of a doctoral program is to prepare students for stewardship in their discipline [5]. At the core is enabling students to conduct high quality research and contribute to the knowledge base of the discipline. An underlying assumption is that doctoral students will pursue academic careers after completing their degrees. However, an academic career involves other activities besides research. At the forefront is teaching and advising students. Unfortunately, it is questionable whether the process actually trains the doctoral students to teach [11]. In response, research institutions are moving towards further emphasis on teaching as a necessary skill for future careers.

Furthermore, a career in academia can differ in terms of its requirements of doctoral students and the preparation required. For example, Larsen and Neely [10] indicated that MIS doctoral students seeking careers in primarily teaching institutions needed to spend more time honing and complementing their teaching skills compared to students seeking positions in research institutions.

It is noteworthy that academia is not the only option available to doctoral students. In fact, in a survey of doctoral students (in Art History, Philosophy, English, History, Sociology, Psychology, Ecology, and Molecular Biology) indicated that expectations for academic careers represent 47.9% of students [1]. Such a percentage is expected to be even higher in more applied fields such as computer science and information systems.

In effect, institutions need to define the purpose of their doctoral programs beyond research. In other words, while preparation for research is at the core of any doctoral program, institutions need to consider preparing students for teaching, business and industry, and government. This is particularly true for teaching institutions motivated by preparing doctoral students for careers in teaching institutions and thereby capitalizing on the 'teaching' culture of the institution. Other motivations such as addressing economic development issues (preparing regional labor force) also draw heavily on the purpose of the program.

Curriculum

Contrary to the IS 2002 and the Master of Science in Information Systems (MSIS) 2006 model curricula for the undergraduate and master programs, respectively, there is no one curriculum model for doctoral education in IS. Instead, different institutions devise their programs in accordance with their mission and philosophies. An examination of existing programs listed on the Association for Information Systems (AIS) ISWORLD web site reveals a wide range of programs ranging from technical emphasis (computer science, and operations research) to managerial and organizational emphasis. It is also clear that IS reference disciplines (computer science, operations research, management, and economics, to name a few) of the senior faculty in established programs play an important role in the orientation and research emphasis of the programs. Accordingly, the research methodologies employed vary, including quantitative, qualitative, and design science research.

Nevertheless, the curriculum must be internally coherent, must provide education in the core IS areas (as described in the core MSIS curriculum) and current research in these areas, must have education for knowledge development and dissemination (research), and must contribute to the mission of its school and its university.

Given the breadth and depth of the IS field, course work is expected to require two years of full time study or the equivalent before concentrated work on the dissertation begins. The curriculum content should include (at a minimum):

- Core IS courses (following the MSIS core courses, though emphasizing the theory and knowledge relevant to these areas.
- Philosophy of science, including a concentration of research methodology courses.
- A number of electives in the form of seminars, special studies, or regular courses offering opportunities for students to concentrate on certain research areas and to present, master, and identify research directions in such areas of interest.
- A dissertation, which is a student-generated work and establishes the student's ability of conduct independent research and scholarship addressing a professionally relevant and theoretically grounded problem, question, or hypothesis.

In effect, the curriculum should provide a student with both core content areas and content relevant to the individual area of expertise being developed. It should also allow a student to communicate and express ideas clearly orally and in writing. Other considerations include providing necessary multi-disciplinary exposure [12].

Moreover, all entering students must be able to demonstrate essential knowledge in both business fundamentals and information systems. Essential knowledge includes the following: knowledge of economics and finance, knowledge of the different types of information systems (IS), the application of IT in organizations, knowledge of management concepts as they relate to the management of information systems, and knowledge of computer hardware, software, communications, and knowledge of programming.

While an undergraduate degree in information systems, computer science, and/or business administration is not a requirement for admission to a doctoral program in IS, meeting the knowledge requirements is. Knowledge requirements can be met in a variety of ways, including an undergraduate degree in IS; specific undergraduate or graduate course work that covers required knowledge; and appropriate, verifiable IS/IT or management experience. Students using experience to meet the basic knowledge requirements may be required to demonstrate competency in the subject. Students with

an MSIS degree can waive a large number of course work credits, normally up to 30 credit hours.

Offering such curriculum in traditionally teaching institutions is challenging. Examples of such challenges include the ability to offer a large number of courses in the program, provide a research culture, and offer advanced research methods courses, including data analysis and statistics. Table 1 summarizes some of these challenges and offers suggestions for addressing these challenges.

Table 1. Suggestions for Addressing Curriculum Challenges in Traditionally Teaching Institutions

Challenges	Suggestions
Number of courses	▪ Capitalize on MSIS courses ▪ Enroll students in cohorts ▪ Focus on one or two areas of specialization
Research culture	▪ Encourage and organize regular research seminars ▪ Increase seed money (funding) for faculty to initiate research projects ▪ Increase support for conference attendance and presentation ▪ Emphasize research productivity in tenure and promotion guidelines
Specialized research methodology courses	▪ Sponsor faculty to develop the necessary expertise ▪ Partner with other research institutions to provide such courses

Ideally, as the program grows, it will be able to address such challenges through increased enrollments, an established research culture, a larger faculty pool, and a greater breadth and depth of faculty expertise, i.e., as would be normally encountered in a research institution.

Faculty

Faculty is the Achilles heel for any program, and particularly so for doctoral programs. Faculty members in doctoral programs are responsible for teaching courses, advising and mentoring students on an individual basis, supervising research projects and dissertations, and participating in doctoral examinations.

Accordingly, faculty have to have appropriate qualifications and expertise as evidenced by an established record of scholarship and a commitment to continued research productivity, including publication, involvement in research projects, and participation in peer reviewed activities. Moreover, faculty need to have a commitment to continued teaching effectiveness, to their students, and to doctoral education.

The aforementioned requirements are certainly challenging for teaching institution where a 'research culture' may not be present. Accordingly, significant effort is required to establish such a culture as indicated in the 'Curriculum' section. Moreover, institutions need to encourage and support doctoral faculty in their research, teaching, and advisement work with doctoral students. Examples of such support include workload credits and recognition in tenure and promotion guidelines.

Students

Students came from varied backgrounds. Some were currently working in the IS/IT field, while others were attempting to change careers and move into academia. Nevertheless, the quality of students admitted to a doctoral program affects the educational quality of the program [10]. Examples of attributes for doctoral students include the following:

- Adequate academic preparation and a strong record of academic achievement.
- Career plans and objectives for professional development that provides a clear motivation and desire to excel and complete the program in a timely manner.
- Proficient language skills for non-native English speakers

Moreover, Larsen [10] emphasizes the importance of personality of students for securing jobs after completing their doctoral programs. Accordingly, interviewing candidates is recommended as a means to evaluate a candidate's personality.

Resource and Facilities

The facilities supporting IS doctoral program course work and research include networking labs, computing labs, and software licenses. Software includes statistical software, software development environment, e.g., Microsoft .NET studio, ASP.NET, and Apache server for web development, Computer-aided Software Engineering (CASE) tools, group decision support systems (GDSS), decision support

systems and technologies, e.g., TeraData, and Enterprise Resource Planning (ERP).

With the exception of statistical software and GDSS tools and laboratories, much of the aforementioned facilities are already available in teaching institutions with undergraduate and masters level programs in IS.

Delivery Method

A fundamental assumption underlying doctoral education is the concept of apprenticeship in which students work closely with their faculty advisors to learn how to conduct research and increasingly become independent scholars. Implicitly, physical meeting in or out of class is the delivery method.

Nevertheless, recent advancements in information technology are enabling other forms of delivery methods as can be seen from the proliferation of distance programs. Doctoral programs are no exception. Peter Carr [3] from Athabasca University in Canada (home of the first online MBA) advocates that high quality, collaborative applied research is possible online, and accordingly, a good quality doctoral program is possible online. While Crowston [13] questions some of Carr's arguments about purely distance program and emphasize the importance of face-to-face interaction for particular kinds of collaborative tasks, online doctoral programs are being developed. Examples include Capella University, University of Phoenix Online, and Nova Southeastern University.

While the debate about online versus face-to-face doctoral programs is expected to continue, distance education offers teaching institutions (with a distance education infrastructure) an opportunity to capture mid-career professionals unable or unwilling to give up lives and careers to move to a traditional resident program for two or more years.

CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

Establishing a doctoral program in IS is particularly challenging for teaching intensive institutions where a research culture and infrastructure may not exist. However, with vision, planning, and management, it is feasible to establish high quality doctoral programs that meet the needs of its students while strengthening the mission of the institution.

Directions for future research pertain to doctoral programs in IS in general and include the following:

- How effective are IS doctoral programs in preparing students for the wide range of careers they pursue?
- What is the market for new IS Ph.D.s?
- What are the expectations for prospective doctorate students?
- What is the efficacy of 'online' versus 'face-to-face' delivery of doctoral programs in IS?

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